The Gist of Emergency Medicine©

-The Management of Real or Simulated Patient Encounters-

- Third Edition -

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Michael O. Hebb

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-The Management of Real or Simulated Patient Encounters-

- A Review Book -

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Preface and Acknowledgments

Hello there! This publication originated as a one page outline in January 1987, when I began to prepare for the American Board of Emergency Medicine's simulated patient oral examinations, and it grew from there. I finished it in its present form in April 1990, and I have made many hundreds of additions and modifications since (the book* has become my "hobby"). I still have vivid recollections of the somber, stressful atmosphere of the examination waiting room, and some candidates shaking their heads and muttering to themselves. But once you got beyond that, it was fun (in a "sick" sort of way), like other competitions.

The simulated patient oral examination experience, has made me more appreciative of the value of the observation component of real patient encounters. Also, the adventure highlighted the indispensability of other health care professionals and support staff (that you tend to take for granted).

This manual was written for oral board candidates, practicing physicians, residents, interns and medical students. It is meant to compliment standard texts and oral board courses ("practice makes perfect"). Also, it is designed to refresh and reinforce the "trouble-shooting neuronal synapses" (prn) of the emergency room physician, and as a brief reference in the ER (I find it particularly useful for "warming up," just prior to returning to work following a vacation). I have attempted with this 1998 edition to at least "touch on everything," and have purposely double spaced the text throughout, so that you can make your own strategically placed notes (pencil recommended). I have also tried to editorialize some "life" into the book, by drawing on my own experiences with patient encounters. However, in order to forewarn the readership, I should inform you that reading this book is much like working a shift in the ER, at times it's easy, and sometimes it is hard work! (but still reader friendly I hope). Readers are advised to frequently pause, visualize, and reflect, while proceeding through the text.

I would like to thank my wife, Diane, for putting up with my preoccupation with emergency medicine (and Daytona Beach), and my twenty-two year-old son, publisher, and second year medical student, Adam, for his perseverance. In addition, thanks to my other "post-graduate neuroscience kids," Andrea, Jonathan (now a first year medical student), and Matthew for their encouragement and assistance. Also, I would like to thank my four year old granddaughter, Adrienne, who, on more than one occasion during the past two years, has reminded me of the importance of listening: "You're not listening to my words, Grampie." As well, this publication would not have been

* I passed the ABEM orals using this book (in 1992, when the book was only 74 pages long!).

possible without the input from the countless patients, family members, and significant others, that I have encountered during my “graveyard shifts” at the Dartmouth General Hospital’s emergency department over the past sixteen years.

Last, but not least, I would like to thank the nursing staff at the DGH/ER for their input, their expertise, and for tolerating my idiosyncrasies.

Finally, I hope you find that reading this book is the closest thing to the everyday practice of emergency medicine that you can do, at home, in the comfort of your favorite easy chair.

A.M.O.H.

- the management of real or simulated patient encounters -

The Mnemonic and the Preamble

Before starting the simulated patient encounter/oral examination, write the following mnemonic across the top of the notepad provided in the examination room (takes about ten seconds):

AACBC - FUNM - GTAAFF - HPD (a bizarre mnemonic!)

AACBC = allergies/airway and cervical spine/cord, breathing, circulation, and finish the primary survey.

FUNM = foley, urinalysis, ng, and mast.

GTAAFF = gram stains/cultures/other investigations, tetanus prophylaxis, antibiotics, analgesics, flow sheets, and frequent vital signs.

HPD = history (finish), physical (secondary survey), and additional investigations, procedures, and therapeutic measures; diagnosis(es) and disposition.

See page 56 for the short form of the management guide (one page).

Remember, in addition to the patient, the examiner will role play or represent anyone that you want him/her to (or references, e.g. poison control centre). Try to imagine that the examiner is the various people that he/she is role playing (not easy, takes practice, had any acting experience?). (This also helps the examiner feel more like the person(s) they are role playing, making for a more "enjoyable encounter." Remember that the examiner/patient is also under "stress."). Take your time during the simulated patient encounter, as there is a tendency to rush. Take brief notes, and speak at a reasonable pace, as the examiner needs the time to digest and record what you have said. Listen for cues from the examiner, but don't depend on it; some examiners, like some patients, can be rather stingy with their cues.

The examiner's "cues" may be real, or simply distractions. They are meant to test your resolve, your flexibility, and your ability to use the cues to the patient's benefit.

Explain to the reluctant patient/examiner the importance of the history. Explain your actions (and procedures) to the examiner/patient (e.g. the insertion of a ng tube), and determine the clinical response. Obtain informed consent prn. Ensure that all your orders have been carried out, and the results of your investigations have been returned. Be careful not to read into x-rays, EKGs, etc., what you want or expect to see. Talk to the patient (e.g. "feeling better?"), nursing staff, family, and significant others, as appropriate throughout the encounter. Do not

forget to introduce yourself, and shake hands if appropriate (patient's mental status?). During your introduction, let the patient know that you are aware of the nature of their problem, for example, "the nurses tell me that you have had a fever and a cough for a couple of days." Treat the family, friends, and the significant others with the importance and respect they deserve, it is essential to have them "on your side" (along with the patient!).* You may be asked by the family if the patient "will be all right," before your assessment is completed, do not brush them off with a "will be fine" answer. Keep them informed and if necessary, find a quiet, private room for them (e.g. the patient is critically ill or injured). Be user friendly and non-judgmental (not always easy). Try to anticipate and show the appropriate concern for the psychological, the sociological, and the economic needs† of the patient, the relatives, and the significant others. Refer to the patient by name (how's your short term memory?), beware of treating the patient as, for example, a "kidney stone" (not hard to do during the oral exams or when the ER is busy). Caution against the human tendency to blame the victim (e.g. "if she had locked her car doors she wouldn't have been mugged"). Be objective, resist the temptation of becoming the judge and the jury (e.g. injured impaired driver). Remember in the real world any emergency room patient encounter can result in a complaint being lodged against you, and the relatives and the friends (including those not present), often exert a strong influence on that decision (even a "trivial" complaint can trigger a time consuming investigation). Beware of those gray area patient discharges from the emergency department. The patient may accept your decision to send them home, but not necessarily agree with it, and not tell you unless you ask them specifically, e.g. "Do you feel well enough to go home?" → "I would if I was younger and didn't live alone" → discussion. Always assume the worst case scenario until determined otherwise, not vice versa, for example, acute myocardial infarction, pulmonary embolism, ectopic pregnancy, acute appendicitis. Err on the side of consultation/observation/admission. Good interpersonal relations, along with exemplary care, and adequate, legible, medical records is your best defense in the minefields of emergency medicine (don't forget to note the times when recording your assessments and reassessments). "Gallows humor," if in "good taste," and "out of the earshot" of the patients, and the public, can be useful for reducing tension during the difficult times in the emergency

* Family, friends, and the significant others, can often be excellent, and sometimes invaluable allies, e.g. the uncooperative alcoholic patient with pneumonia.

† I feel compelled to say that universal health care insurance raises a society's minimum level of dignity (my impression). I hope Canada's medicare system survives.

department. However, beware of cynicism, which is detrimental to the functioning of the emergency room (an endemic problem).

Remember the adage "when the going gets tough, the tough get going" (sometimes with a little help from caffeine).

Additional suggestions (when appropriate), regarding real patient emergency room encounters are respectively submitted as follows*:

(1) Keep the patients with non-urgent problems in the waiting room, until you are almost ready to see them. There is no surer way to unnecessarily create an irritable patient, than a prolonged wait in a confining examining cubicle. In the waiting room, they can either watch television, talk, read or "people watch." However, keep in mind that patients with "trivial" or bizarre complaints, can sometimes be harboring serious disease, which can be missed at triage (e.g. shoulder pain / coronary artery disease). In any case, the "missed" patient may be more visible in the waiting room, than tucked away in an examining cubicle.

(2) Whenever feasible, have the relatives/significant others with the patient when you assess them (beware of the "vasovagal spectator," e.g. when suturing lacerations). This will save you explanation time, discourage you from doing only a partial assessment when you are busy, or feeling tired and lazy, and make the patient, their relatives, and their significant others all feel that they played a part in the decision making process. This may make them more forgiving should things not go well, or an error is made. For example, if you fail to diagnose a subtle fracture after having shown the x-rays to the patient, and their relatives or significant others, they are more likely to understand why the fracture was missed (advise the patient that your "soft tissue injury only" diagnosis is provisional, and that the x-rays will be reviewed by the radiologist → then provide the patient with a follow-up procedure plan, as part of your management of the injury).

Remember to make it clear to the patient and their significant others, whether the diagnosis is, (a) established, e.g. fractured wrist, (b) presumptive, e.g. acute appendicitis, or (c) not yet determined, e.g. the differential diagnosis of chest pain.

* I hope that these suggestions do not inadvertently offend anyone. The book was written primarily for my own use and I read it cover to cover periodically to "freshen up" (however, I must admit each book sale gives me a "shot in the arm").

Be candid with the patient and their significant others, for example, "At this point in time I don't know what the exact diagnosis is" → followed by a discussion of your differential diagnosis and your plan of action (patients and their significant others "love to hear what is going through your mind").

(3) Simulate an office setting as much as possible, if appropriate. For example, have the patient sitting or lying on a stretcher, the relatives/significant others sitting in chairs, and the physician sitting on a stool using a night table as a desk (sitting is more conducive for "creative thinking," and facilitates getting on the "right track" with the "right gut feeling"). This way everyone will be more comfortable and at about the same eye level (decreasing their likelihood of feeling intimidated). You may have to practice some "crowd control," e.g. the significant others constantly interrupting, or rattling their car keys. When assessing a patient, take advantage of any opportunity to shut out the noise from the rest of the emergency department (e.g. close the door if there is one/let the nursing staff know where you are → also applies when you have gone to, for example, the cast room).

(4) During a patient encounter, always be pleasant, or at least polite, and try never to become angry* (sometimes a challenge, especially when you are not in a "good mood," e.g. obnoxious patient with an equally obnoxious personal hygiene, e.g. "toxic socks syndrome"; however, a short burst of "controlled anger" may very occasionally be useful for patients with a behavior problem: caution!, it may backfire). Be careful not to unduly antagonize† patients (another endemic ER problem). It is self-defeating, and may occasionally precipitate violence. Make a conscious effort during patient encounters to try not to appear impatient, or in a hurry (may take some practice). Strive to maintain an informal, friendly demeanor (at times a conscious effort is required). You can make a five minute encounter seem like ten minutes to the patient, or vice versa (however the patients like to see you going at top speed while they are waiting for your "presence".)

* If you lose your "cool" and are rude to a patient or their significant other, it may come back to haunt you (for example, a legal action, or a time consuming investigation of a complaint and its resolution, or you have to encounter with the patient or the significant other that you were rude to, at a subsequent ER visit). Maintaining your professionalism in the face of incivility can be challenging, but to do otherwise will sabotage the patient encounter. Remember the adage, "whatever goes around, comes around."

† Agitated patients/relatives/significant others may have to be "talked down" to prevent a further escalation in their disruptive behavior (maintaining a pleasant demeanor will often counteract their irritability and vice versa). Do not take undue risks, summon security/police sooner than later. See also "Combative patient," p. 38.

Remember: even when the ER is chaotic, you still have to be able to patiently listen* to what the patient has to say (can be difficult at times: keep in mind that the history is the foundation of the diagnosis, the management, and patient rapport).

(5) Complete the chart, prescriptions, and off work slips, etc. in the patient's presence, otherwise the patient will not appreciate the total time that you spent on them. This is a good public relations maneuver with no increase in time consumption (also increases the legal credibility of your medical records). In addition, I often go through the patient's old chart in their presence (I tell them I am going to look through their "book" which appears to amuse them). I get the definite impression that this reassures the patient that you have a good working knowledge of their pre-existing medical problems.

Remember, at least a little smile at the end of the patient encounter goes a long way, and is not likely to be misinterpreted. You should take advantage of any appropriate opportunity to share a smile or a laugh with patients, significant others, or staff, "laughter is the best medicine".† For example, when informing patients regarding their x-rays (e.g. cervical/lumbar spondylosis), I often start out by saying "a little rusty," which seems to amuse the patients and their significant others (one of the few advantages of being an older physician who appears a little "weather worn" himself).

(6) At shift change, before transferring the care of a patient over to the oncoming physician, review the case to determine if you can make any decisions regarding disposition, e.g. additional investigations?/procedures?/therapeutic measures?, consultation?, continued observation?, admission?, discharge? (I usually begin preparing for my 8am exit with a 5:30am "round up"). If you are the oncoming physician accepting the care of a patient, obtain a full report and beware! Take nothing for granted, and do your own complete assessment, or sooner or later you will get "burned" (also applies to patients returning to the ER for whatever reason). Remember, taking over the care of a patient is frequently more difficult and hazardous, than if you had seen the patient from the beginning.

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* Occasionally, you may get the impression that the patient does not think that you are taking their complaints seriously (they may be right). A clue is that the patient keeps repeating their complaints over and over again. If you are getting these "vibes," refocus, and reassure the patient that you are indeed taking their complaints seriously.

† Remember the Nissan® automobile ad: "Life is a journey, enjoy the ride."

(7) Patients are frequently accompanied by the police (e.g. psychiatric assessment), who at times can be recruited to assist in the patient's management (e.g. countertraction during the reduction of a shoulder dislocation). Treat the police as significant others (unless the patient objects) , this often results in a "bond" between the police and the patient, which usually works to everyone's advantage, including the patient's.

In addition, the police often bring assault victims to the ER to have their injuries documented and treated. Guard against the tendency to become, over time, desensitized to the plight of the victims of violence. Sit down with the patient and take a brief, but unhurried history of the assault (e.g. "tell me what happened"), and give a response if appropriate (e.g. "when I hear a story like this it makes my blood boil"). This will help you develop some individual empathy for the patient. The patient will feel better for it (out of proportion to the treatment you provide), and so will you.

Furthermore, the police frequently ask for a copy of an assault victim's ER chart. A solution is to give the patient two copies of their ER chart, and they can then give one copy to the police if they so wish (e.g. the patient, ER visit completed, is being accompanied by the police back to the police station to give a statement, to take injury photographs etc.). Remember to record this transaction on the patient's ER chart.

(8) When requesting a consultation, don't ramble, and don't waffle (attention spans may be shortened by fatigue). Make sure your "homework" is done, and decide what the patient's needs are before placing the telephone call (have the patient's chart in front of you and "stick to your guns" prn). *For example*, "I have a 51 year old man with unstable angina and documented critical three vessel disease. He needs admission to CCU." Consultant: "See you shortly."

If the consultation is not urgent, make that clear, e.g. 2230 hours, "This is a tomorrow patient" (consultant gives a sigh of relief on the other end of the phone). "She is a 25 year old with Crohn's disease that I have admitted to the floor, the orders are written, could you see her in the morning?" Consultant: "Sure! Tell me more about the patient."

Do not call the consultant unnecessarily in the middle of the night, especially when it will not make any significant difference in the patient's immediate management. However, make the consultant aware of the timing when you call in the a.m. (helps improve early morning attitude). For example, 0700 "I have a 45 year old patient here in the department with a trimalleolar fracture. He has been here since 0300, he's otherwise in

good health, and the pre-op workup is done." Appreciative consultant: "I'll be right in, I'm in the OR all day." (If I have to have surgery, I would prefer that my surgeon has had a good night's sleep!).

The consultation process is of course frequently more challenging than depicted above (especially interhospital). Unfortunately, unprofessionalism and arrogance, on the other end of the telephone are not rare entities, and may surface with stress and fatigue.

Beware of accepting telephone advice, especially from another hospital, as it can vary from being completely suitable, to totally inappropriate. Don't struggle with a bad telephone connection, ask them to call you back.

(9) Remember there is the "well elderly," who tend to have typical presentations, e.g. chest pain/ischemic heart disease, and the "frail elderly," who often have atypical presentations, e.g. confusion/urinary tract infection. The frail elderly are usually accompanied by a caregiver, and may demonstrate the "suitcase" sign (almost pathognomonic for requiring admission).

In elderly patients with dizziness and/or syncope, do not forget to check for postural hypotension, which is often due to their medication, e.g. antihypertensive.

Beware of the elderly patient who has fallen, complains of hip/back pain, and you see "nothing" on their hip/pelvis/lumbar x-rays. If the patient cannot flex their hip, or move around on the stretcher without grimacing in pain, do not be too quick to send them home. They may have a subtle fracture, and in any case may have to be admitted for pain control (consult radiology/orthopedics).

(10) Avoid prejudging the lack of seriousness of the chief complaint, because for example: (1) you know the patient from many previous visits, e.g. somatoform disorder/now acute appendicitis, (2) the triage information on the chart (or old chart), e.g. sore arm/IHD, migraine/subarachnoid hemorrhage, (3) the attitude of the nursing staff (or yourself) towards the patient, e.g. alcohol abuser, or (4) the patient has been placed in a non-urgent cubicle, e.g. abd. pain/abd. aneurysm.

(11) If a patient declines an examination or investigation (for example a pelvic or rectal exam in the presence of lower abdominal pain), make sure they understand that your assessment will be incomplete and why (they will often then change their mind). If the patient is otherwise cooperative, you have to continue as best you can. Remember there is a fine line between a patient's refusal of care, and the physician's abandonment of the patient.

Not infrequently, after you have assessed a patient, the nurse comes to you and says that the patient is now refusing part or all of the clinical plan, that they appeared to have previously agreed upon, e.g. analgesics, blood work, I.V.'s, admission. Beware of uttering a reflex response to the nurse, that may contain sub-optimal tone and content. If you are overheard by the patient, it is as if you said it directly to that patient, dissipating any rapport that you may have had with that patient (and perhaps other patients if they overheard).

(12) In addition to the correct diagnosis and treatment, don't forget to make the patient feel better with symptomatic therapy, for example, inform (e.g. explain the mechanism of their renal colic), comfort and reassure, fluids, antipyretics, analgesics. Keep in mind that like drugs, health care workers have a placebo-therapeutic effect. Do not lose site of the fact that you are in the "feel better business." Sometimes, it may be useful to ask a patient with a chronic/recurring problem "what works?" → e.g. "a shot of toradol worked the last time."

A specific diagnosis is not always necessary or possible, and the inappropriate aggressive pursuit of same can result in considerable patient discomfort or worse. Remember the timeless principle "first do no harm ("stay out of trouble," avoid iatrogenic misadventures), cure sometimes and comfort always."

Patients should not wait unnecessarily to receive adequate analgesia. For example, (1) a multiple trauma patient, or (2) denying a patient analgesia because it might interfere with making the diagnosis of acute appendicitis*. Informed consent is probably more reliable in the patient whose pain has been at least partially alleviated.

(13) While all simulated patients require at least an abbreviated complete assessment, some real patients do not, e.g. minor ankle sprain. However, the decision to do only a partial assessment must be a conscious one, and based on the patient's past and present history and vital signs, e.g. diabetic patient who presents with a "sore finger" but is also having chest pain and tachycardia. Remember that one painful injury may "drown out" the discomfort from another less painful, but perhaps more serious injury or injuries, e.g. fractured wrist and cervical spine fracture.

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* Safety of Early Pain Relief for Acute Abdominal Pain, BMJ 1992; 305:554-6. Conversely, the patient with moderate abdominal pain is usually quite willing to postpone analgesia, when the surgeon will be visiting them within the hour, e.g. "I want the surgeon to see you just as you are now."

(14) In the presence of chronic or terminal illness, remember to determine the patient's and family's expectations. Some may want only varying degrees of supportive care, while others may request that "everything be done." When indecision/guilt prevails, your role as a facilitator of decisions may include attempting to reach a consensus by proposing an appropriate plan of management (discourage unnecessary investigations and fruitless therapeutic interventions). Remember to appropriately specify on the order sheet, e.g. "No CPR" (with other orders to suit the situation, e.g. 50% O_2 prn).

In addition: do not underestimate the value of your participation in palliative care. "Stealing" even a few minutes to be with the dying stranger is time very well spent (and very much appreciated by the patient, family, and significant others).

(15) Patients may bring various specimens with them to the ER, that you may not need or wish to see, for example, a dirty diaper (yuk!). Be diplomatic (avoid making unpleasant "primate" facial expressions). "Inexplicably", patients with urinary tract symptoms rarely bring a urine sample with them to the emergency department (and sometimes can't provide one → be tolerant, not annoyed). The ability to chuckle about the many little irritants encountered in the ER (which seems to become bigger when you are busy), is a useful attribute, another example, a fully conscious adult patient lying on a stretcher, in no acute distress, who keeps their eyes closed while talking to you, even after you have diplomatically requested eye contact (this drives the nurses "crazy" too). Conversely, some patients also seem to be able to "laugh off" the many little annoyances, that they may encounter during their "adventure" in the ER (patient survey?).

(16) On the rare occasion, during a psychiatric assessment, the patient discloses that he is planning a homicide, and identifies the intended victim (e.g. estranged girlfriend or wife). In addition to the proper disposition of the patient, there is a moral and medical-legal obligation (Tarasof, California; no legal precedent yet in Canada), to ensure that the contemplated victim is informed of the threat. Do not overlook a death threat because, for example, "I didn't think he was serious" (psychiatrist's testimony / a recent first degree murder conviction in Canada). The patient making the death threat needs to be detained, until a formal assessment for a voluntary/involuntary psychiatric admission is completed, and the police are informed of the threat, and the requirement that the intended victim be notified of the threat.

(17)(A) Alcoholics with evidence of liver disease: try telling the patient they are on "alcoholic death row." That seems to hold their attention while you are discussing rehabilitation with them (you may at least get them to

go to the detox unit). Be on the watch for the undiagnosed, unexpected, alcohol abuser, for example, the pleasant, elderly, vodka drinker. Be liberal about adding an ethanol level to your bloodwork orders. There will be the occasional surprise.

(B) Smokers with early respiratory disease: try saying to the patient that they are on the "slippery slope to chronic ill health and premature aging," or, "you are on the fast track to emphysema." They then seem to listen while you discuss with them the importance of smoking cessation (a few may even quit!).

(C) Be on the lookout for drug seekers, somatization patients, and the occasional Munchausen's syndrome (and rarely Munchausen's by proxy → usually, but not always, a pediatric patient, for example, poisoning, or an infant with recurrent apnea or sepsis/needle tracks?). All three will challenge your clinical skills, your tolerance, and your stamina, (striving to be physically fit helps maintain your stamina and partially alleviates the night shift* "jet lag"). The nursing staff can sometimes "sniff these patients out," but be careful, they can be dead wrong too.

(D) Don't let anxious parents or significant others "rattle you." Listen to them, acknowledge their anxiety, and proceed (sometimes simultaneously), in a warm and deliberate fashion. Otherwise, their anxiety (and yours) may escalate, e.g. a small child with a fever and you have just begun your assessment, "what's wrong with her doctor?" .

(18) Investigations: all investigations should be of course medically indicated. However, the judicious use of "therapeutic tests" can be at times clinically efficacious (and may facilitate the patient's "closure" of a minor medical problem). For example: (1) ankle/skull x-rays: the patient appears overly concerned about the possibility of a fracture, is only partially reassured by your assessment, and your reasons for not doing x-rays fall on "deaf ears," e.g. "that's what they told me the last time and my ankle turned out to be broken"; (2) EKG: the patient with benign chest wall pain who is very anxious about heart disease, e.g. "thanks for doing the cardiogram doctor, I feel much better now, better safe than sorry they say" (the nursing staff may have already done a preemptive EKG); (3) chest x-ray: the patient believes he has pneumonia or lung cancer (he may be right); (4) chemstrip/urinalysis: the patient fears they may have diabetes or "kidney infection," and (5)

* Working a busy 12 hour night shift in the ER is much like running a marathon. At times, it can be almost effortless, but you frequently "hit the wall" at about 4am. If you can steal even a few minutes to "nod off," this will facilitate you to "run through the wall." *See also reference #13,* "Shiftwork - adaptation strategies" *p. 179.*

CBC*: the patient feels her "blood is down." Caution, this "thinking" tends to drift you towards excessive ordering of investigations and medications, e.g. skull and ankle† x-rays, antibiotics (the pervasive temptation of expediency and increased patient satisfaction). Remember: it may be wise not to be too quick to discount the patient's self-diagnosis. Withhold your "famous last words" until the "verdict" is in, because the patient can be embarrassingly correct.

Be very reluctant to order any investigations on a patient with a somatization disorder, except when very clearly indicated. Their satisfaction, if any, will be short lived.

Caution: if the results of your investigations do not fit the clinical picture, reassess the situation and repeat the investigations(s) prn (e.g. error in blood work labeling?, venipuncture above an I.V. site?).

Be careful not to get in the habit of inadvertently ordering unnecessary or poorly organized investigations, as a means of delaying your decision regarding a patient's disposition. Attempt to order all the investigations that you will require, when you initially assess the patient. If further tests become necessary, request them as soon as the need becomes apparent. The decision to admit a patient can frequently be made, and the preliminary emergency/admitting orders written, at the time of your initial assessment, before the investigations are completed, e.g. acute exacerbation of COPD (I call them rapid sequence admissions).

(19) Lawsuits (scary stuff!)

12% of the medical lawsuits in Canada arise from the patients seen initially in the emergency room. The most frequent clinical problems involved are: myocardial infarction, appendicitis, meningitis, ectopic pregnancy, intracranial hemorrhage, testicular torsion, and extremity injuries, e.g. tendon, nerve, foreign body, scaphoid fracture. Beware of returning patients (e.g. same day, same problem), patients who leave against medical advice, and violent, intoxicated, or disoriented patients (relatives of a drug or alcohol abuser, even if previously estranged, may pursue a complaint with vigor). Also ensure that: (1) the attending physician (or his designated duty doc), for every patient you admit to hospital is personally notified (and recorded on the chart, or in the ER logbook), (2) your interpretation of x-rays is on the chart for the

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* Occasionally a patient gets impatient waiting for their blood work results, and wants to go home. Encourage them to stay, as there will be the occasional surprise (e.g. new diabetic, K^+ 2.7).

† Implementation of the Ottawa Ankle Rules. JAMA 1994; 271:827-832.

radiologist to see, and (3) delayed EKG, x-ray, and lab reports are properly followed up (for example, I booked a follow-up gallbladder ultrasound on a patient which revealed gallstones, and a right renal carcinoma. He has since had a cholecystectomy, and a right nephrectomy, and apart from a recent coronary angioplasty is alive and well 10 years later. I recently have had two more gallstones/renal carcinoma patients).

Communication, care, and records are the key words. Always read the nurses' notes. Beware of undue delays (especially in these days of the downsizing of Canada's medicare), e.g. suspected subarachnoid hemorrhage/ CT scan/ angiogram/ accessible berry aneurysm/ neurosurgical intervention. In addition, do not forget to do what you tell the patient you are going to do, e.g. booking an appointment for an urgent mammogram. In addition, provide a backup plan, just in case the investigation(s) are inadvertently not booked, or the results are not communicated to the patient. For example, tell the patient to call their family doctor if they have not received an appointment time in the next day or two, and to see their physician after the investigation to obtain the results of same (and for a follow-up assessment). Tell the patient not to assume that it was subsequently decided that the investigation was not necessary, or that the findings were ok.

Take very seriously that free, informal advice, that you give out to other physicians or nurses around the x-ray viewing boxes (the hub of the ER). This is especially important if you have been taken for a "quick look at the patient," e.g. rash, lumps, erythematous area. Keep in mind that there is no good samaritan law to protect you (patients can be very observant). Take similar precautions with all patient care telephone discussions.

Remember the "relative management test," that is to manage every patient as you would want a favorite relative of yours managed* (not always a simple task). Do not subject a patient to any risk or regimen, that you would not subject yourself or your family to (might be a useful policy to promulgate in court, should you ever be a defendant in a malpractice case). Before discharging patients from the ER, ask yourself: would your decision to send this patient home be defensible, should the threat of a legal action arise? Do not send a patient home, that you still have the least amount of uncomfortable concern about, e.g. fever, chest pain (no

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* It may sometimes be appropriate and useful, to reassure the patient/significant others by relating to them, that you are managing their illness/injury in the same manner, that you would want a member of your own family with the same problem managed (ask yourself, "am I?").

one will fault you for holding onto these patients). Beware of unintentionally medically discriminating against certain patients (e.g. minimizing the history which may lead to inadequate management), some examples: alcohol/ drug/ nicotine/ abuse/ overdose, asocial behaviour, psychiatric disorders, the disadvantaged, the minorities, the obese, the "unattractive," the "poor historian," homosexuals. Remember, negative or derogatory remarks about patients, may adversely influence the care that other health care providers may give. Avoid negativism (not always easy, another endemic ER problem). Keep the following adage in mind: "If you can't say something nice, don't say anything at all" (at times you may have to "bite your tongue").

One of the challenges in emergency medicine is the ability to manage properly the occasional patient, known to you, that for whatever reason, you have a distinct dislike for (the feeling may be mutual/double jeopardy!). An extra effort to focus on the patient's problem(s), will help you push the animosities, at least temporarily, into the background. Remember, no one wins a shouting match*.

Occasionally, a patient may request to be transferred to another hospital for personal reasons (e.g. the patient or significant other has more confidence in another health care facility when the necessity for surgery arises, for example, open reduction of an ankle fracture). Avoid any confrontation, or "subtle" displays of "bad feelings" (easy to say). Arrange a safe, smooth, and timely transfer of the patient to the hospital of their choice.

Never use the words "I don't care" in the emergency department, in any context. For example, a patient who is waiting for an ankle x-ray and threatens to leave, "It is up to you if you stay for your x-ray or not, I don't care." The only words the patient will remember are "I don't care," and if a complaint or legal action subsequently raises its ugly head, then you are "dead in the water" (you can't help what you think, but you do have control over what you say). Poor public relations is the catalyst† for most complaints and legal actions. That is not to say, that you have to take limitless verbal abuse from "competent," cantankerous

* Patients who have "acted up" during a previous visit, may exhibit signs of relief when you don't appear to remember them ("a fresh start").

† Some "average physicians" have the ability to generate zero patient complaints in the ER, not even a trivial one. One older, quiet, but pleasant, family physician, who had a large private practice and worked part time in our department did not generate a patient complaint in 17 years. Perhaps these physicians' practice behaviour should be studied in detail.

patients. If appropriate, record on the chart, excerpts of exactly what the patient said. For example, “referred to me as a pig-faced, baldheaded, Fxxx Axxx” (perhaps they should be charged with uttering profanities in a public place).

Another catalyst of complaints/litigation is the “if only” comments made to the patient, and/or their families by subsequent health care providers (e.g. patients subsequently diagnosed with cancer or meningitis). Remember that, “it is so easy to be wise after the event, and condemn as negligence that which is a misadventure” (Denning, L.J.: Roe v. Ministry of Health {1954} 2Q.B.66 {C.A.}). Sometimes, an explanation of the natural history of the disease/injury, and management options and pitfalls (with no real or apparent “cover-up”), will help to clear up any festering misunderstandings that the patient, or significant others may have. When I am working in the ER I often remember the old adage, “people who live in glass houses should not throw stones.”

Caution: except in unusual or simplistic situations, telephone advice to the public should be limited to an appropriate invitation to come to the emergency department (telephone encountering with patients is usually the nursing/receptionist staff’s responsibility).

Warning: when the beds are in short supply, you tend to tighten your admission criteria, and as a result you have to be vigilante that you do not send a patient home, whom you would otherwise admit (e.g. atypical chest pain). In the same vein, resist the temptation to take “shortcuts” during the busier times in the ER (or you will get “burnt”).

Since becoming a full time ERP, I frequently remember my mother’s words, “stay out of trouble” (sometimes my parting words to the appropriate patient of any age which invariably ends the visit on a somewhat jovial note. Another alternative message is “try to be more careful”).

(20) Allegations of sexual impropriety (very scary stuff!)

Never do a pelvic examination in the ER without a nurse in attendance (no matter how busy the department is). Ideally, a nurse should also be present during breast or rectal examinations (often not feasible). If a significant other wants to be present during an examination and the patient agrees (or vice versa), do not put up any resistance. Take extra care to be sure the patient understands why you will need to examine sensitive areas. Proper draping practices are essential. Do not unnecessarily expose those areas that you are not presently examining. If you have the “gut feeling” that a patient is a high risk (or on the basis of

their past history), take full precautions (nurse present during all "encountering"). Do not use the fear of allegations as an excuse for omitting indicated examinations.

(21) Remember the medical record can be your best friend. Records don't necessarily have to be extensive, but they need to be complete with the times of your assessments and reassessments (in addition, write down on the patient's chart the results of your investigations, e.g. EKG, X-rays, CBC, ethanol level, also with the times prn). What may be a perfectly adequate medical record for a simple ankle sprain with no legal connotations, may be inadequate for the same injury occurring in a shopping centre, or during an assault. Keep in mind that the courts generally accept verbatim, and do not challenge your medical record, that was written in your own handwriting, during or immediately following the patient's visit (including ethanol levels; at least that has been my experience). In court have a copy of your chart with you, and stick to it as much as possible, otherwise the lawyer for the other side may try to "trip you up," and discredit your testimony (e.g. assault victim's injuries, "the injuries were consistent with the patient's description of how the injuries occurred," e.g. punched, kicked, choked, or "the injuries were consistent with but not specific for being assaulted").

Charting "as you go," is particularly useful when you have several patients with various problems "on the go" (helps compensate for a fading short term memory), for example, an assortment of patients with an assortment of problems, such as fever, alcohol/drug/abuse/overdose, asthma/COPD, chest/abdominal pain, trauma, migraine, P.V. bleeding, ureteral calculus. Again, remember to start out each notation with the time.

(22) When patients ask, "why did I get this," avoid long convoluted explanations, especially when the etiology is unclear. You may only exacerbate the patient's confusion, rather than alleviate it. With "minor" problems, e.g. bursitis, I sometimes begin my reply to that question by saying, "probably bad luck" (or "good question!!"), which invariably elicits a laugh from the patient and significant others (in a non-derogatory fashion, I sometimes refer to the orthopod as the carpenter and the urologist as the plumber which also elicits a chuckle, *see #5, above*).

Nonetheless, an easily understandable, straightforward explanation is essential (but easy to overlook); it improves patient compliance, and may potentiate the effects (e.g. biliary colic analgesia), or decrease the discomfort of your diagnostic (e.g. lumbar puncture), and therapeutic interventions ("explain the pain"). The patient and significant others can be somewhat distracted, and may need the explanation repeated

on one or more occasions before it "sinks in." The patient may be more attentive during history taking or explanations, if you place a comforting hand (prn) on their shoulder or forearm.

(23) A significant portion of the patients seen in the emergency department do not have emergent/urgent problems, and would have been more appropriately attended to in a family physician's office (or in some instances self care would have sufficed). Physicians are not the health care police, and should resist the temptation from acting as such (however a patient who I have admitted on several occasions with COPD used to good-heartedly refer to me as the warden). You should assume that every patient has a significant problem(s), until you have determined otherwise. However if the visit is inappropriate, and that does not become self-evident to the patient during your clinical assessment, you may then want to educate the patient regarding the appropriate use of the ER (you may make a contribution of consequence to the education of the public!)*.

(24) When you are working solo in the ER, the situation may arise when you have no choice but to assess and treat your family members, relatives, friends or colleagues (that has happened to me on several occasions). The Nike® slogan says it best, "Just do it." The adult patient usually appreciates the uncomfortable position you find yourself in.

(25) In the ER there is not much time to develop patient rapport. Depending on the appropriateness of the situation, it may be beneficial for the "one night stand," to let the patient know that they are not alone, e.g. "We have had several other patients in the last day or two with the stomach flu and dehydration, and they frequently required I.V. fluids for a few hours." In addition, referring briefly to your own personal medical experience may be helpful as well, e.g. "I have also had severe pain after root canal work, I'll give you what worked for me."

Sometimes, the first thing the patient or significant other says to you is, "Do you remember me?" (e.g. "I was here nine months ago with a sprained ankle."). If you do remember, great! If you don't, you are in a no win situation. If you say yes, you are being dishonest (tempting). If you say no, they are disappointed no

* Nevertheless, the proportion of "elective patient visits" in the ER population appears to be decreasing (in my humble opinion). I now regard the straightforward, "non-urgent, clinical problem" as a refreshing break from the more complex patient encounters. Resist giving these "elective patients" the impression that you have an "attitude problem" (may take a conscious public relations effort on your part, especially when the ER is busy/long patient waiting times/staff and patient fatigue). Minimizing their problem is not appreciated by the patient (e.g. "It's only the flu, there's nothing we can do," instead of providing the patient with some symptomatic treatment). The adage, "If you are too nice to them, they'll be back," promotes sub-optimal care. *See "Lawsuits (scary stuff!)" above.*

matter what your explanation is. I simply sidestep the issue by saying, "I fail all memory tests" (they usually laugh and we get on with the present problem).

(26) Croskerry in his article, "Pitfalls in the Emergency Room" [15] describes ten cognitive errors that frequently take place in Emergency Medicine:

(1) Playing the Odds: Ruling out a diagnosis just because it is unlikely, e.g. headache/fever/-bacterial meningitis.

(2) Gambler's fallacy, for example, you have already seen four patients during the shift with unstable angina, so you tend to think that the fifth patient with chest pain can't be unstable angina as well. Vice versa: you think all five patients with abdominal pain have viral gastroenteritis, but one has appendicitis.

(3) Sutton's slip: you tend to stop looking once you have found "the diagnosis," for example, pyelonephritis and bacterial meningitis.

(4) Zebra retreat (not all hoof beats are horses): you think of an unusual/serious diagnosis but you talk yourself out of it (e.g. it is 0400, your CT scanner is broken down, and the nearest one is in another hospital ten miles away).

(5) Ying-Yang out: because the patient has already been worked up "the ying-yang," there is the tendency to begin with a defeatist attitude. Nevertheless, the diagnosis may now be evident at this point in time, or this may be an entirely new problem. Try not to let any defeatist feelings that you may have, be apparent to the patient. Patients always appreciate a sincere attempt at elucidating their problem.

(6) Vertical probability error: the most probable diagnosis is not correct, for example, the patient with flank pain, microscopic hematuria, and a past history of renal calculi, is diagnosed as having renal colic; only the less rigid "lateral thinking," will result in the right diagnosis of a leaking abdominal aneurysm being made.

(7) Posterior probability error: the patient's past history must be interpreted with caution, for example, a patient with many previous ER visits for migraine headaches, but now has a subarachnoid hemorrhage.

(8) Psych-out errors: there is the tendency to medically under-assess and under-treat psychiatric patients.

(9) Anchoring illusion: the tendency to favor the diagnosis considered first, e.g. appendicitis/-ectopic pregnancy.

(10) Representativeness error: the patient does not represent the patient-profile associated with a disease, e.g. 32 year-old female/chest pain/ischemic heart disease.

(27) A harmonious working relationship between the nursing staff and the medical staff is an essential ingredient of patient care in the ER (an understatement). Some of the nurses' "pet peeves" regarding ER physicians are as follows: (1) frequently irritable (unperturbable is the optimum), (2) doesn't consider the nurses' suggestions, (3) doesn't keep the nurses' informed, (4) orders tests and therapy piecemeal, (5) procrastinates (e.g. contributing to the "traffic jam" in the ER by continuing to see new non-emergent patients, while other previously assessed patients are ready and waiting for decisions to be made), (6) too many verbal orders, (7) frequently late for shifts/slow charting/misplaces charts/forgets patients/disorganized, (8) tries to avoid the difficult patients (e.g. the "weak and dizzies"), (9) illegible handwriting, and (10) spending prolonged periods on the telephone organizing "the rest of their life," or discussing the latest hockey game in detail with the other emergency room physician or consultant (when all the stretchers are occupied and standing room only in the waiting room). I must admit I have been guilty of some of the above at one time or another.

In addition, do not discourage the nursing staff from doing what they feel is appropriate presumptive management (e.g. O_2, IV's, monitors, EKG, blood work), particularly in patients with an atypical presentation (e.g. acute myocardial infarction with minimal interscapular pain).

Assume that all patients have drug allergies, and remember to determine the presence or absence of drug allergies before giving any drugs (including topicals and aerosols). This basic maneuver can easily be overlooked in the "heat of the moment."

If during the oral examinations, you end up down a blind alley, don't panic, retrace your steps beginning with the vital signs (has your assessment of the patient been complete?), limit the damage, do not do anything that carries a significant risk unless clearly indicated. There is a tendency to do "stupid" things you would never do in actual practice ("I can't believe I did that"), and omit things you routinely do in real life (dawns on you as you are walking down the hall from the examination room). Beware of the clear-cut case, patients may have more than one significant problem, e.g. fractured hip/ neck injury/ IHD/ CHF/ diabetes. Be diligent, and pay attention to detail, do a complete history and physical otherwise you may miss an important diagnosis (e.g. glaucoma, testicular torsion), or at the very least lose points. Do not forget to examine the breasts, back (log roll prn → exit wound?), lymphatic system, Gu (ectopic pregnancy?), rectum (carcinoma?), and CNS. Remember to remove the diaper in infants and the disabled. When examining a region if the examiner says, "normal," move on, if he/she says, "what are you looking for?" that is a clue that you will probably uncover an abnormal finding(s) in that region (or your verbal physical examination skills for that particular system are being tested in detail). The bottom line in actual or simulated patient encounters is: be complete, and do not stop looking once you have uncovered a serious illness or injury.

Some timely procedures to keep in mind are intubation, needle chest or tube thoracostomy, pericardiocentesis, cardioversion, peritoneal lavage, and culdocentesis. Some of the procedures and investigations (e.g. colonoscopic), are included in this guide to serve as reminders for possible discussion with the consultants. You may be asked by the examiner to describe how you would do a certain procedure (e.g. a chest tube insertion).

Remember, you are in charge, and unlike real life, nothing will be done during the oral examinations unless you specifically order it (e.g. "Start CPR"). The onus is on you to verbally seek clinical information from the multiple role playing examiner, give orders, diagnose and direct the management of the patient as you would a real case. In both simulated and actual situations, be pleasant, specific, assertive, decisive, but flexible, and never lose your "cool" (easier said than done, especially during a night shift when you have just been awakened from a dead sleep, and you are still in a "postictal state"). Obtain timely consults prn (e.g. surgery, radiology), and use references prn (Micromedex®? → look up infrequently used drugs and treatment, for example, you may want to call poison control {Poisindex®?}, to see if you are forgetting anything/new treatment guidelines?). If the examiner says a consultant or certain investigation is not available, that means he/she wants you to continue for the present without them. Do not confuse or irritate the examiner (he/she is the patient too!). Making the patient/examiner "feel better"

will enhance your score. Stabilize patients as early as necessary. Ensure that all monitors are being observed by trained staff and alarms are set(prn).

All the *simulated patients* are either admitted, or very infrequently discharged. There is no room for prolonged observation in the hypothetical emergency department (e.g. overnight). Do not leave critical patients unattended by staff, have the nurse report to you immediately any change in the patient's vital signs. Be cautious about sending the patient (unstable?) out of the department for investigations, e.g. x-rays (remember the timeless adage, "out of sight, out of mind").

Follow this guide, but be flexible, the sequence and content will have to be altered to suit the situation, but at least an abbreviated complete assessment of all patients is required. Resist the temptation to do only a partial assessment.

When reading this manual (or your favorite text), visualize as much as possible. That is visualize the patients, the anatomy, the physiology, historical items, symptoms, signs, investigations, actions, procedures, diagnoses, management, and disposition. This will help you to "think of it," when managing a real or simulated patient.

This book is meant to be read repeatedly cover to cover, and if you know it "cold", you should find your automatism* when dealing with real or simulated patients is increased (my impression), leaving you more time to think through the more difficult problems, and to "stay in control". In addition, if you attend an oral board course and/or practice "homemade" cases (based on real patients), with your colleagues or fellow medical students, you may also discover that your clinical / candidate performance is further enhanced (also my impression). Medical students can adapt the manual to suit the stage which they are presently at in their medical education.

* For example, taking less time for you to determine the gist of a patient's problem. Beware of the adage, "often in error, never in doubt."

The Management Guide

→ *remember to pause, visualize and reflect, while reading through the guide.*

→ use universal precautions.

→ don't forget to wash your hands between patients (easy to overlook!).

(1) Examiner briefs you on the pre-admission condition of the patient:

Radio communication with the ambulance personnel: description of the patient and the vital signs → if the approximate age; sex, present problem(s), plus all the vital signs are not given, ask for them (level of consciousness, P, R, B/p and body temperature): ask: what does the patient look like?, and for monitor strip or interpretation prn: give orders pertaining to the BCLS, ACLS & ATLS necessary for a safe transfer depending on the personnel and equipment available. Do not order cardioversion without first knowing the mental status of the patient (℞ I.V. versed® (midazolam) or valium® ± demerol® prn plus synchronization prn). When you are directing on-site stabilization via radio, timely orders include at which point to transfer the patient to your or another facility, e.g. a trauma centre (do not forget to phone the other hospital's emergency room physician).

AND / OR

(2) Examiner briefs you on the condition of the patient on arrival at the emergency room: if the approximate age; sex, present problem(s), plus *all* the vital signs are not given, ask for them (level of consciousness, P, R, B/p and body temperature). Use a flexible rectal probe with an electronic thermometer prn (hypo or hyperthermia?). Know your pediatric vital signs:

Age	Pulse	Resp.	SB/p	Approximate weights	
0-2 yrs	140-120	40-25	60-90	Newborn	3.5kg ±
2-4 yrs	120-100	25-20	90-100	6 Months	7kg ±
4-16yrs	< 100	20-16	100-120	1 Year	10kg ±
				5 Years	20kg ±
				10 Years	35kg ±

(3) Candidate to the examiner:

→ "What does the patient look like?"

e.g. obtunded, distressed, SOB, pale, diaphoretic, cyanotic, jaundiced, lethargic, anxious, agitated, depressed, hostile.

→ "What does the nurses' triage and admission notes tell me?"

e.g. history of present problem(s), allergies, meds, preexisting conditions, and the nurses' physical assessment.

→ *At this point pause for a moment to digest the opening scenario, and then proceed with rapid stabilization if necessary, e.g. dyspnea, chest pain, hypotension. Alert the nursing*[*]*, x-ray, and lab staff prn. Remember to stay focused.*

(4) or (5) (depending on the urgency) Introduce yourself to the patient (and/or parent(s) prn):

For example, "Hello Mr. Smith, I am Dr. Jones and I will be looking after you." Ask the patient pertinent questions regarding the present illness or injury (trauma / medical / psychiatric / assessment), *for example,* "What hurts?" (MVA? ask about seat belt use, shoulder or lap type? airbags?). "Tell me about this chest pain that you have been having." "Tell me about how you are feeling," e.g. tense?, angry?, depressed?, weak? "Do you have any other medical problems?" "Are you taking any medications?" "Are you taking your medications as directed?" "Have there been any recent changes to your medications?" "Are you allergic to any drugs or anything else?" "Is there anything else bothering you?" "Is there anything else about you I should know?" (e.g. previous hospitalizations, surgery/splenectomy?, serious illness or injury). "What is it that you fear[†] might be wrong with you?" (e.g. heart attack?, appendicitis?, meningitis?, "killer strep infection"?, cancer?). Inform the patient of your immediate plans, for example, physical examinations, investigations, therapeutic measures → "Do you have any questions Mr. Smith?" "I want you to feel free to ask me or the nurses questions at any time." Remember that with alcohol/drug abuse/overdose, the history of

[*] For example, in a calm voice with a resolute tone, "this patient needs an I.V., real soon," followed by specific stabilization orders (the nurse may already have begun presumptive management/O_2, monitors, I.V., EKG, bloodwork).

[†] Remember that specifically addressing any such "fears" is a "must do."

drug or alcohol ingestion is frequently unreliable. Beware of the patient who wants "nothing to be wrong with them," and minimizes or omits their symptoms*.

History may also be obtained from the parents (e.g. child), other family members, significant others, EMTs, police, old charts, and the family physician. Use the telephone prn to acquire the necessary information. First aid treatment administered prior to arrival? (e.g. poisonings, frostbite).

(In cases of sexual assault, Rx ACBC's, supportive care, call the sexual assault team if your hospital has one, and protect the "chain of evidence" by ensuring an appropriate forensic examination is performed {does your ER have a prepackaged sexual assault kit?}).

(4) or (5) (depending on the urgency) Candidate to the examiner (as appropriate for this patient):

While I am doing the ABC's, I want the nurses to give the patient O_2† (50-100%), place the patient on the cardiac monitor, pulse oximeter, and automatic sphygmomanometer, obtain a monitor strip and start I.V.(s) → one or more?, site(s)?, size?, ringers? (warm prn), rate? (pressure infusions prn), pediatric microdrip prn (except with hemorrhagic shock), pediatric bolus(es) prn → ringers 20cc/kg → maintenance 2cc/kg/hr. Take several tubes of venous blood for STAT: CBC-diff-sed.rate, BUN, creatinine, glucose, lytes, etc. prn (e.g. chemstrip for serum glucose?, blood cultures {aerobic, anaerobic, viral?}, x-match, coagulation studies, CPK-MB, LDH, ethanol, acetaminophen, salicylates, other serum drug levels {e.g. theophylline, dilantin®, tegretol®, digoxin}, amylase, sgot, alk. phos., bilirubin, mono spot, Ca, Mg, PO_4, serum osmolarity). Do the arterial blood gases prn (plus a carboxyhemoglobin level?), an EKG and a urinalysis. Obtain a list of the patient's present medications (including contraceptives, topicals, transdermal patches, inhalers, aerosols/home O_2, and over the counter medications), and drug allergies (medical alert bracelet or necklace?). Undress the patient as soon as feasible.

Obtain the patient's old charts (often invaluable). Inform me immediately of any changes in the patient's vital signs.

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* Conversely, there are the patients who inherently dramatize their symptoms.

† I have yet to see a case of significant respiratory depression in the ER from the use of oxygen in COPD patients.

The patient may have to be restrained*, searched (photo? ID?, medical information?, drugs?, weapons?), or have their clothes cut off (and/or motorcycle helmet carefully removed using the standardized technique). In addition, the patient's premises may have to be searched by the EMTs, police, or significant others (drugs?, empty drug containers?, suicide note?, poisons? e.g. methanol?).

(6) Airway and C-Spine/Cord: Ask the conscious patient pertinent questions: e.g. any trouble breathing, speaking, or swallowing?, any neck pain?, any weakness or numbness? (recent onset?, transient neurological symptoms?)

Examine the airway and the cervical spine: apnea?, kussmaul breathing?, airway already in place? (e.g. intubated?, check tube placement), airway patency?, stridor?, F.B.?, tracheal deviation?, gag reflex?, trauma?, tender cervical spine?, jugular venous distension?, subcutaneous emphysema?, unexplained hypotension?

℞ place the patient in a position of respiratory comfort prn, 50-100% O_2 prn, pulse oximetry prn, immobilize the c-spine prn, and after the patient has been stabilized, call for a portable lateral x-ray prn (c-spine may already have been immobilized by the EMTs with a Philadelphia collar, Ked, backboard, light weight spacers, and chin/forehead/body straps/tape; patient may also require sedation, e.g. I.V. haldol® 5-10mg prn); suction prn (plus nostrils in infants), remove dentures prn, jaw thrust prn (relatively safe with suspected c-spine injuries), soft xylocaine lubricated nasopharyngeal airway prn (may be used in patients with or without a gag reflex; size = tip of nose to tragus of ear), oropharyngeal airway prn (contraindicated in patients with a gag reflex), prn racemic epinephrine aerosol (0.5cc 2.25% in 4.5cc of saline/specify, with O_2, not medical air), ventilate with bag and transparent mask prn, with careful in-line traction prn, thiamine 100mg I.V. prn (prevent/treat Wernicke's syndrome), 50% dextrose 50cc I.V. prn, narcan®† 2mg I.V. prn ± flumazenil (benzodiazepine antagonist, careful!, consult references), 0.3mg q 1 minute prn to 2mg (restrain patient first?, either narcan® or flumazenil can precipitate violent behavior/acute withdrawal); orotracheal tube prn (uncuffed to 6-7 years of age → size of external nare or "#5 at 5 years"), nasotracheal tube prn (1 size less than an orotracheal tube),

* If you find it necessary to restrain, or threaten to restrain a patient, make a note on the chart. For example, "the patient has been consuming ethanol, and at present (e.g. 0300 hours) is incompetent, and a danger to himself and others" (also remember to obtain an alcohol level, and record it on the chart).

† Titrate the narcan®/flumazenil in suspected addicts to just adequately reverse the respiratory and CNS depression only, avoid inducing withdrawal.

needle cricothyroidotomy/percutaneous translaryngeal ventilation prn (must be no obstruction to exhalation, use a #12-14 intracath through the cricothyroid membrane with 3cc syringe barrel and a #7 endotracheal tip, also requires manual intermittent high pressure O_2 source/ 50 psi → exhalation obstructed? → 2nd or 3rd intracath prn); cricothyroidotomy prn (with #4 or 5 Shiley or #5 endotracheal tube), tracheostomy prn (by consultant). Open cricothyroidotomy in young children is fraught with difficulties.

Before intubating, place the patient on a cardiac monitor, suction with a rigid tonsillar suction prn, xylocaine® spray prn ± sedate prn ± paralyze prn, ventilate for 1-5 minutes with 100% O_2 prn ± Sellick's manoeuvre prn (→ nitrogen washout → pulmonary O_2 reservoir increased), check the intubation tube cuff for air leaks (plus lubricate the tube and stylet with xylocaine jelly), and place the patient in the sniffing position unless contraindicated. After intubation, inflate the cuff, and hold the intubation tube at level of the orifice until cut and secured, ventilate with 100% O_2 (hyperventilate prn), auscultate over both axillae and the stomach, suction the trachea and major bronchi prn (use a well lubricated soft suction catheter less than ½ the size of the lumen to be suctioned), and then pass a nasogastric tube (nasopharyngeal airway may be used as a conduit) → an orogastric tube may be easier. Next, reduce the cuff pressure to the minimum required to eliminate air leaks, and order a chest x-ray and a ventilator. Intubate comatose patients without a gag reflex, and before removing an esophageal obturator airway (EOA). Use Sellick's manoeuvre prn to assist intubation, and help prevent gastric distension, emesis, and subsequent aspiration.

Make use of xylocaine® spray and jelly prn, nasoconstrictors prn, I.V. valium® or versed® prn, I.V. atropine prn, I.V. xylocaine® prn, neuromuscular blockade prn, soft tissue x-rays of neck prn, indirect and direct laryngoscopic exams prn, and McGill forceps as indicated. With orotracheal intubation use a lubricated stylet, otherwise you will need perfect visualization (be careful to ensure the stylet does not protrude through the distal end of the tube). If you are having a problem passing the tube through the larynx (adequate lubricant? edema?), try a tube 0.5-2.0 sizes smaller. A small endotracheal tube will suffice, at least temporarily (and may be lifesaving!).

Rapid sequence induction and intubation

When intubating the awake, fatigued patient (e.g. COPD), I have had success to date with copious xylocaine® spray and jelly plus I.V. valium® prn. If time permits, I call the

anesthetist to do a rapid sequence induction and intubation* with neuromuscular blocking, etc. (know your limitations). If the patient goes to sleep for a few minutes after I have taken over their ventilation, then I know that I made the right decision!

An oropharyngeal airway may be used as a bite plate in a patient with an orotracheal tube. Patients not intubated, and without neck injuries, especially children, should be kept in the sniffing position. Use a nasotracheal tube when intubating patients with seizures, trismus, or cervical spine injuries (orotracheal intubation may be attempted in patients with possible cervical spine injuries, if strict in-line traction is employed, and the neck is kept in the neutral position. Fiberoptic assisted?). When C-7 is not visualized, repeat the lateral c-spine x-ray with the shoulders pulled down, or obtain a swimmer's view prn (CT scan?).

Bag and mask ventilation, even without in-line traction, may be more effective using two people, one on the mask ± in-line traction, the other bagging. Patients with epiglottitis can be bagged (not always) if necessary, and taken immediately to the OR for rapid sequence induction and intubation (if you are required to immediately intubate the patient in the ER, direct a smaller than usual tube through the "eye of the cherry"). In addition to epiglottitis, prophylactic intubation may be required for head, neck, and chest injuries, multiple trauma, and burns.

In newborns, assess their tone, ventilatory effort, and heart rate. Most asphyxiated newborns will respond to 100% O_2 ventilation with bag and mask, and protection against hypothermia (they need a 34-36°C environment). Use a straight Miller blade in patients less than 4 years of age. In newborns use a Miller blade size 0 to 1, and an endotracheal tube size 2.5 - 3.5. The recommended distance from the tip of the endotracheal tube to the lips, in 1, 2 or 3 kg infants is 7, 8, or 9 cm respectively. The Broselow Pediatric Resuscitation Tape© (AHA-PALS) displays the appropriate ACLS drug doses, fluid volume requirements, equipment selection, and basic life support techniques, all based on the length of the patient, which directly correlates with the weight. Remember that when intubating pediatric patients, the larynx is more anterior and

* Recently, I witnessed an anesthetist easily intubate a tiring patient with CHF/pulmonary edema, using 10mg valium® I.V. followed by 40mg succinylcholine I.V.

cephalad than in adults (e.g. C_{2-3} level in infants versus C_{5-6} in adults). In addition, the smallest diameter of the airway in infants and young children, is below the cords at the cricoid ring.

Foreign bodies, e.g. a coin in the esophagus usually faces forward, and in the trachea it usually faces side on. In patients with a partial upper airway obstruction due to a foreign body, if they are ventilating adequately, do not interfere with their efforts to expel the foreign body. If ventilation is inadequate, treat as a complete obstruction → back blows X 5 prn, abdominal or chest thrusts X 5 prn, and remove the FB if visible → the sequence is repeated prn, and/or direct laryngoscopic exam and removal with McGill forceps as appropriate.

The pediatric I.V. doses of narcan® = 0.01mg/kg I.V. prn, dextrose 50%, 25% or 10% = 1-2cc kg/I.V./prn, valium® = 0.2mg/kg/I.V./prn. The tidal volume is 10cc/kg x 12-20/min.

Drugs that can be given endotracheally, using twice the I.V. doses are: narcan®, atropine, isoproterenol, lidocaine, epinephrine, and diazepam (mnemonic = NAILED).

Brief pause prn: any change in the clinical status or the vital signs?: assessment: investigations and available results: timely management prn: inform, comfort, and reassure the patient prn. Beware of iatrogenic hypothermia, especially in infants and the elderly ® prophylactic heat lamp/warming blanket prn.

(7) Breathing: Ask the conscious patient pertinent questions e.g. any SOB, chest pain, or hemoptysis?

Examine the chest: inspection first, e.g. dyspnea?, audible wheeze?, labored breathing?, chest contusion?, permanent pacemaker? (patients frequently forget to tell you about their pacemaker).

℞ place the patient in a position of respiratory comfort prn, 50-100% O_2 prn, pulse oximetry prn, needle chest prn (e.g. tension pneumothorax/ 2nd interspace midclavicular line or nipple level/ 5th interspace midaxillary line), chest tube prn (nipple level/ 5th interspace midaxillary line), aerosol ℞ prn (e.g. 1cc ventolin®*, plus 2cc atrovent®, plus 3cc saline/ or racemic epinephrine 2.25% 0.5cc in 4.5cc saline/specify, with O_2, not medical air, measure the PEFR before and after, if appropriate), prn adrenaline 0.3-0.5cc (0.01cc/kg/child) 1:1000 s.c., bag and mask with 100% O_2 prn, intubate and ventilate prn, order portable chest x-ray prn (+ expiratory film?, upright or supine? → hemothorax may be difficult to see in the supine film, may have a granular

* pediatric dose of ventolin® = 0.03cc/kg to 0.5-1.0cc

appearance), arterial blood gases etc. prn (e.g. theophylline and other drug levels prn). Use the largest chest tube (32-40 F) that you can when draining a hemothorax. Patients may have to have a chest needle or tube inserted before the chest x-ray. When intubated or bronchospasmic patients go sour, think of a tension pneumothorax (e.g. decreased or absent breath sounds unilaterally ± shock due to impaired venous return) → immediate needle decompression with an intracath prn (e.g. #14), which is then connected to an underwater seal drainage as a temporary measure, until a chest tube is inserted.

The normal bicarbonate level is 21-26 meq/L (metabolic acidosis / normal / metabolic alkalosis) and the normal pCO_2 is 35-45mmHg (respiratory alkalosis / normal / respiratory acidosis).

When ordering ventilators, specify a volume (preferred), or pressure model, percent O_2, tidal volume, rate, automatic or triggered, ± peep (5-10cm H_2O). For children < 10kg, use a preset pressure, or time-flow ventilator. Order chest x-rays (+ expiratory film?) after intubation, chest needle or tube, thoracocentesis, pericardiocentesis, intercostal nerve blocks, CVP, subclavian or internal jugular venipunctures, and transvenous pacing. Repeat chest x-ray in 6 hours prn.

℞: for example, tension pneumothorax, hemopneumothorax, sucking chest wounds, esophageal rupture (blunt trauma?, iatrogenic?, violent emesis?, plus pneumomediastinum?, plus fever?), diaphragmatic rupture (or hernia in the newborn), massive hemoptysis, tracheal-bronchial rupture (air embolism?), sternal fracture (myocardial contusion?), flail chest (pulmonary contusion?), aspiration, ARDS, pulmonary embolism, pneumocystis carinii pneumonitis (occurs in heterosexuals too!), bronchospasm and respiratory failure. In addition to the standard therapy, consider giving $MgSO_4$ I.V. (e.g. adults 2-4$^+$g) for moderate-severe bronchospasm (may alleviate the need for intubation?[*]).

Brief pause prn: any change in the clinical status or the vital signs? assessment: investigations and available results: timely management prn: inform, comfort, and reassure the patient prn. Remember that agitation/hyperventilation may be due to anoxia or metabolic acidosis, not anxiety.[†]

[*] I have avoided a difficult intubation on more than one occasion using I.V. $MgSO_4$, and an another occasion using five sequential 1mL I.V. doses of epinephrine 1:10,000 plus I.V. $MgSO_4$.

[†] Anxiety is more often secondary, that is the result of the present problem, e.g. chest pain, rather than the cause of the present symptoms, e.g. psychogenic hyperventilation.

(8) Circulation: Ask the conscious patient pertinent questions: e.g. any chest pain or SOB?

Examine the cardiovascular system:

Pediatric systolic pressure = 80 + 2 X years of age

Radial pulse present = SB/p ≥ 80

Femoral pulse present = SB/p ≥ 70

Carotid pulse present = SB/p ≥ 60

Orthostatic vital signs prn (e.g. unapparent GI hemorrhage?); capillary refill?

℞: CPR prn*, direct pressure for bleeding prn, 50-100% O_2 prn, pulse oximetry prn, cardiac monitor and strip prn, EKG prn, trendelenburg prn, mast prn (± inflation), I.V.(s) prn → cut downs prn, anterior tibial interossessus infusion in children prn (use a bone marrow needle if available, 1-3cms below and medial to the tibial tuberosity, use a screwing motion prn/direct away from the epiphysis; remember the external jugular vein may be easily available in infants and children; in adults use the distal tibia), crystalloids prn, e.g. ringers lactate; packed red blood cells prn → O neg prn, type specific prn, or matched prn (in increasing order of preference, urgency dependant) → diluted with warm saline prn (40-45°C) ± blood warmer prn, and under pressure prn; fresh frozen plasma prn, cryoprecipitate prn (safe?), platelets prn, vagal maneuvers prn, ACLS drugs prn (± ET route prn), cardioversion prn (± synchronization prn, ± I.V. versed® or valium® prn ± demerol® prn, or general anesthesia prn), pacing prn (transcutaneous or transvenous), pericardiocentesis prn ± 0.5-2 liter bolus of ringers prn (false negative tap?, echocardiogram?, CT scan?), heparinize prn, thrombolytic therapy prn, emergency angiography prn/angioplasty prn/CABG prn/intraaortic balloon pump prn/thoracotomy prn.

Acute myocardial infarction? → rule out pulmonary embolism, aortic dissection, cardiac tamponade, hypovolemia, and septic shock. Repeat "normal" EKGs prn, e.g. reoccurrence of chest pain. An EKG should be performed on all distressed patients (e.g. abdominal. pain, panic attacks), who have ischemic heart disease, or who are candidates for same. Compare the present EKG with previous EKGs prn.

* Remember that not all cardiac arrhythmias/arrests are due to coronary artery disease. *See* Cardiac arrest/Ventricular tachycardia, *#(2), p.57.*

Transcutaneous (50-200 MA), and transvenous (2-20 MA) pacing, particularly the former, may need I.V. versed® or valium® ± demerol® for sedation. Pacing should be set on the demand mode, or in special circumstances overdrive.

℞: for example, life threatening arrhythmias, shock (hypovolemic?, vasogenic?, cardiogenic?), acute myocardial ischemia (cocaine use?) or contusion, pulmonary edema (MI?, arrhythmia?, cardiomyopathy?, acute valvular dysfunction?, non-cardiac pulmonary edema?), pulmonary embolism (DVT?), pericarditis, pericardial tamponade (supraclavicular cyanosis?), pulmonary hypertension, hypertensive emergencies and dissecting thoracic aortic aneurysm (± neurological signs?, ± MI?), or rupturing abdominal or thoracic aortic aneurysm (including traumatic, widened mediastinum?).

Ventricular fibrillation → defibrillate immediately with 200 joules, and repeat x 2 prn (200J, 360J), then continue ACLS (but not so fast with the defibrillator that the patient is still awake, treat the patient not the monitor, loose or detached leads?).

Electrical mechanical dissociation → rule out tension pneumothorax, hypovolemia, pericardial tamponade, acidosis, hypoxemia, hyperkalemia, hypercalcemia, pulmonary embolism, and ruptured ventricular wall or valve.

Beware of the wide complex tachycardia, treat as a ventricular tachycardia, e.g. lidocaine and/or procainamide prn (no verapamil or digoxin), cardioversion prn (usually synchronized, 25-50J^{+}, ± sedation/general anesthesia prn). Cardiovert unstable patients prn (e.g. ischemia, hypotension, CHF, decreased cerebral status) → cardioversion is contraindicated in digitalis toxicity (last resort? 10-25J).

Do not hesitate to give indicated ACLS drugs prn (know doses!), for example, epinephrine (high dose?), NTG (often I.V.), lasix®, morphine, atropine, lidocaine, procainamide, bretylium, amiodarone, dopamine ± fluid bolus(es) if appropriate; verapamil, adenosine, beta blockers. Following the administration of an ACLS drug, give a 20mL I.V. fluid bolus, and elevate the arm in order to speed the delivery to the central circulation.

For cardiac arrest not responding to standard ACLS protocols, consider giving $MgSO_4$ 2-4^{+}g I.V. bolus.

Use ringers lactate in adequate amounts for hemorrhagic shock (several litres prn, 3:1 rule), recheck HB after 2-3 liters (after 20ml/kg bolus(es) in children → total blood volume = 80 ± /mL/kg). Do not hesitate to give packed red blood cells prn (5-10cc/kg bolus(es) in children), with informed consent* if appropriate. Do a quick examination before, or while the mast is being applied (e.g. urethral injury?). Thomas splint(s) may have to be removed in patients with fractured femur(s) ± fractured pelvis, so that the mast may be applied. A blood pressure cuff can be used as a temporary tourniquet for brisk bleeding from an extremity, e.g. lacerated brachial artery. Caution: there are early reports that suggest that raising the systolic blood pressure above the minimum required (90-100) for adequate perfusion, may aggravate or reinitiate the bleeding in hemorrhagic shock.

Remember that any patient that requires ringers for hemorrhagic shock may require packed red cells. With severe or moderate shock, plus ongoing bleeding, the decision to give packed red cells in addition to the ringers can be made immediately (plus fresh frozen plasma prn with massive transfusions).

In patients with hemorrhagic shock who fail to respond to volume replacement, look for tension pneumothorax, hemothorax, pericardial tamponade, unrecognized blood loss (e.g. abdomen, retroperitoneum, pelvic or femoral fracture), acute gastric distension, neurogenic shock, and medical problems, e.g. MI, DKA, adrenal failure.

Traumatic Cardiac Arrest (or high risk of/have the trauma team notified immediately) → ℞ ACBC's → tension pneumothorax?, pericardial tamponade?, hypovolemia? → needle chest?, pericardiocentesis?, simultaneous fluid replacement

→ immediate thoracotomy? → treat cardiac tamponade prn (open decompression), direct cardiac massage (external cardiac compressions considered ineffective in traumatic cardiac arrest), control bleeding prn, aortic cross clamping prn. Blunt trauma plus cardiac arrest, ± thoracotomy → dismal prognosis → penetrating trauma plus cardiac arrest, plus thoracotomy → 5-30% survival.

Brief pause prn: any change in the clinical status or the vital signs?: assessment: investigations and available results: timely management prn: inform, comfort and reassure the patient prn.

* My usual opening line to patients who require PRBC's is, "looks like you are going to need some of that red stuff." Patients seem to be very aware of the pros and cons of blood transfusions.

Hemorrhagic shock = at least 15% loss in the total blood volume.

Pediatric cardiac arrest is frequently secondary to respiratory arrest or shock.

(9) Patient responsiveness: Ask the conscious patient pertinent questions: e.g. any headaches, speech problems, weakness or numbness?

Mnemonic for altered states of consciousness and coma:

TIPS:	T:	trauma, temp., thiamine	VOWELS:	A:	alcohol, drugs, toxins.
	I:	infection, AIDS.		E:	Endocrine, liver, lytes.
	P:	psychiatric, porphyria.		I:	Insulin, oral hypoglycemic agents, diabetes mellitus.
	S:	space occupying lesion, stroke, intracranial hemorrhage, shock, status epilepticus (seizures may be subtle).		O:	O_2, CO_2, CO, opiates.
				U:	Uremia, hypertension.

Examine the nervous system:

Level of consciousness (AVPU = (1) fully awake, or (2) responds to verbal stimuli, or (3) responds to painful stimuli only, or (4) unresponsive); lateralizing signs (± aphasia?), Glasgow scale (best visual, verbal, and motor response, score 3 - 15). Rule out head and neck trauma in all patients with a decreased level of consciousness. Memory or focal deficit?, hypo/hyperglycemia?, uremia?, other metabolic encephalopathy?, prolonged postictal state? (has an underlying problem?, e.g. encephalitis?), status psychomotor seizures? (EEG?), new headache?; coma nyd? → include gastric lavage?, and charcoal?; CT scan?, MRI?, lumbar puncture?

Increased intracranial pressure (+ reflex hypertension?)

→ Avoid hypoxemia, hypercapnia, agitation, seizures, pyrexia, and cerebral edema.

→ ℞ ACBC's, intubate prn and hyperventilate prn with 100% O_2 to a pCO_2 of 25-30 prn, mannitol 20% 5-10cc/kg/I.V. prn (caution), lasix 1-2mg/kg/I.V. prn (caution), dexamethasone (decadron®) prn, initial dose 1mg/kg to 50mg I.V. (plus Zantac® 50mg I.V. for stress ulcer prophylaxis?), reverse trendelenburg position if not contraindicated. ℞ seizures prn (e.g. I.V. valium®/dilantin®, consider giving dilantin® prophylactically: 15mg/kg/I.V. over 30-60 minutes), ℞ agitation prn (e.g. I.V. haldol® 5-10mg and/or ativan®1-2mg prn), ℞

pyrexia prn (e.g. Tylenol® supp./external/core cooling prn), and treat underlying conditions prn (e.g. meningitis, intracranial hemorrhage, head injuries).

Seizures ℞ ACBC's, thiamine 100mg I.V. prn, dextrose 50% 50cc I.V. prn, valium®5-10mg I.V. prn (pediatric 0.2mg/kg), dilantin® I.V. prn (15mg/kg loading dose over 30-60 minutes).

Emergency burr hole(s) prn (e.g. epidural hemorrhage)

→ ℞ ACBC's, burr hole(s) 1 inch above the zygomatic arch and 1 inch in front of the ear.

Critically ill patients with bacterial meningitis should begin antibiotic treatment in less than 30 minutes, regardless of how many investigations have been completed (however, always do blood cultures before giving the first dose of antibiotics, e.g. adults/ceftriaxone 2g plus ampicillin 2g). Beware of the early bacteremic stage with fever alone, which may respond initially to symptomatic treatment (significant pyrexia? → suppressed with a recent antipyretic?, toxic?, immunocompromised state?, focus of infection? → septic workup? → presumptive antibiotic therapy prn). Remember that several disorders may result in a septic appearing infant, for example, (1) bacterial/viral/mycoplasma infections (e.g. sepsis, meningitis, pneumonia, "flu"), (2) dehydration/shock (± electrolyte problems) from any cause, (3) overdoses (e.g. ASA), (4) hypoglycemia (e.g. ASA overdose, infections), (5) cardiac failure/arrhythmia (e.g. congenital heart disease, SVT), (6) shaken baby syndrome (+ other CNS trauma/bleeds), (7) anemia (e.g. aplastic, hemolytic, blood loss), (8) renal failure, (9) infantile botulism (never seen it), (10) HIV/infections (e.g. pneumocystis carinii pneumonia).

Combative patient → hypoxic?, hypovolemic?, hypoglycemic?, infection?, head/ cervical spine injury?, alcohol?, drugs?, e.g. cocaine, PCP, anabolic steroid rage; substance withdrawal?, psychosis?, postictal?, personality disorder? → do not under estimate a patient's potential for violence (female patients too!). Weapons?, mental status?

→ ℞ ACBC's, thiamine 100mg I.V. prn, 50% dextrose 50cc I.V. prn, haldol® 5-10mg I.M./I.V. ± ativan® 1-2mg I.M./I.V. q15-60 minutes prn if appropriate, continued physical restraints prn, and ℞ underlying problems.

Brief pause prn: any change in the clinical status or the vital signs?: assessment: investigations and available results: timely management prn: inform, comfort, and reassure the patient prn. Beware of prematurely attributing dyspnea/weakness/parathesia to a psychogenic etiology.

(10) Finish the primary survey (an abbreviated complete physical assessment), plus → foley catheter prn (urethra ok? → obtain a spontaneously voided specimen first if feasible → micro/gross hematuria?), urinalysis, measure urine output, nasogastric (cribiform plate ok?)/orogastric tube prn (acute gastric dilation?), mast prn (if not already applied during the ABC's), gram stains (of buffy coat?) and cultures prn (± other stains?), tetanus toxoid prn/tetanus immune globulin prn, antibiotics prn (often I.V., cultures first prn), analgesics prn (early prn, often I.V.), flow sheets prn (e.g. glasgow scale, vital signs, fluid input/output, and other assessments, investigations and therapeutic interventions). Monitor the central venous pressure (± PCWP) prn.

Other points: type and amount of ng drainage (bile only?; swallowed blood from epistaxis/hemoptysis?) → continuous or intermittent gastric suction?, zantac® I.V.? (stress ulcer prophylaxis?); gross or micro hematuria? (no red cells? → myoglobinuria?; red cell casts?/nephritis?, on anticoagulants?, trauma or renal/bladder tumor?, UTI?, renal calculus?), minimum urine output 1cc/kg/hr for children to 50^{+}cc/hr for adults, instill xylocaine jelly into the urethra prior to catheterizing males, obtain toxic screens on gastric aspirate and urine prn, use an infusion pump prn (e.g. dopamine), and give prophylactic low dose heparin (e.g. 5000 units s.c. q12h), if appropriate. Multiple trauma patients require the following (portable?) x-rays (± others prn): skull, cervical spine, chest, abdomen, and pelvis. CT Scan?, MRI? (e.g. shaken baby syndrome → retinal hemorrhages?). Last meal?, keep NPO?

Be on the look out for the abuse (psychological/physical/ sexual), and neglect of children, women, the handicapped, and the elderly (discrepancies in the history and physical?).

Brief pause prn: any change in the clinical status or the vital signs?: assessment: investigations and available results: timely management prn: inform, comfort, and reassure the patient prn.

Once the patient is stabilized, don't hesitate to take a few moments to collect your thoughts and review the case with the help of the mnemonic (see page 6). Ask yourself, "Am I missing anything?", " Is there something else going on?" It may be helpful to visualize the anatomy involved (e.g. abdominal pain), in order to assist you in your

differential diagnosis. Beware of making premature decisions, or excessive procrastinating. Obtain appropriate, timely, consultations prn.

(11) History (finish): whenever and from whoever (patient ± significant others via the nurse prn, e.g. family, friends, EMTs, police, family physician), old charts prn if available (often invaluable/faxed from other institutions prn).

(A) Chief complaint(s) and history of present illness or injury → new illness?, reason for seeking care at this time? (the patient may have another "agenda," e.g. depression, substance abuse, cancer/heart-phobia). Keep in mind that the older generation frequently have memory deficits (one elderly gentleman told me that he had "craft disease," which he described as "can't remember a fxxxing thing.")

(B) Functional inquiry, for example, fatigue (anemic?), fever, chills, rigors (pneumonia/pyelonephritis?), malaise, night sweats (TB?), heat or cold intolerance (hyper/hypo-thyroid?), myalgia, pain (where?, what hurts?), anorexia, polyphagia (diabetes?), weight change, insomnia (depressed?), nervousness, agitation, anger, depression, suicidal preoccupation? → "Are you a danger to yourself or others?" (record the patient's response on the chart) → suicide note?, method contemplated?

Headache(s) (new? meningitis?, brain tumor?, warning leaks?), vision (detached retina?/vascular occlusion?), diplopia (myasthenia gravis?), ocular pain (iritis?, glaucoma?), hearing loss (sudden?, idiopathic?), tinnitus (acoustic neuroma?, Menière's disease?, ASA toxicity?), dizziness (cardiac arrhythmia?), vertigo ± nausea (labyrhinitis?), nasal obstruction and discharge (purulent?, sinusitis?), epistaxis (on ASA?), mouth sores (neoplastic?), teeth, bleeding gums (bleeding disorder?), pain or swelling of face or neck (infection?, neoplasm?), sore throat(s) (recurrent tonsillitis?), odynophagia (epiglottitis?), dysphagia (ca of esophagus?), hoarseness (ca of larynx?), difficulty with breathing, snoring (sleep apnea?, pickwickian syndrome?).

Cough (smoker?, aspirated foreign body?), sputum (purulent?), hemoptysis (group A strep. infection?, cancer?), wheezing (asthma? and/or toxic exposure?), dyspnea (e.g. exertional, paroxysmal nocturnal, orthopnea, or at rest); chest pain (visceral?, somatic?, with radiation?, related to exercise?, cold?, meals?, stress?, or coitus?); palpations (PVC's?), intermittent claudication (PVD?), pretibial edema (CHF?); breast lumps or discomfort (mammogram?), nipple discharge (ductal ca?).

Thirst (infants/ decreased diaper change/ dampness?), heartburn (IHD?/Ca?), antacid* use?, abdominal pain or discomfort (location? e.g. mid-epigastrium/Ca of pancreas?), nausea, vomiting (fever?, others also ill?, neurological symptoms/signs?, vector? e.g. seafood); hematemesis (on NSAIDs?), jaundice (hepatitis?, neoplasm?), bowel function (Ca of colon?), diarrhea, melena (on iron tabs?), hematochezia, rectal bleeding (Ca of rectum?), rectal problems, groin discomfort/hernias, ("pigging out" on fresh beets, which contains the food pigment anthrocycan, may result in simulated hematochezia/ hematuria. Blueberries can result in pseudomelena/liquid tylenol in vomitus may be reported as blood by the patient).

Dysuria/urgency/frequency (UTI?), polyuria/polydipsia (diabetes mellitus/insipidus?), nocturia (prostatic Ca?), hematuria (bladder/renal neoplasm?, UTI?), perineal lesions (STD?, cancer?), urethral discharge (STD?), testicular pain/discomfort or lumps (cancer?, torsion?, epididymitis?), L.M.P.? (BCP?), menstrual problems (e.g. secondary dysmenorrhea, endometriosis?), pregnancy (ectopic?) and menopausal problems, vaginal discharge (Ca of cervix?), dyspareunia (pelvic pathology?/endometriosis?).

Joint, back and skin problems (e.g. rash?, easy bruising?), lumps anywhere?

Problems with memory, thinking, speech, movement, gait (Guillian-Barré syndrome?), sensation; syncope? (while standing? or recumbent?, with effort/exercise?, orthostatic hypotension?, vasovagal?, posttussive or postmicturition?, obstructive cardiomyopathy?); drop attacks? (with no change in mental status/posterior circulation TIA?).

(C) Past history and current health status → old charts (ask the examiner: "what do the old charts tell me?") → past and pre-existing problems → medical, surgical (including OB & GYN), psychiatric; e.g. diabetes?, hypertension?, IHD?, hyperlipidemia?, seizures?, surgeries?, pacemaker?, artificial heart valves?, splenectomy?, previous blood transfusions?, hepatitis B^+/C^+?, HIV^+? Past history of psychological, physical, and/or sexual abuse? (patients with a history of dysfunctional behaviour may have a higher incidence of being a victim of past or present abuse → opening line e.g. "What was your childhood like?").

(D) Personal history: *allergies*, *medications* including contraceptives, topicals, transdermal patches, inhalers, aerosols/home O_2, and over the counter meds (e.g. NSAIDs, megavitamens), ± recent changes, ± compliance

* Ask the patient if they carry a pack of antacid tablets with them most of the time.

(takes less or more than the recommended dosage → "we all have trouble remembering to take our medications, how often do you forget?"). Inquire about substance abuse, e.g. nicotine, excessive alcohol, "drugs," e.g. cocaine, excessive caffeine (anxiety?, hypokalemia?). Remember to ask about exposure to second hand cigarette smoke (e.g. asthmatic child/adult and/or patients with, for example, frequent sinusitis and/or chest infections). Stress the importance of a smoke free environment.

Other: recent foreign travel (e.g. malaria); occupation (e.g. coal miner), pets/animal exposure (e.g. parakeets/psittacosis), martial status (e.g. recently divorced), socially isolated?, financial or family problems?, regular adequate exercise?

Make the appropriate allowances for a patient's cultural differences prn. Do not pass up the opportunity to briefly* counsel patients on their life-style or substance abuse, when they may be very vulnerable to your suggestions (you may even precipitate a change in their behaviour!†). I often tell patients about a friend of mine who, "out of the blue," quit smoking (1-2 packs/day), and drinking (20-40 oz./rum/day), one Monday morning, now some twenty years ago (without AA, nicotine patches, valium®, or even a physician visit; said he hadn't planned to quit that day, said it was because he woke up that morning with such a bad taste in his mouth; his actual description was much more "graphic in detail").

In addition, when appropriate, discuss accident/injury prevention with the patient, e.g. defensive driving?, seat belt use?, motorcycle/bicycle helmet use?, workplace safety/protective gear/safe work habits?

(E) Family history e.g. coronary artery disease in the relatively young (e.g. 40's). Familial hyperlipidemia?, other familial disorders?

(12) Physical exam (secondary survey and additional investigations and procedures): Tell the examiner/patient you are going to do a complete physical examination: inspection first, e.g. what do I see when I look at etc.?

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* Sometimes a brief discussion, or comment, is all that it takes to make a positive, permanent, alteration in a patient's lifestyle. It is worth the effort. You may at least facilitate some harm reduction (e.g. decreased alcohol consumption). But remember, lecturing just doesn't work!

† It may also be appropriate to have a pointed discussion with the patient regarding their multiple, behaviour-related ER visits (after the patient has settled down/sobered up, e.g. visits are always alcohol/drug related with loud, demanding, disruptive behaviour).

Remember that a careful physical examination (not necessarily academically detailed), and judicious investigations/consultations, may turn up something that you did not expect to find. Some examples are: glaucoma, mild Bell's palsy, carotid artery stenosis, CNS neoplasm, subcutaneous emphysema, pericardial rub, mediastinal crunch, myocardial infarction, atypical pneumonia, pancreatitis, mild jaundice, appendicitis, pyelonephritis, incarcerated hernia (strangulated?), torsion of the testicle, ectopic pregnancy, abdominal aortic aneurysm, cancer of the skin/oral cavity/larynx/breast/lung/kidney/colon/bladder/ovary/uterus/cervix/-rectum, diabetes mellitus, anemia, leukemia, renal failure, hypokalemia, hyponatremia, poisonings.

General description, vital signs and skin: awake?, alert? appears acutely or chronically ill?, toxic?, distressed?, diaphoretic?, (patient's hand placement?, e.g. gallbladder area), SOB?, pale?, cyanosed? (peripheral or central cyanosis?, supraclavicular cyanosis/pericardial tamponade?), jaundiced?, anxious?, agitated?, tremulous?, appears hostile or angry?, looks depressed?, apparent age?, approximate height and weight?, nutrition?, hydration? rash?, erythroderma?, exfoliation?, petechiae?, purpura? (palpable?, nonpalpable?, nonblanching?, +hematuria?); wounds?, lacerations?, bites?, linear abrasions and contusions? (assault?), needle tracks?, skin lesions (undiagnosed neoplasm?, e.g. melanoma?*, refer for adequate excision/biopsy prn), decubitus ulcers?, cellulitis?, burns? → 100% O_2?, copious ringers?, prophylactic intubation?, escharotomy?, toxic combustion gases? e.g. carbon monoxide, cyanide, phosgene, (be liberal about ordering carboxyhemoglobin levels).

HEENT: inspect and palpate the scalp, the cranium, and the face; auscultate the head, the eyes and the neck prn, transillumination prn, x-rays?, CT scan?, MRI?, arteriography?

Eyes: ptosis?, pupils, visual acuity (including visual fields), eye movements, nystagmus (horizontal?, vertical?, rotary?), lids, conjunctiva, sclera, cornea (contact lens?), anterior and posterior chambers, retina (subhyaloid hemorrhage?), macula, disc, bruits, slit lamp exam prn, tonometry prn (with a weight of 5.5grams, a reading of > 4 represents a normal intraocular pressure of 20mmHg or less; glaucoma?, steamy cornea?, marble hard eye?), fluorescein staining of the cornea prn (caution: contact lenses will take up fluorescein), x-rays prn (intraocular foreign body?), eye patch prn (± antibiotic ung?), eye shield prn.

* The ABC's of a melanoma → asymmetrical configuration, irregular border, varying degrees of pigmentation in the same lesion, recent changes in a "mole."

Caution: ocular procedures (e.g. removal of a corneal foreign body), may occasionally precipitate a vasovagal reaction.

Remember that vision is the vital sign of the eye.

Ears: external ear (hematoma?), TM (hemotympanum?, CSF leak? → basilar skull fracture?), hearing.

→ Beware of perichondritis, malignant otitis externa (diabetic?, immunocompromised?), acute tympanic perforation with vertigo and/or complete hearing loss, unilateral serous otitis (pharyngeal neoplasm?), mastoiditis, cholesteatoma, Menière's disease and acoustic neuroma.

Nose: general appearance (fracture?), patency, foreign body? (e.g. toddler), septum (hematoma?), tumor?, CSF leak?, purulent discharge? (acute sinusitis?), epistaxis? (nasal cautery and/or nasal packing/Epistat® prn), nasal flaring in infants (respir. distress?). Note: titrate the amount of saline injected into the Epistat® balloons with the nasal bleeding and the patient's discomfort. You may have to give several small injections of 1-2mL of saline, allowing the patient a "breather" in between saline injections. (I have never yet had to, or been able to, completely fill the Epistat® balloons. A very useful device, especially at 0400* hours!)

Oral cavity: breath odor (occasionally helpful, e.g. DKA, tonsillitis), mucosa, teeth, tongue, pharyngeal tonsils/-adenoids enlarged?/infected?/throat culture?, intraoral laceration from unwitnessed seizure?, undiagnosed neoplasm?

Neck: stridor? (impending complete upper airway obstruction?), voice (hoarse?, cancer?) , thyroid (scar?), movement (cervical precautions prn) and posture (nuchal rigidity?), JVP (CHF?), lymph nodes (infection?, lymphoma?, metastatic?), larynx (fracture?), trachea (midline?), carotids (bruits?), subcutaneous emphysema?, injuries?.

Chest:

Inspection → dyspnea?, audible wheeze?, respirations (tachypnea?), use of accessory muscles, indrawing, asymmetry, grunting (infants), injuries.

Palpation - percussion → point?/tenderness? (costochondritis?, #rib†), dullness, tactile fremitus.

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* Once the epistaxis has been arrested with the Epistat®, the patient can then be admitted, and have a daytime ENT consultation (resulting in a very grateful otolaryngologist!).

† Alcoholics may have rib fractures (new and old), and not remember any injury taking place.

Auscultation → air entry?, rales, rhonchi, rubs (pleurisy?, pulmonary embolism?, pericardial rub?, or mediastinal crunch?), whispered pectoriloquy, (basal rales cleared by coughing?).

In addition: pulse oximetry prn, PEFR prn, arterial blood gases prn, chest x-ray prn (portable? + expiratory film?), FEV_1 prn, FVC prn, thoracocentesis prn, bronchoscopic prn, ventilation and perfusion scan prn, pulmonary angiogram prn.

It may be useful not to take a smoking history until immediately after listening to the typical smokers' chest → "How much do you smoke?" "A pack a day." "Maybe your chest is trying to tell you something." → the patient usually nods in agreement → discussion → "In other words, I should stop smoking." Keep in mind that smoking is still public enemy number two (second of course, to man's inhumanity to man, e.g. the snipers of Sarajevo*). Is the patient being admitted? → try a written "No Smoking" order.

Breasts: general appearance, skin ("orange peeling" sign?, retraction?), nipples (discharge?, ductal Ca?), lumps (cancer?, mastitis-abscess?), axillary/ cervical lymphadenopathy?, aspiration of breast cyst prn, mammogram prn, biopsy prn.

Cardiovascular System:

Inspection → distended neck veins?, JVP, precordial heave.

Palpation → apex, thrill, B/p bilateral, peripheral pulses and edema, capillary refill (< 2 seconds?).

Auscultation → rhythm, rate, murmurs, clicks, snaps, pericardial friction rubs (pericarditis?), and mediastinal crunch (pneumomediastinum?); bruits.

In addition: central lines prn → CVP prn (normal = 5-10cm H_2O), Swan-Ganz cathader prn (pcwp normal = 10mmHg), cardiac index prn, arterial lines prn, doppler prn, angiography prn, CT scan prn, echocardiogram prn, holter monitoring prn, stress EKG prn, cardiac cathaderization prn, angioplasty prn, bypass prn, intraaortic balloon pump prn.

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* In harm's way: Peter Vaughan, MD: CMAJ 1997; 156:855-6.

Abdomen and Rectum:

Inspection → distension?, surgical scars? (splenectomy?), mass? (pulsating?), hernias?, peristaltic movements?

Auscultation → bowel sounds (normal?, absent?, ileus?); bruits.

Percussion → tenderness? (localized by coughing?), liver, spleen, shifting dullness? (ascites?).

Palpation → tenderness? (flank?/renal?), peritoneal irritation? (involuntary rectus spasm?, board-like rigidity?), mass?, pulsating? abdominal aneurysm?, hernias?, liver, spleen, kidneys.

Rectal (bimanual prn)

→ fissures?, fistula?, herpes?, condyloma?, hemorrhoids?, anal sensation and sphincter tone, fecal impaction?, F.B.?, tumor?, prostate, abscess? (e.g. ischio-rectal), pelvic tenderness?, blood? (hematochezia?, melena?/occult bleeding?), rectal/stool smears/-cultures (and ova/parasites) prn, pelvic fracture? (careful rectal exam).

In addition: obturator/psoas/heel tapping signs (appendicitis?, diverticulitis?, PID?), Murphy sign's (GB disease?), pelvic exam prn, serial abdominal girth prn, abdominal series prn (need an upright chest or a left lateral decubitus x-ray following 5-10 minutes of positioning prn in order to demonstrate free air), ultrasound prn, proctoscopic prn, sigmoidoscopic prn, gastroscopic prn (endoscopic sclerotherapy/coagulation?, e.g. esophageal varices; inject site of bleeding gastric/duodenal ulcer with adrenaline?), water soluble contrast UGI and/or barium enema prn, gastric lavage prn (e.g. poisoning, UGI hemorrhage {bloody aspirate clears?} → intubate first prn {e.g. tricyclic overdose with ↓LOC} → trendelenburg and left side position → use a Ewald tube, adult size = 36 - 40, children = ± 18 - 36 F); peritoneal lavage prn and/or CT scan prn (for peritoneal lavage use ringers 20cc/kg to 1 litre → ng, foley and abdominal series 1st, old abdominal surgical scars?); appropriate antibiotics prn, Blakemore tube prn, colonoscopic prn, nuclear scans prn, retrograde cholangiopancreatography prn, liver biopsy prn.

℞ for example, rupturing abdominal. aneurysm, GI hemorrhage, ectopic pregnancy, perforated viscus (including esophagus), peritonitis, acute mesenteric occlusion (disproportional pain), toxic megacolon, peptic ulcer (helicobacter pylori infection?), gastritis, esophagitis (xylocaine/antacid po?), cholecystitis (hemorrhaging hepatic adenoma?), hepatitis, pancreatitis, appendicitis (only ruled out with time and

reassessments including rectal exam prn; left shift WBC's?, ultrasound?, mesenteric adenitis?, Mettelschmerz?, Meckel's diverticulum?); diverticulitis, inflammatory bowel disease (irritable bowel syndrome?), sigmoid volvulus (distended sigmoid extends to RUQ), or cecal volvulus (distended cecum extends to LUQ), ischemic colitis, incarcerated/strangulated? hernia, bowel obstruction, renal calculus? (complete ureteral obstruction?), UTI?, trauma (e.g. ruptured spleen, lacerated liver, retroperitoneal hemorrhage {fractured pelvis?}, pancreatic tear, bowel perforation, kidney/bladder rupture); pyloric stenosis (infant), intussusception (child ± 1 year, RUQ mass?), midgut-volvulus (child ± 1 year). Also, intrathoracic disease (e.g. pneumonia, acute inferior MI), diabetic ketoacidosis (± intraabd. pathology), sickle cell crises and others (e.g. porphyria/porphyrinuria? ± neurological manifestations?), may present with abdominal pain.

Remember that: (1) the patient may temporarily feel better when the appendix perforates, (2) abdominal pain sometimes turns out to be a result of constipation often promptly "cured" by a fleet enema (more frequent in children?), (3) any middle-aged/elderly patient with abdominal/back pain should have an abdominal aortic aneurysm ruled out (it may or may not be palpable or pulsatile, ultrasound?, CT scan?). Beware of attributing the pain of a leaking abdominal aortic aneurysm to, for example, diverticulitis/appendicitis/UTI/renal calculus, or radicular pain (abdominal aortic aneurysms may also present with weakness/syncope/intermittent or sustained hypotension with minimal or no pain, a "great imitator"), and (4) X-ray confirmation is required to demonstrate that a radiopaque foreign body (e.g. a coin) has passed into the child's stomach. Beware of button batteries that lodge in the esophagus.

In addition, be careful to distinguish between uncomplicated and complicated gallbladder disease, for example, simple biliary colic, cholecystitis requiring antibiotics, concomitant pancreatitis, perforated gallbladder, cholangitis (life threatening).

Genitourinary System: examine the genitalia (beware of undiagnosed gynecological cancers/testicular tumors and testicular torsion); gonorrhea, chlamydia, and herpes cultures prn (plus a gram stain for gonorrhea ± other smears and cultures etc. prn → e.g. "hanging drop", darkfield microscopy ± VDRL, PAP smear; HIV antibodies?); urinalysis and culture prn, KUB prn, IVP prn (in head injury patients do CT scan 1st); continuous bladder irrigation (CBI) prn; urethrogram prn (suprapubic drainage of a distended bladder with a temporary intracath prn); cystogram prn, cystoscopic and a retrograde pyelogram prn, CT scan prn, arteriography prn, dialysis prn, renal biopsy prn.

Pregnancy and more Gynecology: prenatal record available? (the patient may have a copy), serum pregnancy test prn (ectopic pregnancy?), ultrasound prn (transvaginal?), culdocentesis prn, D and C prn, gynecological biopsies prn, laparoscopic prn; fetal monitoring prn (external or scalp), and monitor strip prn, fetal scalp blood gases prn, immediate obstetrical delivery prn (double setup exam in the OR?, cervical dilation?, station?) → vaginal delivery or c-section prn. Avoid doing a vaginal or rectal exam in the ER on patients with third trimester p.v. bleeding → ℞ ABC's, ultrasound, consult obstetrics. Rh negative? → WinRho SD® 120-300^{+}µg prn.

On occasion, a patient may arrive at the ER, in labor, delivery imminent, who at triage complains of abdominal pain, but makes no mention of or denies pregnancy (may also present with headache/seizure/coma/hypertension/other features of preeclampsia/ eclampsia).

Beware of an ectopic pregnancy, a ruptured hemorrhaging ovarian cyst, a ruptured tubo-ovarian abscess, and vaginal tears. Remember that any female capable of becoming pregnant (including those with a history of tubal ligation[*]), with lower abdominal pain (especially unilateral; ± p.v. bleeding; endometriosis?), should have a serum pregnancy test done (ICON), and if positive, the diagnosis is an ectopic pregnancy until proved conclusively otherwise. In normal pregnancies the serum beta-HCG levels should double every second day.

Lymphatic/hematologic → epitrochlear, cervical, axillary, and inguinal lymph nodes (lymphoma?); spleen; bone marrow aspiration prn, lymph node biopsy prn. Anemia? → acute/chronic blood loss? (e.g. ca of the colon), or decreased production (e.g. pernicious anemia), or increased destruction (e.g. hemolytic anemia). Serum iron and/or B_{12} and folate levels?, coombs test?

Back, pelvis and extremities:

→ Inspection and range of movement of the back, tenderness?, log roll prn (exit wound?); if an injury is suspected, restrain on a backboard until a fracture and/or neurological injury is ruled out, CT scan?, MRI?

→ Pelvis → fracture? → hemorrhagic shock?, associated inquiries?, e.g. ruptured bladder.

[*] I recently attended a patient who had an ectopic pregnancy ten months following a cesarean section/tubal ligation. The patient presented with sudden, severe, generalized lower abdominal pain and nausea (menses was six weeks previously). The lower abdominal and pelvic tenderness was also generalized, and there was no bleeding from the cervical canal (the serum pregnancy test was positive).

→ Extremities: injuries?, needle tracks?, lesions?, range of movement?, radicular pain?, varicose veins?, DVT?, peripheral vascular disease?, popliteal aneurysm?, crush injury? (compartment syndrome?), neurovascular-tendon status?, arterial injury? (pulse oximetry?).

→ Joints → overlying erythema?, deformity?, warm to touch?, effusion?, hemarthrosis? (hemophilia?), crepitus?, associated muscle atrophy?, movement. Polyarticular involvement? → fever?, lethargy?, anorexia?, other systems involved?, e.g. skin, eyes, heart, GI, renal, lymphatic/ hematologic, CNS.

Beware of the septic joint, osteomyelitis, and osteogenic sarcoma.

→ Fractures (compartment syndrome?) → open?, gross deformity?, point tenderness?, bony crepitus?, instability? → splint fractures and reduce dislocations with pre and post neurovascular status assessment.

→ In addition: x-rays prn, myelogram prn, CT scan prn, MRI prn, arthrocentesis* prn/arthroscopic prn → irrigate joint prn (septic joint?), arthrogram prn (complete rotator cuff tear? → persistent limited movement after local lidocaine injection?), ESR/ ANA/ Rh factor prn, STD/chlamydia?, streptozyme®?, sickeldex®?, bone scans prn, venogram/ultrasound prn, doppler prn, arteriography prn.

Central Nervous System:

Mental status → alert?, orientated?, cooperative?, mood, speech, thought, insight.
→ infant → playfulness?

Cranial nerves → smell, visual acuity and fields, eye movement (nystagmus?), pupils (reactive?, use magnification prn), corneal reflexes, papilledema? (bulging fontanelle in infants?), facial sensation, facial movements (lower facial paralysis only in upper motor neuron disease), hearing, vestibular tests prn, gag reflex?

Motor → neck, arms, trunk, legs → involuntary movements? (tremulous?, asterixis?), wasting?, atophy? → power, tone, coordination, gait (Romberg's sign?, cerebellar or dorsal column ataxia?).

Reflexes → deep tendon reflexes/plantar reflex/symmetrical?, clonus?, grasp and sucking reflexes?.

* Do not insert the needle through an area of overlying erythema (cellulitis?).

Sensory → stimulate above and below the foramen magnum; pain and temperature (anterior cord), vibration and position (posterior cord), touch, two point discrimination, stereognosis (cortex); ipsilateral and contralateral straight leg raising, nuchal rigidity?, Kernig's or Brudzinski's signs.

In addition:

→ Infant → inconsolable crying or crying when picked up by the parents → meningitis?

→ Trauma → CSF leaks? (clear fluid draining from the nose or ears?, dipstix positive for glucose?), CT scan?, MRI?

→ Uncal syndrome → ataxic respirations, ipsilateral pupillary dilation (oculomotor nerve) and contralateral hemiparesis → epidural hemorrhage?

→ Pinpoint pupils → narcotic, clonidine or phenothiazine overdose?, cholinergics?, miotic eye gtts?, pontine hemorrhage (ocular bobbing?) or cerebellar hemorrhage?, (miosis reversed with narcan®? → acute opiate withdrawal?, restrain patient first?); stat CT scan prn, refer neurosurgery prn (cerebellar hemorrhage needs immediate neurosurgical intervention).

→ Pupil reactivity is retained in toxic/infectious/metabolic coma.

→ Drop attacks (no LOC) → posterior circulation TIA?

→ Sacral sparing (incomplete cord lesion).

→ Spinal shock → hypotension, priapism.

→ Locked-in syndrome (destruction of ventral pontine tracts).

→ Beware of bizarre neurological symptoms ± physical findings, e.g. warning CNS bleeds, brain tumors, TIA, multiple sclerosis → CT Scan?, MRI?, LP?, referral?

→ X-rays → special views?, e.g. flexion and extension views of the cervical spine (with a physician present; unstable ligamentous disruption?).

→ Lumbar puncture prn (with seizures, a decreased mental status, papilledema or focal signs do a CT scan first before deciding to proceed) → repeat the L.P. in 6 hours?, L.P. contraindicated in bleeding disorders (DIC in progress?). If the possibility of bacterial meningitis crosses your mind then, unless contraindicated, you should go ahead and do a lumbar puncture (do blood cultures first and then I.V. antibiotics before or after the

L.P., depending on the patient's clinical status, err on the side of giving antibiotics, for example, adults/- ceftriaxone 2g plus ampicillin 2g).

→ Fundi → spontaneous venous pulsations in the recumbent position → no increase in intracranial pressure.

→ Emergency myelogram prn (e.g. acute spinal cord compression from metastasis or central disk protrusion or abscess; focal back pain?, level?, urinary incontinence or retention?, CT scan?, MRI? (the "gold standard"), I.V. decadron®?, I.V. antibiotics?, radiation?, emergency surgery?).

→ Emergency EEG prn (seizure arrest in status epilepticus real or apparent?; status psychomotor seizures?).

→ Intracranial pressure monitoring prn, normal = 5-15mmHg.

→ Third cranial nerve palsy → dilated pupil, eye deviated downwards and laterally (5 o'clock).

→ Sixth cranial nerve palsy → eye deviated downwards and medially (7 o'clock).

→ Sustained upwards/downwards gaze → brainstem/cerebral damage.

→ Dermatomes, some examples:

C6 - thumb (biceps reflex).

T10 - umbilicus.

L3 - anterior knee (knee reflex).

L5 - great toe.

S1 - lateral foot (ankle reflex).

→ Nerve conduction studies prn.

→ early pain control may significantly reduce the number of analgesics required later (neuroplasticity).

(13) Conclusion:

(A) Review the diagnosis(es) and treatment with the consultant(s), the patient, the family, and the family doctor, e.g. "Please call the cardiologist." Beware of consultant inertia. Ask the patient and the family if they have any questions, and give a realistic prognosis. For example (excerpt), "All heart attacks are serious." "He is stable right now." "I cannot give you any guarantee, but I expect him to do OK." "The cardiologist will be able to tell you more over the next few days." (Displaying the "cross your fingers" sign {± "so far, so good"}, may be at times an appropriate adjunct to relaying your "gut feelings" to the patient/family, e.g. epistaxis, threatened abortion).

(B) Disposition*

1) Admit → to where? → for example, to a standard bed†, a monitored step-down bed, the ICU, the burn unit, the alcohol and drug detoxification unit, or the psychiatric floor (involuntary admission?). The patient may be first sent directly to, for example, the operating room, the hyperbaric chamber, or the dialysis unit. Ideally, the attending physician should see the patient and write the admitting orders in the emergency department. However, for low risk patients, the practice of the ER physician writing the admission orders and the attending physician reassessing the patient "upstairs" at a later time, is both acceptable and realistic. The emergency room physician is responsible for the patient, until the patient is seen by the attending physician.

   The mnemonic "Diet" (**D**iet, **I**nvestigations / consults, **E**xercise/activity and **T**reatment) is useful for writing observation/admission orders. Does the patient have any advance medical directives? e.g. end stage COPD/no intubation.

   Remember: do not let a patient talk you into discharging them, when admission is clearly indicated. However, circumstances may necessitate some flexibility.

2) Transfer (via land, air, sea, to for example a trauma center) with adequate immobilization of the entire patient; the ambulance requires police assistance with traffic?; the simulated patient in a board examination is unlikely to be transferred. Air Transport: the volume of gas increases with a decrease in the barometric pressure → adjust prn, e.g. ET cuff; vent prn, e.g. ng or rectal tube.

   Remember: (1) to ensure that continued active management of the patient occurs during transit, (2) to make mutually satisfactory arrangements for the patient transfer with the receiving hospital, (3) to phone an update on the patient's condition upon the patient's departure, or while in transit, (4) to provide

* Do not be too quick to discount the patient's opinion regarding observation/ admission/ discharge. It is my impression that their judgment has a "good batting average." Remember to make a note on the patient's chart, e.g. "patient declined observation and elected to go home. The pertinent risks were discussed. Advised to return prn." An exception to the above is a patient that refuses observation/ admission because they do not wish to be separated from their alcohol/ nicotine (patients are reluctant to admit to this).

† Our hospital now has home care for up to twenty selected low risk patients (e.g. COPD). The nursing staff consists of former ER and ICU nurses who were looking for new challenges.

nurse/physician escorts prn, and (5) to send copies of the medical, nursing and pertinent old charts, x-rays, Ekg's, and lab reports with the patient. Expedite the patient transfer prn, beware of undue delays.

3) Observation in the emergency room* → prolonged observation of the simulated oral examination patient is unlikely. When actual patients are being kept for overnight observation, it may be necessary to give the relatives or significant others "permission" to go home (relieve the guilt).

4) Discharge† → instructions‡ , prescriptions, and time off work slips§ (the patient needs to be accompanied home by a supportive relative or significant other?) → follow-up → family doctor, social services (requires home support?, needs immediate placement in a women's/children's shelter?); public health and other reporting (e.g. child and elder abuse → usually admitted; motor vehicle registry for review of driver's license, e.g. alcoholism). Transportation home? → present fitness to drive a motor vehicle? (e.g. alcohol, drugs ± iatrogenic?, head injury) → also applies to patients who leave against medical advice. Remember to invite the patient to return if necessary.

5) Patient wishes to leave against medical advice → Is the patient competent to refuse treatment?, e.g. drugs, alcohol, psychosis, mentally handicapped, head injury → document your substantiating findings, e.g. mental status → have the patient sign the refusal of treatment form if possible. Do not let an incompetent patient with

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* Even after overnight observation of a patient that is now completely asymptomatic, e.g. "flu/abdominal. pain," remember to advise the patient to return if there is a significant recurrence of their symptoms, e.g. RLQ pain (should the patient subsequently develop acute appendicitis then they will not forever think you missed the diagnosis). Avoid "famous last words", e.g., "this is not your appendix."

† When discharging patients who will/may have pain at home, do not forget to give them a few analgesics tablets "to go", e.g. tabs 5 of Tylenol® with codeine, or Demerol® 50mg (if appropriate). Even if it turns out that the patient does not need the tablets, they may find it reassuring to have them on hand (also applies to anxiety/ativan® tabs 5). If the patient requires additional medication, they can see their own physician (follow up may be indicated in any case). Again, be on the look out for drug seekers, or a past history of drug abuse.

‡ Discharge instruction sheets (e.g. head injury, fever, casts, sutures) must be explained to the patient.

§ Reinforce the "work ethic" whenever the opportunity avails itself, for example, to the patient who wants to take as little time as possible off work, "I like your attitude."

a significant problem leave the ER* (easier said than done). Remember to give the patient an invitation to return anytime, and a "welcome back" if they do return ("He's back!!!" → sometimes a test of your cordiality). In addition, you should attempt to provide optimal outpatient management, e.g. antibiotics for pneumonitis. For the board oral examination purposes, the simulated patient will stay if the importance is explained to them.

6) Patient expires (all simulated patients survive) → try to have the family prewarned, even if only for a few moments beforehand → grief counseling, coroner's case?, autopsy?, organ donations? Avoid "breaking the news" over the telephone, if at all possible, without being untruthful.

During grief counseling, try to accomplish the following (as appropriate):

(1) Relieve the family and significant others of any blame.

(2) Review the diagnosis and treatment, and stress that everything that should have been done, was in fact done.

(3) Clear up any misconceptions or misunderstandings (sometimes not possible). For example, a patient with lung cancer who has just expired as a result of a sudden, massive hemoptysis → angry wife "his doctor said he would live for one or two years" → fact and fate related discussion.

(4) Advise the relatives and significant others not to hold their feelings back,† and avoid the "stiff upper lip."

(5) Advise delaying any important decisions (e.g. selling the family home), for a considerable time (e.g. 6-12+ months).

(6) Give the relatives the opportunity to view the body of the deceased if they so wish (after the resuscitation room has been "cleaned up").

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* Some jurisdictions have a "hospital act" which allows the police to detain an incompetent patient for assessment/observation.

† Remember, there is nothing wrong with letting your feelings show, and making physical contact with the grieving survivors. I often make a small monetary donation to the hospital in memory of the patient, and I frequently receive back a very appreciative note from the family. It has always bothered me that before the family leaves the ER, they may see you back to work as if nothing has happened. The donation, I hope, demonstrates to the family that their relative's death did not go "unnoticed" by the ER staff.

(7) Refer the "victims" to their family physician for follow-up, and to support groups prn, for example, the parents of a SIDS patient. Remember that the grief reaction doesn't always resolve itself, and may result in long term sequelae, e.g. depression, divorce, alcohol abuse.

In addition, stress the importance of not interfering with the grief reaction with sedatives. However, it may be comforting for them to have a few tablets on hand just in case they feel they really need them. If so, give placebo amounts (e.g. ativan® 1mg tabs 5), so as not to interfere significantly with the grief reaction. Remind the family, friends, and significant others that they, not medications, will provide the most important comfort to each other.

Remember the grief reaction can include anger. If the family becomes angry and hostile, stay calm, and try not to take it personal.

Other "victims", for example, an operator of a motor vehicle which has just hit and killed a pedestrian, may also need early psychological intervention. As well, the ER staff after a prolonged unsuccessful resuscitation attempt may need "debriefing" (e.g. a pediatric drowning).

Last but not least: when patients are leaving your care (admitted, discharged, transferred, shift change), don't forget to say goodbye (and good luck!).

Please note: most of the simulated patients will require admission. Following the case the examiner will usually ask you a few straight forward questions (know your pathophysiology and therapeutics).

The Short form of the Management Guide

(1) The initial description of the patient, and the vital signs as supplied by the examiner (are the vital signs complete? → level of consciousness, P, R, B/p, and body temperature).

(2) Ask: "What does the patient look like?" (and for any missing vital signs).

→ "What does the nurses' triage and admission notes tell me?"

(3 or 4) Order the initial stabilization by the nurses, and/or the EMTs, e.g. CPR, O_2, monitor, pulse oximetry, I.V.(s) etc., e.g. bloodwork, drug allergies?, present meds?, old charts?, restrain prn, search prn, undress. Have the patient's premises searched prn, by the EMTs/police/significant others (suicide note?, drugs?, poisons?).

(3 or 4) Introduce yourself to the patient, and take an initial history.

→ use universal precautions, and don't forget to wash your hands between patients (easy to overlook!).

(5) Airway/cervical spine/cord: thiamine prn, dextrose prn, narcan® prn(± flumazenil?).

(6) Breathing.

(7) Circulation, and finish the primary survey (an abbreviated complete assessment).

(8) Foley catheter drainage prn (urethra ok?).

(9) Urinalysis prn.

(10) Nasogastric tube prn (cribiform plate ok?).

(11) Mast prn (usually applied during the ABC's).

(12) Gram stains and cultures prn, ± other stains prn.

(13) Tetanus toxoid prn, and tetanus immune globulin prn.

(14) Antibiotics prn (often I.V., cultures first prn).

(15) Analgesics prn (early prn, often I.V.).

(16) Flow sheets prn → assessments, investigations, and therapeutic measures.

(17) Frequent vital signs, and patient reassurance prn.

(18) Finish the history (present, past, personal, family).

(19) Physical exam (secondary survey), and additional investigations, procedures, and therapeutic measures.

(20) Diagnosis(es), treatment, and the disposition of the patient (e.g. ICU)

Significant Reminders

→ these are numbered, indexed, and loosely arranged by organ systems or specialty, and are not necessarily related to the preceding or subsequent significant reminder. This makes it necessary for the reader to "change gears" frequently, much like when working in the ER, where patients present in an unpredictable pattern.

→ "Listen up" (including me): remember to pause, visualize, and reflect, while reading through the significant reminders.

I. CPR - ELECTROLYTES - ACID - BASE

(1) Basic Life Support

(A) The "Chain of Survival"

→ early access, early CPR, early defibrillation, and early ACLS.

(B) CPR:

(1) Establish unresponsiveness.

(2) Obtain assistance (help!); activate the EMS.

(3) Properly position the patient.

(4) Open the airway.

(5) Establish breathlessness.

(6) Ventilate the patient (airway obstructed?, Heimlich manoeuvre?).

(7) Establish the presence or absence of a pulse (carotid).

(8) Precordial thump? → perform closed-chest compressions prn: depth, 0.5 to 1 inch (infant), 1 to 1.5 inches (child), or 1.5 to 2 inches (adult), times 80-100+/minute.

Compressions/Ventilation ratios = 15:2 or 5:1 for one or two rescuers, respectively, for adults. 5:1 for both situations in infants and children. Compression rates = 80-100 for children and adults, 100^{+} for infants.

(2) Cardiac arrest/Ventricular tachycardia

Remember that not all cardiac arrhythmias/arrests are due to coronary artery disease. Specific management in addition to CPR is required. For example, consider the following as appropriate (*see index prn*):

1. Drug overdoses, e.g. tricyclics (bicarb prn), digoxin (bicarb prn, $MgSO_4$ prn, dilantin® prn, digibind® prn), calcium blockers (calcium gluconate prn, glucagon prn), beta blockers (glucagon prn).
2. Smoke inhalation/carbon monoxide and/or cyanide poisoning?/from burning synthetic furniture materials? → 100% O_2/sodium thiosulfate 25% 1mL/kg to 50mL prn/converts cyanide to nontoxic thiocyanate/early presumptive therapy? Hyperbaric O_2 chamber prn.
3. Hypothermia (core rewarming prn, bretylium prn).
4. Tension pneumothorax/cardiac tamponade (needle decompression prn).
5. Others, e.g. shock (ringers prn), anoxia (ventilate prn), acidosis (bicarb prn), hyperkalemia (bicarb prn), pulmonary embolism (100% O_2, heparin, thrombolytics?, surgery?), trauma (thoracotomy?).

(A) Ventricular fibrillation or pulseless ventricular tachycardia

℞ Precordial thump?, BCLS, ACLS, defibrillate immediately with 200J, and repeat X 2 prn (200J, 360J), then prn*. Epinephrine prn, lidocaine prn, consider bicarbonate, bretylium prn, procainamide prn, amiodarone prn, consider $MgSO_4$.

* hypothermic cardiac arrest?, s*ee also #(2), p.156.*

(B) Ventricular tachycardia with a pulse

℞ Precordial thump?, BCLS, ACLS, lidocaine prn, procainamide prn, consider bretylium, cardioversion prn (usually synchronized, 50^+J ± sedation prn; cardiovert unstable patients prn, e.g. ischemic chest pain, CHF, hypotension, decreased cerebral status).

Accelerated idioventricular rhythm (slow ventricular tachycardia) usually requires no treatment.

→ Beware of iatrogenic ventricular tachycardia secondary to, for example, quinidine (hyperkalemia?), or type 1C antiarrhythmics, e.g. rythmol®. *See also #(12), p.69.*

(C) Asystolic cardiac arrest

℞ precordial thump?, BCLS, ACLS, epinephrine prn, atropine prn, if in doubt defibrillate prn (fine ventricular fibrillation?), consider bicarbonate, consider immediate transcutaneous pacing. Hypothermic cardiac arrest?, *see also #(2), p.156.*

(D) Electromechanical dissociation (EMD)

→ also referred to as pulseless electrical activity (PEA).

℞ BCLS, ACLS, epinephrine prn, rule out correctable conditions, e.g. tension pneumothorax (needle chest prn), pericardial tamponade (pericardiocentesis prn), hypovolemia (ringers prn), hypothermia (core warming prn); consider bicarbonate, consider transcutaneous pacing.

(3) Racemic epinephrine aerosol

℞ 0.5ml 2.25% in 4.5ml saline (e.g. acute laryngeal edema, croup, epiglottitis, bronchospasm). Beware of cardiac arrhythmias, and rebound stridor.

→ I am starting to use a little more racemic epinephrine aerosols, versus ventolin® aerosols, for bronchospasm, especially when it is severe, and I am thinking that I may have to intubate this patient, or when it is part of an allergic complex, e.g. urticaria, angioedema, anaphylaxis. Nevertheless, for bronchospasm, I still use ventolin® aerosols the vast majority of the time (an exceptionally safe drug).

(4) Venous cutdowns:

Proximal saphenous vein → 5cm below the junction of the medial third of the inguinal ligament.

Femoral vein → just medial to the femoral artery.

Distal saphenous vein → just anterior to the medial malleolus.

Basilic vein → 2fb above and medial to the olecranon.

(5) Central Venous Pressure

→ zero reference point at 1-3cm. anterior to the midaxillary line at the 4th intercostal junction. Normal CVP = 5-10cm H_2O. Do not use the cephalic vein for central lines, because of the high failure rate of insertion due to its tortuous course.

(6) pH

pH decreased by 0.10 → bicarb decreased 5meq, or pCO_2 increased 10mmHg → K^+ increased 0.5meq → O_2 availability increased 10% → ionized calcium increased 0.10meq, and vice versa for pH increase of 0.10.

(7) Anion gap

→→ Na - (Cl + CO_2 content) = 12 (normal)

(8) Metabolic Acidosis

(A) Anion gap metabolic acidosis (an acute process)

→ mnemonic mudsleep = methanol, uremia, diabetic ketoacidosis, salicylates, lactic acid, ethanol, ethylene glycol, paraldehyde, and cyanide. In addition, carbon monoxide, iron, or isoniazid poisoning, and any situation that results in hypotension, seizures, or cellular dysfunction.

(B) Non-anion gap metabolic acidosis (a more chronic process)

→ e.g. diarrhea?, cholestyramine?, hyperalimentation?, renal insufficiency?, pyelonephritis?, diamox®?, obstructive uropathy?, renal tubular acidosis?

(9) MAST

→ tamponades bleeding, increased initial venous return, increased perivascular resistance, selective perfusion of the upper body, and stabilization of fractures. Pulmonary edema is an absolute contraindication, and beware of compartment syndromes with inflation times greater than two hours. Deflate MAST very cautiously! (little by little, abdomen first; in the OR?).

(10) Sodium bicarbonate

→ 1meq/kg over 15-30 minutes to avoid paradoxical cerebral acidosis (may have to be given as a bolus in desperate situations, e.g. cardiac arrest, critical hyperkalemia with bizarre looking Ekg complexes).

→ repeat arterial blood gases prn.

Children → dilute with equal amounts of sterile water.

(11) Metabolic alkalosis

→ most commonly a result of excessive diuresis, or loss of gastric secretions, or massive transfusions. Chloride responsive alkalosis (urine Cl < 20meq/L), or chloride resistant alkalosis (may need large quantities of KCl).

℞ chloride deficit = 20% x wt.(kg) x (100 - serum chloride) → give ½ of the chloride deficit over 8-12hrs → give as NaCl/KCl (75:25), and with severe metabolic alkalosis add 0.1 N HCl (NaCl/KCl/HCl → 50:25:25). *See also #(17)(A), p. 62.*

(12) Chronic respiratory acidosis

→ relatively normal pH.

→ lower pCO_2 by 5mmHg/hr.

(13) THIRTEEN

Dead space normal = 2ml/kg.

Tidal volume normal = 10ml/kg.

Minute volume normal = 5-6 L/minute (100ml/kg).

Right to left shunting = lung perfused but not ventilated.

(14) Fluids and electrolytes

→ correct in this order

:

→ (1) shock/significant dehydration (e.g. boluses of ringers), (2) pH, (3) K^+, (4) Ca and Mg, and (5) NaCl. Dehydration/pH/lytes may only be partially corrected initially, with complete correction over time in conjunction with the treatment of the underlying condition, e.g. diabetic ketoacidosis. *See also #(17)(A), p.62.*

→ Remember to consider adverse drug reactions/interactions/toxicity, e.g. diuretics (↓ NaCl, ↓ K^+), theophylline (↓ K^+), digoxin (↑ K^+), ACE inhibitors (↑ K^+), SSRIs (↓ NaCl/SIADH).

(15) Daily water loss (approximate)

→ urine = 1-1.5 liters, skin = 300mL, and lungs = 700 mL.

Severe thirst denotes a water loss of > 3% total body water.

(16) Osmolarity

→ 2 x Na + glucose/mmol/L + Bun/mmol/L = 275-295 mosm/L.

Osmolar gap normal ≤ 10 (actual minus calculated).

(17) Sodium

(A) Hyponatremia

→ dilution, loss (urine Na < 20meq/L), or SIADH (Ca of the lung?, taking a SSRI?)

℞ ABC's, fluid restriction prn, 0.9-3% saline prn, lasix prn.

→ too rapid a correction of serum sodium may result in cerebral edema, and permanent neurological damage. Remember the "idiogenic osmole" factor.

→ initial correction prn of 6-8meq in the serum sodium over 3-4 hours, followed by a correction of ≤ 12meq/day. Remember that I.V. potassium also contributes to the osmolar load.

→ 3% saline is reserved for severe symptomatic hyponatremia (e.g. seizures, 4mL/kg, caution!).

(B) Hypernatremia

→ decreased water intake (e.g. coma), increased water loss (e.g. diarrhea, diabetes insipidus), increased sodium intake (e.g. I.V. sodium bicarbonate), or decreased sodium loss (e.g. renal disease).

℞ ABC's, bolus ringers prn, 0.45% saline prn, ℞ diabetes insipidus prn, ℞ other electrolyte problems, e.g. hypokalemia.

→ same correction precautions as for hyponatremia.

(18) Hypokalemia

→ urine loss, for example, diuretics, diabetic ketoacidosis, alcohol abuse, theophylline toxicity, renal tubular acidosis, cushing's disease, licorice toxicity; GI loss, for example, vomiting, diarrhea, villous adenoma.

→ serum NaCl also decreased?

℞ ABC's, adults 10-40mEq KCl/I.V./hr prn, and treat the underlying etiology (see above).

→ 40meq KCl raises serum potassium by approximately 1 mEq.

→ I frequently give a "bolus" of potassium po in addition to the intravenous route, e.g. micro-K, 4 capsules.

(19) Hyperkalemia

→ tall peaked T waves (in extreme cases may resemble the QRS).

→ renal failure? ± diabetic ketoacidosis?, ACE inhibitors?, digitalis toxicity?, addison's disease?, myoglobinuria?

Emergency ℞ (may be required before the electrolyte levels are available/ T wave changes).

→ ABC's

→ Sodium bicarbonate 50-100meq I.V. over 15-30 minutes prn (if the patient is critical a bolus may be required). Children ℞ 1meq/kg.

→ Calcium gluconate 10% 10-20ml I.V. in D_5W over 15-30 minutes prn (not with digitalis toxicity). Children ℞ 0.2mL/kg.

→ 20 units insulin in 100ml of 50% dextrose I.V. over 1 hour prn. Children, ℞: 1mL/kg 50% dextrose followed by regular insulin 0.1 unit/kg/I.V. (with renal failure/diabetic ketoacidosis, give a bolus of I.V. insulin {10 units adults, 0.1 units/kg children}, followed by an insulin drip, and of course no dextrose. *See also* Diabetic ketoacidosis *(#(2), p. 116).*

→ Kayexalate and sorbitol, 15g of each qid po prn (adult dose).

→ Kayexalate and sorbitol, 50g of each in 150ml H_2O enema prn. Children, 1 g/kg of both in 50-150mL H_2O enema prn.

→ Lasix, 1mg/kg I.V. prn (adult/child dose).

→ Dialysis prn.

(20) Hypocalcemia

℞ ABC's, calcium gluconate 10% 1-10ml prn slowly I.V. (pediatric = 0.2ml/kg), and treat the underlying cause, e.g. pancreatitis.

Hypercalcemia ℞ ABC's, saline boluses prn, K^+ prn, $MgSO_4$ prn, lasix prn, steroids prn, etidronate disodium prn, plicamycin prn, calcitonin prn, dialysis prn, and treat the underlying cause, e.g. bone metastasis, multiple myeloma, sarcoidosis, hyperthyroidism, hyperparathyroidism.

(21) Hypomagnesemia

→ for example, alcoholics, diabetics, diuretic therapy

℞ ABC's, $MgSO_4$ 2-4^{+}g I.V. prn over 30-60 minutes, or IM prn.

Hypermagnesemia, e.g. iatrogenic; ℞ ABC's, I.V. fluids, calcium gluconate 10% 1-10ml prn slowly I.V., lasix prn, dialysis prn.

(22) Hypophosphatemia

→ for example, diabetic ketoacidosis

℞ ABC's, KH_2PO_4, K_2HPO_4, and calcium prn.

Hyperphosphatemia

→ ℞ ABC's, regular insulin and 50% dextrose, aluminum hydroxide antacid, plus see the following.

→ with renal failure → ℞ dialysis

→ without renal failure, ℞ saline, diamox® 500mg q6h I.V., calcium prn.

II. CARDIAC ARRHYTHMIAS AND ACLS DRUGS (FIRST OF TWO SECTIONS)

→ *See also #(1) and #(2), pp.57-58, and* Cardiology (second of two sections), *p. 88.*

(1) Cardiac rhythm

→ PR interval = 0.12 - 0.20 seconds.

→ QRS = 0.06 - 0.10 seconds.

→ QT = 0.33 - 0.42 seconds.

(2) Bradycardias

℞ ABC's, 100% O_2 prn, atropine prn, dopamine prn, epinephrine prn (infants), isoproterenol prn, transcutaneous pacing prn, transvenous pacing prn, permanent pacing prn.

(3) Atrial flutter

℞ ABC's, 100% O_2 prn, synchronized cardioversion prn (25-50^{+}J with sedation/general anesthesia prn), or I.V. digoxin or verapamil prn → neither drug with WPW.

(4) Atrial fibrillation

→ myocardial ischemia?, hypokalemia?, mitral stenosis?, thyrotoxicosis?, alcohol abuse?

℞ ABC's, 100% O_2 prn, synchronized cardioversion prn (100-200 joules with sedation/general anesthesia prn) → only in recent onset AF, or patients anticoagulated for 6 weeks.

→ ℞ I.V. digoxin or verapamil prn → neither drug with WPW.

→ AF with regular ventricular response → digitalis toxicity?

→ Untreated AF with slow ventricular response → sick sinus syndrome?

→ Inadequately digitalized AF patients may have a controlled ventricular response only at rest due to the vagal effects of digitalis.

→ Atrial fibrillation of recent onset → alternate therapy (personal communication with a cardiologist) → stable patient, ℞ sotalol, if beta blockers contraindicated, ℞ rythmol® → if not converted after 2-3 days → ℞ synchronized cardioversion with sedation/general anesthesia prn; unstable patient, ℞ procainamide I.V. → synchronized cardioversion prn with sedation/general anesthesia prn. Caution, both sotalol and rythmol® may be proarrhythmic. *See #(13)(D), p.69, and #(16)(C), p.70.*

(5) SVT (Supraventricular Tachycardia)

(A) SVT with digitalis toxicity

℞ ABC's, 100% O_2 prn, correct hypokalemia prn, I.V. lidocaine prn, $MgSO_4$ 1g I.V. prn, digitalis fab antibody fragments, no cardioversion. Hyperkalemia? → ℞ fab fragments plus standard hyperkalemic therapy, except no calcium *(see #(19), p.63).*

(B) SVT without digitalis toxicity

℞ ABC's, 100% O_2 prn, increase vagal tone, verapamil 5mg I.V. (or adenosine 6mg I.V., repeat with 12mg prn), repeat verapamil prn, 5mg in 5-10 minutes (give calcium gluconate 10% 1-10ml slowly I.V. for significant verapamil induced hypotension prn), cardiovert unstable patients prn (synchronized, 25-50^{+}J with sedation/general anesthesia prn). I have had a good experience with using verapamil, and it is still my drug of choice for uncomplicated SVT. If verapamil doesn't work, use adenosine and vice versa. *See also #(11), p.68, #(18), p.71, #(19), p.71.*

(C) SVT with acute myocardial ischemia/infarction

℞ ABC's, 100% O_2, vagal manoeuvres, adenosine 6mg I.V. prn → 12mg X 2 I.V. prn q 2minutes → synchronized cardioversion prn, with sedation/general anesthesia prn. Adenosine is a better choice than verapamil in the unstable patient.

(6) SIX

(A) Torsade de pointes

℞ ABC's, 100% O_2, isoproterenol I.V. drip, and/or $MgSO_4$ 1-2g slowly I.V. → 1-2g/hr prn, overdrive pacing prn, discontinue causative drug, e.g. quinidine, rythmol®, hismanol®, seldane®. Children and young adults can also develop torsade de pointes as a result of an inherited long Q-T syndrome. Diagnosis, referral, and treatment with, for example, a beta blocker, following a warning syncope or seizure may prevent a future sudden death.

(B) Wide complex tachycardias

℞ as a ventricular tachycardia → ℞ ABC's, 100% O_2, I.V. lidocaine, and/or I.V. procainamide, cardiovert unstable patients prn (usually synchronized, 25-50$^+$J with sedation/general anesthesia prn). No verapamil or digoxin.

(7) Aberrant conduction

Aberrant conduction → you may see a P′wave, a varying BBB, and a decreased ventricular rate with carotid massage, versus PVC's → fusion beats, a full postectopic pause, a constant coupling interval, and a QRS > 0.14

(8) Mobitz I (Wenckeback)

→ nodal and transient (usually a narrow QRS complex).

→ ℞ ABC's, atropine 0.5 mg I.V. prn.

(A) Mobitz II

→ infranodal structural damage, which may progress to complete heart block (usually a wide QRS complex)

→ ℞ ABC's, 100% O_2 prn, presumptive/pacing prn.

(B) Complete heart block

→ narrow QRS @ ± 50/minute → nodal and usually transient

℞ ABC's, 100% O_2 prn, atropine prn, presumptive/pacing prn (transcutaneous pacing usually requires sedation).

→ wide complex @ ≤ 40/minute → permanent infranodal structural damage

℞ ABC's, 100% O_2, isoproterenol prn → transcutaneous → transvenous → permanent pacing → avoid isoproterenol with MI if possible.

(9) Electromechanical dissociation (EMD)

→ also known as pulseless electrical activity (PEA).

→ rule out a tension pneumothorax, cardiac tamponade, hypovolemia, acidosis, hypoxemia, hyperkalemia, hypercalcemia, pulmonary embolism, and a ruptured ventricular wall or valve. *For the management of EMD, see #(2)(D), p.58.*

(10) Sick sinus syndrome

→ intermittent brady and tachy arrhythmias → holter monitoring prn.

℞ ABC's, 100% O_2 prn, ACLS drugs prn, and pacing prn.

(11) Preexcitation syndromes

Bypass tracts (some examples)

1. Atrium to ventricle (WPW) → short PR interval, plus a delta wave.
2. Atrium to bundle of His (LGL syndrome) → short PR interval, no delta wave.
3. Bundle of His to ventricle (Mahaim fibres) → normal PR interval, plus a delta wave.

Wolff-Parkinson-White syndrome (WPW) may mimic a MI on the EKG → the bypass tract may be hidden.

→ WPW with wide complex tachycardia ± atrial fib or flutter

→ treat like a ventricular tachycardia.

→ ℞ ABC's, 100% O_2, lidocaine prn, procainamide prn, cardiovert unstable patients prn (usually synchronized 25-100$^+$J with sedation/general anesthesia prn). No digoxin or verapamil.

→ WPW with reentrant SVT → narrow complex → ℞ ABC's, 100% O_2 prn, procainamide prn, adenosine prn, synchronized cardioversion prn (25-50$^+$J with sedation/general anesthesia prn). No digoxin or verapamil.

(12) Antiarrhythmics

Class IA	quinidine procainamide disopryamide	Class II	propranolol metoprolol acebutolol
IB	lidocaine phenytoin mexitil®	III	bretylium amiodarone sotalol
IC	rythmol®	IV	verapamil cardizem®
		V	Unclassified: adenosine digoxin

(13) THIRTEEN

(A) Procainamide

100mg q5 minutes slowly I.V. until converted, or hypotension, or increased QRS or QT, or 1g given → drip 2-6 mg/min/prn. *See also #(2), p.108.*

(B) Lidocaine

→ 1-2mg/kg bolus → repeat prn to total 3mg/kg → 2-4 mg/min drip. Children 1mg/kg bolus → 1mg/kg/hr.

(C) Dilantin®

→ 15mg/kg I.V. over 30-60 minutes (loading dose), for digitalis toxicity with ventricular tachyarrhythmias and ectopics. *See also #(10)(A), p.147.*

(D) Rythmol® (propafenone)

→ type 1C antiarrhythmic, ℞ initial dose 150mg q8h po. *See also #(4), p.65.*

→ caution, may be proarrhythmic.

(14) FOURTEEN

(A) Inderal®

→ the original beta blocker.

→ 0.5-1mg I.V. prn to a total of 5^{+}mg (e.g. adjunct ℞ in acute MI), or children 0.01 - 0.1mg/kg/I.V., to a maximum 0.5-1mg dose.

(B) Metoprolol

→ $beta_1$ blocker → indications → angina, hypertension, and adjunctive ℞ for acute MI.

→ ℞ 5mg I.V. prn

→ ℞ 50mg bid po (initial dose).

(C) Acebutolol

→ $beta_1$ blocker → indications → angina, hypertension.

→ ℞ 100mg bid po (initial dose).

(15) Labetalol

→ I.V. for the emergency treatment of severe hypertension.

→ alpha and beta blocker → 20mg I.V., then 40 mg I.V. q10 min prn, to a total dose of 300mg prn.

→ Oral dose = 100-400mg bid.

(16) SIXTEEN

(A) Bretylium

→ indicated for resistant ventricular tachycardia and fibrillation, e.g. hypothermic cardiac arrest.

→ 5-10 mg/kg I.V. q15 min prn to 30mg/kg → drip 1-2mg/min prn.

(B) Amiodarone

→ for refractory ventricular fibrillation, consider giving amiodarone 150-600mg I.V. over 5-15 minutes.

(C) Sotalol

→ beta blocker and type III antiarrhythmic, ℞ initial dose 80 mg bid po. *See also #(4), p.65.*

→ caution, may be proarrhythmic (antidote glucagon I.V.?).

(17) $MgSO_4$

→ consider giving 2-4+g I.V. bolus for cardiac arrest not responding to standard ACLS protocols (for other uses of $MgSO_4$, see the index).

(18) Verapamil

→ for uncomplicated SVT 5mg I.V., repeat 5mg prn in 5-10 minutes, children 0.1 mg/kg. Do not use verapamil in children less than 2 years of age, or patients with wide complex tachycardia, WPW with atrial fib/flutter or SVT, LGL syndrome, CHF, or sinus or AV node disease. If necessary, give the antidote calcium gluconate 10% 1-10ml I.V. (adult dose, child = 0.1-0.2 mL/kg), over five minutes should significant hypotension occur.

(19) Adenosine

→ for SVT → ½life is about 10 seconds → may get transient bradycardia, AV block, bronchoconstriction, or facial flushing → ℞ 6mg I.V. → 12mg X 2 I.V. prn q 2 minutes (pediatric 0.1mg/kg → 0.2mg/kg prn). Useful for SVT ± acute myocardial ischemia/infarction. A better choice than verapamil in the unstable patient. The drug of choice for patients under 2 years of age. Adenosine may also be used for narrow complex SVT associated with WPW.

(20) Epinephrine

→ alpha and $beta_{1,2}$ agonist

→ contraindicated in hydrocarbon poisoning.

℞ 5-10 mL 1:10,000 I.V. prn (child = 0.1ml/kg) → consider the empiric use of high-dose epinephrine (adult 5-15mg, child 0.1-0.2+mg/kg) during cardiopulmonary resuscitation.

→ if ineffective during CPR, consider giving a 50meq (1meq/kg) bolus of sodium bicarbonate before repeating the epinephrine (and/or an initial presumptive bolus prn). Epinephrine's effectiveness is decreased in an acidotic environment.

→ ℞ 0.3 cc 1:1000 s.c. prn (child 0.01ml/kg to 0.3cc), e.g. for severe urticaria.

(21) Atropine

→ parasympatholytic, ℞ 0.5mg I.V. prn. (pediatric 0.02mg/kg/dose, minimum 0.1mg).

→ having the patient cough is parasympatholytic, and may alleviate the need for atropine.

→ atropine is ineffective in heart transplant patients with bradycardia (denervated heart).

(22) Cardioversion

→ ± synchronization prn, ± I.V. versed or valium® prn, ± I.V. demerol® prn

→ ± consultation anesthesia/general anesthetic prn, if time permits.

→ contraindicated in digitalis toxicity (last resort? 10-25J)

→ cardiovert unstable patients prn, e.g. decreased level of consciousness, ischemic chest pain/MI, SOB/CHF, hypotension.

→ atrial fibrillation 100^{+}J

→ ventricular fibrillation 200^{+}J (defibrillate immediately, repeat 200J, 360J prn).

→ atrial flutter $25\text{-}50^{+}$J

→ SVT $25\text{-}50^{+}$J

→ ventricular tachycardia $25\text{-}50^{+}$J

→ *See also #(7), p.84.*

(23) Norepinephrine

→ the sympathetic nerve transmitter substance

→ alpha and $beta_1$ agonist.

→ ℞ 4 mg/500cc D_5W at 30cc hr → increase prn.

→ antidote, alpha blocker phentolamine 5 mg I.V. prn, or mix with 10 mL saline for local infiltration for local vasoconstriction prn (as a result of interstitial leaking of norepinephrine).

(24) Alpha stimulation = vasoconstriction

$beta_1$ = tachycardia and inotropic.

$beta_2$ = vasodilation and bronchodilation.

(25) Dopamine (adults, children)

→ 2-5 μg/kg/min → vasodilation

→ 5-15 μg/kg/min → beta stimulation

→ $15\text{-}30^{+}$ μg/kg/min → alpha stimulation

(26) Isoproterenol

→ $beta_{1,2}$ stimulator → 2mg/500ml D_5W at 30-60 cc/hr for bradycardia → give 2.5mg sublingual tablet prn while preparing the I.V. → avoid isoproterenol with acute myocardial ischemia/infarction if possible.

→ pediatric 0.1μg/kg/min/I.V., and increase q5-10min prn.

(27) Digoxin

℞ 0.5mg I.V., then 0.25mg q1h I.V. prn, to total of 1 mg (adult digitalizing dose, obtain a serum digoxin level prn). Initial pediatric digitalizing dose = 5-20μg/kg/I.V. (consult references).

(28) Calcium gluconate 10%

→ ℞ hypocalcemia, hyperkalemia (not with digitalis toxicity), hypermagnesemia, cardiac arrest with renal failure, overdose or hypotension with calcium blockers, hydrofluoric acid poisoning, black widow spider bites/venomous caterpillar stings with pain, and venomous snake bites with seizures.

→ ℞ 1-10mL slowly I.V. prn (pediatric = 0.1-0.2mL/kg to 5mL).

(29) Sodium nitroprusside

→ veno and arteriodilator

→ ℞ 0.5-1μg/kg/min, and increase prn.

(30) Nitroglycerin

→ venodilator (all doses), coronary artery dilator (all doses), and arteriodilator (high doses).

→ ℞ NTG 0.3mg sublingual tablet (or spray) prn (tabs deteriorated?/ok if sublingual burning sensation present).

→ ℞ Nitrong® SR 2.6-5.2mg tid po.

→ ℞ NTG 2% ung 1-2 inches q3-24h prn (or dermal patch 12-14 hours/day).

→ ℞ NTG 5-10μg/min/I.V. → increase by 5-10μg/min every 5 minutes prn.

→ For NTG induced vasovagal bradycardia/hypotension, have the patient cough several times prn (parasympatholytic), and give atropine 0.3-1.0mg I.V. prn.

→ NTG is useful (especially I.V.) for (1) acute myocardial ischemia, (2) moderate hypertension associated with pulmonary edema, or unstable angina, or myocardial infarction, and (3) for pulmonary edema by decreasing preload and afterload, and counteracting the initial increase in LV filling pressures caused by I.V. lasix. NTG is contraindicated in critical aortic stenosis.

(31) Nifedipine

℞ 10-20mg po prn for hypertensive urgencies. A very useful drug! *See also #(9)(A), p.92*. Do not give nifedipine sublingually (uneven absorption, unpredictable effects on blood pressure, JAMA 1996; 276: 1328-31).

(32) Lasix

℞ 1mg/kg I.V. or po ± NTG (*see #(30), p.74*). Patient allergic to sulfas?, prior lasix? → caution prn → substitute ethacrynic acid prn, 50mg I.V. or po prn.

(33) Morphine

℞ 2.5mg-5mg I.V. prn ± gravol® (dimenhydrinate) 10mg I.V. prn for nausea.

→ 0.1mg/kg in children ± gravol® prn.

(34) THIRTY-FOUR

(A) Demerol® (meperidine)

℞ 12.5-25mg I.V. prn (children 0.2-0.3mg/kg) ± gravol® 10mg I.V. prn. Demerol® is preferred over morphine by some clinicians for the pain of inferior MI's. Both demerol® and morphine will result in sedation and analgesia, leading to a decrease in myocardial O_2 demand. Do not underestimate the value of alleviating the pain of ischemic heart disease. Treat the pain aggressively. Remind the nursing staff prn of the benefits of pain relief (more often vice versa).

→ Analgesia with demerol®/morphine may require frequent initial doses I.V., until the patient's loading dose is reached (endogenous opioid receptor binding).

→ when demerol® does not result in adequate analgesia, try morphine and vice versa.

(B) Versed (midazolam)

→ an excellent sedative, e.g. cardioversion, shoulder reduction, ℞ 2-3mg I.V. over 2-3 minutes → titrate with 1-2mg q 2minutes prn, to maximum of 0.07 - 0.1mg/kg.

→ See also #(8)-(11) pp. 92-93 for additional cardiovascular drugs.

III. SEPTIC SHOCK

→ immunocompromised?, e.g. splenectomy, chemotherapy, AIDS.

→ various presentations: fever alone, hypothermia, oliguria, respiratory alkalosis, confusion, metabolic acidosis, hypotension. DIC?

℞ ABC's, supportive care, drainage of pus prn, debridement prn, and antibiotics. Narcan®? Treat according to the site of origin, for example, the GI tract.

℞ (for example)

claforan® 50-180mg/kg daily for children, or 4-12g daily for adults

plus

tobramycin 3-5mg/kg daily children/adults

plus

flagyl® 10mg/kg/q8h I.V. for children, or 500mg/q8h I.V. for adults

Tobramycin or gentamycin therapy → monitor with serum levels.

→ **See also** Toxic shock syndrome**, #(3)(A), p.138.**

IV. CENTRAL NERVOUS SYSTEM (FIRST OF TWO SECTIONS)

→ *See also* Central Nervous System (second of two sections), *p. 125.*

(1) Locked-in syndrome

→ CVA with destruction of the ventral pontine tracts → patient appears to be in a coma, but has vertical eye movement on command.

(2) Cheyne-stokes breathing → bilateral cerebral hemispheric disease?

Hyperventilation → upper brain stem damage?

Apneustic breathing → like breath holding → lesion about 5th cranial nerve?

Cluster breathing → short bursts → lesion pons?

Yawning → posterior fossa lesion?

Vomiting, hiccuping, and coughing → lower brain stem injury?

(3) Fundi

→ spontaneous venous pulsations in the recumbent position → no increase in the intracranial pressure.

pinpoint pupils → narcotic, phenothiazine, or clonidine overdose?, cholinergics?, miotic eye gtts?, pontine hemorrhage? (ocular bobbing?), cerebellar hemorrhage?; (miosis reversed with narcan®? → acute narcotic withdrawal?, restrain patient first?) → CT scan prn, refer neurosurgery prn (cerebellar hemorrhage needs immediate neurosurgical intervention).

(4) If both eyes cross the midline the brain stem is intact.

"Doll's eyes" movement present (brain stem intact) → contraindicated in suspected cervical spine injuries.

Oculovestibular testing (no basilar skull fracture is suspected, plus the Tm's must be intact) → external auditory canals are sequentially irrigated with 50cc of ice water → bilateral nystagmus (no coma, hysterical?) → eyes deviated towards side of irrigation (brain stem intact) → no deviation (brain stem damage?; drugs? → reactive pupils?) → unilateral deviation (structural damage of the brain stem? → CT scan, refer neurosurgery).

(5) Acute cerebellar hemorrhage

→ headache, alert → vertigo, vomiting, unable to stand, truncal ataxia → progressing to coma ± decerebrate posturing ± pinpoint pupils ± eyes deviated away from the side of the lesion.

℞ ABC's, ℞ hypertension prn, and increased intracranial pressure prn → immediate neurosurgical decompression (also for traumatic posterior fossa hemorrhage).

(6) Decorticate posturing

→ flexion of the arms and extension of the legs → upper midbrain lesions.

Decerebrate posturing → extension of both arms and both legs → central midbrain or posterior fossa lesion?

(7) SEVEN

(A) Mnemonic for altered states of consciousness and coma:

TIPS:	T:	trauma, temp., thiamine	VOWELS:	A:	alcohol, drugs, toxins.
	I:	infection, AIDS.		E:	endocrine, liver, lytes.
	P:	psychiatric, porphyria.		I:	insulin, oral hypoglycemic agents, diabetes mellitus.
	S:	space occupying lesion, stroke, intracranial hemorrhage, shock, status epilepticus		O:	O_2, CO_2, CO, opiates.
				U:	uremia, hypertension.

(B) Syncope

A frequently encountered problem in the ER. Before you "pass it off" as benign, satisfy yourself that there is not something more serious going on. For example, arrhythmia/cardiomyopathy, unapparent hemorrhage/GI/ectopic pregnancy, expanding/rupturing abdominal aortic aneurysm, adverse drug reaction, hypoglycemia, subarachnoid hemorrhage, carotid sinus hypersensitivity.

(C) Vertigo

Peripheral vertigo → acute, intense, ± nausea, ± vomiting, ± diaphoresis, ± tinnitus, ± hearing loss, positional, latency 2-20 seconds, fatiguable, plus unidirectional nystagmus with ocular fixation inhibition → benign positional vertigo?, labyrinthitis?, Menière's disease?, cerebellopontine tumor?, acute cerebellar hemorrhage?

Central vertigo → less intense, ± neurological signs, not fatiguable or positional, plus multidirectional nystagmus not inhibited by ocular fixation → conditions affecting the brain stem or cerebellum, drug toxicity?

V. PEDIATRICS (FIRST OF TWO SECTIONS)

® *See also* Pediatrics (second of two sections), *p. 108.*

→ remember to listen carefully to what the parent(s), or other caregivers have to say (you may have to simultaneously take the history, examine, and treat the child).

→ it may sometimes be helpful to reassure the parents/caregivers, by expressing to them that you are treating their infant/child/teenager, as you would one of your own (e.g. your grand-daughter).

(1) ONE

(A) Fever in children up to 24 months of age

→ DPT immunization in the past 24-48 hours?

→ petechiae?, bacteremia?/meningitis? {DIC?}, pneumonia?, UTI?, tonsillitis/otitis?, cellulitis?, viral illness? → has the pyrexia been suppressed with a recent antipyretic? → playful?, inconsolability?, increased irritability when held?, focus of infection?, toxic? → how sick does the child appear? → have a low threshold for doing investigations (immunocompromised state?, e.g. splenectomy, chemotherapy → full septic work-up). Purpura? → aspirate → gram stain and culture. Patients with sepsis/meningitis may also have a concurrent focus of infection, e.g. otitis media.

0-3months of age → temp. ≥ 38.3°C → septic work-up prn → chest x-ray, CBC-diff-sed.rate, Bun, creatinine, glucose, lytes, urinalysis, lumbar puncture, and cultures/gram stains (e.g. nose/throat, urine, blood/gram stain of the buffy coat?, CSF), → presumptive antibiotic therapy prn.

3-24 months of age → temp. ≥ 39.4°C → prn CBC-diff-sed.rate → wbc $15{,}000^{+}$, or bands 500^{+}, or polys $10{,}000^{+}$, or sed. rate > 30 → full septic workup prn → presumptive antibiotic therapy prn.

Sepsis/meningitis (the patient may be hypothermic) → critically ill patients should begin antibiotic treatment within 30 minutes, regardless of how many investigations have been completed (ensure that the blood cultures are done before giving the I.V. antibiotic(s)).

Remember that several disorders may result in a septic appearing infant, for example, (1) bacterial/viral/mycoplasma infections (e.g. sepsis, meningitis, pneumonia, "flu"), (2) dehydration/shock (± electrolyte problems) from any cause, (3) overdoses (e.g. ASA), (4) hypoglycemia (e.g. ASA overdose, infections), (5) cardiac failure/arrhythmia (e.g. congenital heart disease, SVT), (6) shaken baby syndrome (or other CNS trauma/bleeds), (7) anemia (e.g. aplastic, hemolytic, blood loss), (8) renal failure, (9) infantile botulism (never seen it), (10) HIV/infections (e.g. pneumocystis carinii pneumonia).

(B) Diarrhea in children

→ viral?, shigella?, salmonella?, campylobacter?, yersinia?, clostridium difficile?, giardia lambia?, staph toxin?, E. Coli?, bacillus cereus?, post viral enteritis lactose intolerance?

→ Caution! May rapidly develop into a life threatening situation with, for example, shock, acute renal failure, DIC, ARDS (e.g. E. Coli food poisoning from undercooked hamburger meat). One symptom of E.Coli hemorrhagic colitis is severe abdominal cramps which may develop prior to the diarrhea.

→ remember to note on the stool culture requisition what you are suspecting, e.g. E. Coli, bacillus cereus, clostridium difficile.

(2) ASA, Tylenol®

→ ℞ 10-15mg/kg/q4h prn.

→ early antipyretic therapy may facilitate the assessment/observation of patients but the effects are not predictable of bacteremia.

→ giving the crying child a popsicle may result in an instantaneous improvement in their mental status (and their parents, and maybe you too!).

→ do not use ASA in patients with chickenpox or influenza, as there is an association with the development of Reye's syndrome. There is also a preliminary report of a possible association between chickenpox, ibuprofen, and the "killer strep infection." *See also #(3), p.138.*

Toradol® 0.5mg/kg/I.M./I.V. to 30mg (an analgesic NSAID).

Demerol® (meperidine) 1-2mg/kg/I.M. prn (0.2-0.3mg/kg/I.V. prn).

Morphine 0.1mg/kg/I.M./I.V. prn

Codeine 0.5-1.0mg/kg/p.o. prn

Fentanyl 0.5-2μg/kg/I.V. prn

→ Avoid I.M. injections of analgesics in children if possible.

Remember: all narcotics have a steep dose - response curve → a small increase in the plasma level may result in a large increase in analgesia → titration may be required for adequate analgesia (frequent initial I.V. doses prn until the patient's loading dose has been reached/ endogenous opioid receptor binding). Narcotics can be combined with benzodiazepines, e.g. valium® 0.2mg/kg/I.V./prn, or versed 0.05mg/kg/I.V. prn. Have narcan® available (0.01mg/kg/I.V. prn). *See also chronic pain, #(17), p.123.*

(3) THREE

(A) Pediatric fluids and electrolytes

Maintenance

up to 10kg body weight	= 100 mL/kg/day
plus from 11 to 20kg	= 50 mL/kg/day
plus from 21 to 70kg	= 20 mL/kg/day
	= total maintenance requirement/day

Dehydration (isonatremic, hyponatremic, hypernatremic)

mild	= 3-5% of body wt.	= 30- 50ml/kg
moderate	= 6-9% of body wt.	= 60- 90ml/kg
severe	= 10-15% of body wt	= 100-150ml/kg

℞ ABC's, 50-100% O_2 prn, ringers 20ml/kg bolus prn for shock, repeat X 2 prn. $NaHCO_3$ 1meq/kg over 30-60 minutes (careful!) for pH ≤ 7.10, or serum $NaHCO_3$ < 10, Hypo/ hyperglycemic?

℞ Replace the remaining fluid and lyte deficit (+ maintenance) over 1 to 2 days. Use 0.25 - 0.5NS + 5% dextrose (if not hyperglycemic), plus 20-40 mEq KCl/L (once urine output begins). Give 3 % saline prn (4mL/kg, careful!) for severe hyponatremia (e.g. with seizures), and $D_{25}W$ 2-4ml/kg prn for hypoglycemia. *See also #(17), p. 62.*

Oral rehydration → e.g. Pedialyte® 120-150ml/kg/day or 2-2.5oz./lb/day maintenance, plus replace deficits. Give in small, very frequent amounts.

→ if a child with, for example viral gastroenteritis, is going to be hydrated at home, emphasize to the parents that "dehydration is the enemy."

(B) Pyloric stenosis

→ 1-12 weeks of age (usually 2-6 weeks).

℞ ABC's, ℞ dehydration, ℞ hypokalemia, ℞ metabolic alkalosis prn, NG tube, U/S prn, consult pediatric surgery.

(4) Neonatal - Pediatric resuscitation

→ Pediatric cardiac arrest is usually secondary to, for example, apnea or shock.

→ Use the umbilical vein for I.V. administration in newborns.

→ Use the Broselow Pediatric Resuscitation Tape© prn (AHA-PALS).

→ B/P ≤ 70 systolic (child) → poor perfusion? → unstable?

→ ℞ ACBC's, 100% O_2, avoid hypothermia, plus the following prn:

Epinephrine 1:10,000 0.1^{+}ml/kg q3-5min I.V. prn.

Narcan® 0.01mg/kg/I.V./prn.

Isoproterenol 0.1µg/kg/min/I.V. prn, and increase prn.

Ringers 20ml/kg bolus(es) prn.

Packed red blood cells 5-10ml/kg/prn.

Fresh frozen plasma 10-20ml/kg/prn.

Cryoprecipitate 0.2 bags/kg/prn (safe? *see (9)(C), p. 120).*

Platelets 0.2units/kg prn for platelet counts < 50,000.

Atropine 0.02mg/kg/I.V. prn, minimum dose 0.10mg, maximum 0.5mg.

Bicarbonate 1-2meq/kg/I.V. prn (careful!), Neonate: dilute 1:1 with sterile water prn → repeat arterial blood gases prn.

Lasix 1mg/kg/I.V. prn

Diazoxide 1-3mg/kg/dose/I.V./prn, to 150mg q4-24hrs.

Hydralazine 0.1mg/kg/I.V./q4-6 hrs prn.

Mannitol 20% solution 2.5-5cc (0.5-1g)/kg/I.V. slowly q4-6hrs prn.

Cardioversion/defibrillation: see #(7), p. 84.

→ Newborns: beware of prematurity, asphyxia, meconium aspiration, hypothermia, diaphragmatic hernia, choanal atresia, tracheoesophageal fistula, RDS, pneumothorax, shock, and maternal drug abuse. Remember the congenital infections mnemonic TORCHS = toxoplasma, rubella, cytomegalovirus, herpes, and syphilis.

(5) Neonatal seizures

→ CNS and infection workup.

1. ABC's and bloodwork.
2. Dextrose 25% 2mL/kg/I.V./prn.
3. Calcium gluconate 10% 0.2ml/kg/I.V./prn.
4. $MgSO_4$ 50% 0.1ml/kg/I.V./prn.
5. Pyridoxine 50mg I.V. prn.
6. Valium® 0.2mg/kg/I.V. prn.
7. Phenobarbital 20mg/kg/I.V. prn (loading dose) → 5mg/ kg/daily.
8. Dilantin® 20mg/kg/I.V. prn (loading dose) → 5mg/ kg/daily.

(6) Meconium staining in the newborn

→ Try to avoid aspiration of the meconium by suctioning the pharynx and trachea, before initiating assisted ventilation.

(7) Pediatric paddle size/Defibrillation/Cardioversion

→ 4.5cm paddles for infants, 8cm paddles for children.

Defibrillation (do not do blind in children) → ℞ 2 joules/kg → cardioversion → ℞ ¼-½ joules/kg → unsuccessful defibrillation or conversion? → ℞ double the dose. Cardiovert unstable patients (plus sedation prn, e.g. valium®0.2mg/kg/I.V., plus synchronization prn). Consult anesthesia/cardiology before cardioversion if time permits.

(8) A cough is uncommon in infants less than 6 months of age

→ pertussis?, chlamydia pneumonia?, cystic fibrosis?/frequent chest infections/malabsorption/failure to thrive.

(9) NINE

(A) Stridor

→ inspiratory stridor only (partial airway obstruction at the larynx or above), both inspiratory and expiratory stridor (partial tracheal obstruction), or expiratory stridor only (partial airway obstruction below the carina).

→ croup?, epiglottitis?, F.B.?, bacterial tracheitis?, peritonsillar abscess?/tonsillitis/pre-existing tonsillar hypertrophy?, retropharyngeal abscess?, allergic reaction/angioedema? → all seven may result in upper airway obstruction. Do not agitate the child, leave them in a position of respiratory comfort.

→ Bag and mask with 100% O_2 prn.

→ Intubation? Use an ET tube 1-2mm smaller than usual prn (with adequate lubricant, e.g. xylocaine jelly). A small ET tube will suffice, at least temporarily. Consult anesthesia if time permits.

→ Epiglottitis?, direct the ET tube through the "eye of the cherry."

Aspiration of F.B. into tracheal-bronchial system?, esophagus?, unilateral wheezing? → do bilateral decubitus expiration views prn, or an upright expiratory film if the patient can cooperate (the side with the F.B. may demonstrate air trapping).

(B) Croup

→ viral?, bacterial?, spasmodic?

→ Rx ABC's, position of respiratory comfort, humidified 100% O_2 prn, supportive care, ice-saline aerosol prn, racemic epinephrine aerosol prn (0.5cc 2.25% with 4.5cc of saline/100% O_2), intubate prn, decadron® 0.25-0.6mg/kg IM/po prn, antibiotics prn, extended hospital observation prn. Admit ICU prn.

→ rebound stridor following a racemic epinephrine aerosol usually occurs within 2 hours (if at all).

→ some clinicians are using pulmicort® aerosols (budesonide) 0.5-2mg, instead of, or in addition to, decadron®.

(C) Epiglottitis

→ the child is sitting in the "sniffing position" → toxic, fever, muffled voice, dysphagia/drooling, ± cyanosis.

→ Rx ABC's, position of respiratory comfort, humidified 100% O_2, racemic epinephrine aerosol prn (0.5cc 2.25% with 4.5cc saline/100% O_2), portable x-ray?, bag and mask with 100% O_2 prn, intubate in the OR prn, and claforan® 100mg/kg/I.V./day. The patient may require immediate intubation in the ER. The presence of pharyngitis does not rule out epiglottitis. Bacterial tracheitis presents and is managed similarly to epiglottitis.

Epiglottitis prophylaxis: Rx rifampin

→ adults 600mg of rifampin bid X 4 days

→ 1 month to 12 years of age, 10mg/kg bid X 4 days

→ less than 1 month, 5mg/kg bid X 4 days

(D) Retropharyngeal or peritonsillar abscess

→ tonsillitis/pre-existing tonsillar hypertrophy?

Rx ABC's, position of respiratory comfort, humidified 100% O_2 prn, intubate prn, penicillin G 100,000 units/kg/day/I.V., incision and drainage in the OR prn.

(10) TEN

(A) Post-Group A beta-hemolytic streptococcal infection glomerulonephritis

→ renal failure, hypertension, and congestive heart failure.

Rx ABC's, supportive care, antibiotics prn, refer nephrology.

(B) Hemolytic-uremic syndrome

→ usually follows an episode of gastroenteritis or respiratory infection.

→ may result from eating undercooked hamburger meat contaminated with E. Coli.

→ nephropathy, hemolytic anemia, and thrombocytopenia.

→ seizures, hypertension, petechiae, acute renal failure.

℞ ABC's and supportive care (e.g. ℞ seizures, hypertension, hyperkalemia/renal failure, anemia, thrombocytopenia), consult pediatrics, admit ICU prn.

(C) Henoch-Schönlein Purpura

→ acute vasculitis of small vessels with frequent multisystem involvement.

→ etiology unknown, but believed to result from immune complex reactions to various antigenic stimuli.

→ pathognomonic skin lesions → erythematous progressing to purpuric, predominately on the buttocks and lower extremities (feet and ankles in adults).

→ GI, renal, pulmonary, CNS, and arthritic manifestations.

℞ ABC's, supportive care, corticosteroids prn, consult pediatrics.

VI. CARDIOLOGY (SECOND OF TWO SECTIONS)

® *See also* Cardiac Arrhythmias and ACLS Drugs (first of two sections), *p. 65*.

(1) ONE

(A) Unstable Angina

℞ ABC's, 100% O_2 prn, NTG prn (often titrated I.V./avoid hypotension), I.V. morphine/demerol® prn, aggressive pain control prn, atropine prn, heparinize prn, beta blockers prn (e.g. acebutolol 100mg bid po), Ca blockers prn, ASA prn, angioplasty/CABG prn, admit CCU.

(B) Acute Myocardial Infarction

℞ ABC's, 100% O_2 prn, NTG prn (often titrated I.V./avoid hypotension), I.V. morphine/demerol® prn, aggressive pain control prn, atropine prn, lidocaine prn, beta blockers prn (e.g. metoprolol 5mg I.V. prn), lasix prn, dopamine prn, heparinize prn, thrombolytics prn (as early as possible; "time is muscle"), ASA prn, angioplasty prn (cardiogenic shock?), CABG prn, admit CCU.

Beta blockers are especially useful in an acute MI (if not contraindicated), for the management of reflex tachycardia, systolic hypertension, continuing or recurrent ischemic chest pain, and tachyarrhythmias, e.g. atrial fibrillation.

$MgSO_4$ I.V. bolus, followed by an I.V. drip is presently being investigated as an adjunctive treatment for acute ischemic heart disease.

→ Cocaine induced coronary artery spasm?

(C) Thrombolytic therapy for acute myocardial infarction

→ May use I.V. NTG as well.

1) Consult drug protocols (regimens may vary). Review the contraindications, e.g. head/CNS lesion/surgery, recent major surgery (< 2 weeks), active internal bleeding, bleeding disorder, previous hemorrhagic stroke, pregnancy, aortic dissection.
2) Tissue plasminogen activator (tPA) → not antigenic, rapid onset, and there is no generalized fibrinolytic state.

℞ activase® 15mg bolus I.V. over 2 minutes, then 50mg over 30 minutes, then 35mg over the next hour. Give heparin, 5000 units I.V. bolus, then 1000 ± units/hr/I.V. at the start of the activase® infusion, and continue for 72 hours. ASA 325mg/day.

3) streptokinase (streptase®) → approximately one sixth the cost of tPA, but unlike tPA, streptokinase can only be used on one single occasion on the same patient.

℞ 1.5 million units of the streptokinase I.V. over 1 hour, heparin 5000 units I.V. bolus on completion of the streptokinase infusion, then 1000 ± units/hr/I.V. X 72 hours. ASA 325mg/day.

4) tPA versus streptokinase

Consult your cardiologist for the most recent recommendations. tPA is becoming the drug of choice, but streptokinase is equally effective in certain situations (e.g. uncomplicated acute inferior MI). The cost saving with using streptokinase makes it an attractive alternative to tPA, when used appropriately.

5) Some centers regard angioplasty/CABG, rather that thrombolytic therapy, as the treatment of choice for acute myocardial ischemia/infarction in suitable candidates.

(D) Acute myocardial infarction with left ventricular failure

→ requires invasive monitoring.

systolic B/p	> 100	→ nitroprusside (correct arrhythmias)
	75-100	→ dopamine, angioplasty?
	< 75	→ high dose dopamine plus noradrenaline?, angioplasty?

→ Cardiogenic Shock without CHF → trial of ringers 100cc bolus(es) prn → improvement in vital signs?

(2) Acute Myocardial Ischemia with PVC's

→ Inherent bradycardia with escape PVC's. ℞ atropine 0.5-1mg I.V. prn (having the patient cough is parasympatholytic and may alleviate the need for atropine).

→ normal inherent rate with new? PVC's. ℞ lidocaine prn 50-100mg I.V. bolus, then 1-4mg/minute I.V. drip.

→ careful! vice versa can be disastrous.

(3) THREE

(A) Congestive heart failure with acute pulmonary edema

→ precipitating problem?, recurring episodes?

→ tachy/bradyarrhythmia?, hypertension?, hypotension?, acute myocardial ischemia/ infarction?, mitral stenosis?, hyperdynamic state?, hypertrophic cardiomyopathy?

℞ ABC's, 100% O_2, patient sitting upright with legs dependent prn, NTG prn if not hypotensive (S.L.→I.V.?), lasix prn, morphine/demerol prn, dopamine prn, correct dysrhythmias prn, ventolin® aerosols prn/aminophylline prn (cardiac asthma?), phlebotomy prn (anuric?), intubate prn/consult anesthesia prn (if time permits), admit CCU. Beware of (1) right ventricular infarction, (2) pulmonary embolism, (3) acute valvular dysfunction, and (4) ventricular septal rupture. No diuretics for (1) or (2) as there is no pulmonary edema.

→ some clinicians are using capoten® 12.5mg S.L. prn to decrease afterload.

→ occasionally acute pulmonary edema has a non-cardiac etiology, e.g. inhaled toxins (e.g. smoke, phosgene), fat embolism, ARDS (e.g. near drowning, delayed immersion syndrome, sepsis, poisonings, e.g. ASA, narcotics, carbon monoxide). *See #(4), p.97.*

→ beware of the rote treatment of acute pulmonary edema, nevertheless, the majority of patients will respond satisfactorily to 100% O_2, NTG, morphine, and lasix.

(B) Chronic congestive heart failure

℞ ABC's, diuretic (e.g. lasix, spironolactone), vasodilator (e.g. capoten®), low salt diet.

(4) FOUR

(A) Pericarditis

→ infectious (e.g. viral), non-infectious (e.g. uremia), or idiopathic.

→ retrosternal, pleuritic chest pain ± pericardial friction rub.

→ wide spread ST elevations (upward concavity) with no reciprocal depressions (caution: do not confuse with acute myocardial infarction).

→ Rx ABC's, treat complications (e.g. pericardial tamponade, arrhythmias), and underlying disease (e.g. uremia, neoplasm); NSAIDs prn, steroids prn, antibiotics prn, admit step-down/CCU prn.

(B) Pericardial tamponade

→ cyanosis from the neck up?

→ impaired venous return and cardiac filling → tachycardia, hypotension (may be orthostatic only), muffled heart sounds, ± distended neck veins, ± paradoxical pulse, ± clear lung fields.

→ etiology?, e.g. trauma?, dissecting aneurysm? (± MI?, ± neurological signs?), iatrogenic? (e.g. CPR, on anticoagulants?), metastatic pericardial disease?, Dressler's syndrome?, infection?, sarcoid?, AIDS?, dialysis patient?, undiagnosed uremia?

Rx ACBC's, large bolus ringers prn (0.5-2 litres), dopamine prn, echocardiogram and/or CT scan if appropriate prn, immediate? pericardiocentesis prn, Rx underlying cause and refer.

(5) Alveolar - arterial gradient

→ 140 - (pO_2 + pCO_2) ≤ 15 normal

→ pulmonary embolism? → ventilation and perfusion scan? → pulmonary angiogram?

(6) Pulmonary Embolism

→ Deep vein thrombosis (DVT)?

Rx ABC's, 100% O_2 prn, bolus(es) ringers prn, dopamine prn, heparin 5000 units I.V. bolus, then 1000 ± units/hr/I.V., and adjust the heparin drip so that the PTT is 1.5-2 times the control. Initiate presumptive heparin therapy if indicated, e.g. strong suspicion/delayed availability of the ventilation and perfusion scan. Massive embolism? → thrombolytic therapy?, surgery? (also refer to vascular surgery if heparin is contraindicated).

Heparin antidote → I.V. protamine sulfate → 1mg will neutralize 100 units of heparin (consult references).

Remember: the diagnosis of pulmonary embolism is missed 2/3 of the time. The four most common symptoms and signs are: dyspnea, pleuritic pain, tachypnea, and rales → pulse oximetry?, chest x-ray?, blood gases? → ventilation and perfusion scan? → pulmonary angiogram?

Warfarin → for long term anticoagulation, Rx 2-10mg/daily → PT maintained at 1.3-2 times the control.

(7) Seven

(A) Malignant hypertension/accelerated hypertensive crises

℞ ABC's, 100% O_2 prn, lower the diastolic blood pressure to the 100 range, and treat other problems prn, for example, acute encephalopathy (seizures?), CHF, acute myocardial ischemia, intracranial hemorrhage, aortic dissection, renal failure.

→ MAOI hypertensive crises?, drug intoxication? e.g. amphetamines?, cocaine?

→ Admit to the ICU prn.

→ *See also #(8)-(11), pp.92-93, #(15), p. 70, #(29), p.73. (various antihypertensive drugs).*

(B) Hypertension/preeclampsia/eclampsia

℞ ABC's

→ valium® 5-10mg I.V. prn for seizures (or threatened).

→ hydralazine 5-10mg I.V. prn for hypertension.

→ $MgSO_4$ 4 grams I.V. with 250ml D_5W over 10-30 minutes → 1-2g/hr prn → monitor level of consciousness, respirations, B/p, reflexes, urine output, and magnesium levels prn.

→ 10% calcium gluconate is the antidote for $MgSO_4$, ℞ 1-10ml slowly I.V. prn.

→ treat other problems prn, e.g. acute renal failure, CHF, intracranial hemorrhage.

→ evacuation of the uterus as soon as it is feasible.

(8) Trimethaphan

→ ganglionic blocker → secondary drug for aortic dissection with hypertension.

→ ℞ 500mg/500 D_5W at 1-4cc/minute.

(9) NINE

(A) Nifedipine

→ vasodilator, first line drug for moderate/severe hypertension, ℞ 10-20mg po prn. A safe, very effective drug (I have never seen nifedipine induced hypotension, despite my frequent use of this agent). The antidote is 10% calcium gluconate, 1-10ml slowly I.V.

(B) Diazoxide

→ direct arteriolar dilator, ℞ 50mg I.V. prn q5-10 minutes (1-3mg/kg in children).

(10) Clonidine

→ central (and peripheral) alpha$_2$ adrenergic agonist → decreased catecholamines/blood pressure → if abrupt withdrawal of clonidine occurs → rebound hypertension → ℞ clonidine 0.2mg po, then 0.1mg q 1 hour prn, or labetalol I.V., or phentolamine followed by inderal® I.V. *See also #(8), p.146.*

(11) ELEVEN

(A) Captopril (capoten®)

→ angiotension converter enzyme (ACE) inhibitor → ℞ 25±mg bid-tid → may get hyperkalemia with ACE inhibitors. For urgent hypertension → ℞ 25mg SL/po initially, then prn.

(B) Vasotec® (enalapril)

→ ACE inhibitor → ℞ 5-40mg p.o. daily.

→ for urgent hypertension, ℞ 1.25mg I.V. (consult references).

→ ACE inhibitors can cause life threatening angioedema (initially or after prolonged use). *See #(7), p.136.*

(12) TWELVE

(A) Rupturing abdominal aortic aneurysm

→ pale, diaphoretic, abdominal/back pain.

℞ ABC's (try to maintain a systolic pressure in the region of 90-100) → immediate referral for surgical intervention. *See caution, p.36.*

→ any middle-aged/elderly patient with abdominal/back pain, should have an abdominal aorta aneurysm ruled out. Beware of attributing the pain to diverticulitis/appendicitis/ UTI/ureteral calculus, or radicular pain. In addition, an abdominal aortic aneurysm may present with a history of weakness and/or syncope, and episodic or sustained hypotension, with minimal or no pain. The aneurysm may or may not be palpable (ultrasound?, CT scan?). Abdominal aneurysms are one of the great imitators in medicine (has even

simulated renal colic with microscopic hematuria, and has been discovered during an "emergency appendectomy").

Popliteal or femoral aneurysms → may rupture (rare), thrombose, result in distal emboli, or compress local structures, e.g. popliteal vein.

→ ℞ ABC's, 100% O_2 prn, immediate vascular surgery consultation.

(B) Acute peripheral arterial occlusion

→ thrombus, embolus, or trauma → ℞ ABC's, 100% O_2 prn, doppler prn, angiography prn, heparin prn, thrombolytics prn, surgery prn. An immediate referral to a vascular surgeon is crucial.

(C) Intra-arterial injection of drugs e.g. drug abuser.

℞ vasospasm, e.g. hand → ℞ ABC's, pulse oximetry, 100% O_2 prn, heparin prn, vasodilators prn (e.g. nifedipine?, phentolamine?), sympathetic nerve block prn, HBO_2?, immediate referral to vascular/plastic surgery.

(D) Massive iliofemoral venous thrombosis

→ ℞ ABC's, 100% O_2 prn, heparin prn, thrombolytics prn, surgery prn.

→ urgent surgical consultation.

(E) Dissecting thoracic aortic aneurysm

→ chest and/or back pain → shock?, CVA?, MI?, aortic insufficiency?, pericardial tamponade?, hemothorax?, widened mediastinum? → CT scan prn, aortogram prn.

℞ ABC's, 100% O_2 prn, ℞ hypertension prn (e.g. labetalol), ℞ shock prn (pericardiocentesis?) → immediate cardiovascular surgery referral.

VII. CHEST

(1) Pneumonias

→ the patient may or may not have pyrexia, or purulent sputum.

→ beware of the pneumonia where GI symptoms predominate (legionella?).

→ be on the lookout for the less frequent, or unusual pneumonia, e.g. TB, Q fever, coccidioidomycosis (obtain a history regarding living and working conditions, and recent travel).

℞ ABC's, position of respiratory comfort, 50-100% O_2 prn, ventolin® aerosols prn, hydrate prn, antipyretics/analgesics prn, antibiotics prn, and see the following:

(1) Atypical pneumonias

→ Mycoplasma (bullous myringitis?, cold agglutinins?)

℞ e.g. erythromycin† .5-1g q6h I.V. → po

→ Legionella

℞ e.g. erythromycin† .5-1g q6h I.V. → po (legionella requires total of 3 weeks of antibiotic therapy).

→ Chlamydia

℞ e.g. erythromycin† .5-1g q6h I.V. → po

→ Viral, for example, influenza A: ℞ amantadine

(2) Typical pneumonia ± ≥60 years of age, ± alcoholism, ± COPD, ± nursing home acquired. ℞ e.g. mandol® 1-2g q6-8h I.V. for strep. pneumonia, hemophilus influenza, staph. aureus, klebsiella pneumonia, and moraxella catarrhalis. Add erythromycin† if you suspect that mycoplasma/legionella/chlamydia infection may be the etiology.

(3) Rapidly progressive pneumonia.

℞ erythromycin 1g q6h I.V., plus rifampin 600mg od po, plus claforan® 2 grams q6h I.V.

(4) Aspiration pneumonia ℞ penicillin → add claforan® if on H2 blockers.

(5) Ca of lung + postobstructive pneumonia

† Biaxin® (clarithromycin) 250-500mg bid po may be used for mild to moderate infections (better tolerated than erythromycin). Another alternative is doxycycline I.V. or po.

℞ penicillin, bronchoscopy.

(6) Pneumocystis carinii pneumonitis (occurs almost exclusively with AIDS)

→ occurs in heterosexuals too!

→ the chest x-ray may be negative initially.

→ consult references/infectious disease specialist, recommendations may have changed.

℞ bactrim® = 20mg trimethoprim/kg and 100mg sulfamethoxazole /kg/day/I.V./divided q6h (concomitant prednisone?) → po, total of 3 weeks of therapy → prophylactic therapy, e.g. q 4 week pentamidine aerosols. *See also #(4)(F), p.140.*

(7) Pneumonia in immunosuppressed patients e.g. chemotherapy, asplenic, systemic steroids, HIV^+ → if at all possible, establish an etiological diagnosis.

℞ e.g. claforan® + tobramycin + clindamycin, until culture results are known.

→ *See also* Pneumocystis carinii pneumonitis, *above.*

(8) An uncomplicated community acquired pneumonia may be treated with erythromycin, but this does not cover hemophilus influenza. Azithromycin may be used for mild to moderate infections (covers H. influenza), ℞ 500mg po stat then 250mg/day for days 2-5.

(9) Nursing home acquired pneumonia, if not requiring I.V. antibiotics may be given cipro® (ciprofloxacin*) 250-750mg bid po, plus penicillin po. Substitute a macrolide for penicillin prn (e.g. Biaxin®).

(2) Lateral decubitus films

→ may reveal small pleural effusions, and underlying disease in larger effusions.

Thoracocentesis → remove up to 1500cc ± biopsy → studies → rbc's, wbc's, cytology, cultures, stains, specific gravity, protein, glucose.

* ciprofloxacin may also be given I.V. and has a wide range of indications (consult references). Note: ciprofloxacin, clarithromycin and azithromycin are expensive antibiotics.

(3) Uncomplicated TB

℞ isoniazid 300mg (+ pyridoxine?), and rifampin 600mg od, plus pyrazinamide (15mg/kg/day), or in pregnancy, substitute ethambutol (15mg/kg/day) for pyrazinamide. Is the patient HIV positive?

(4) ARDS (Adult respiratory distress syndrome)

℞ ABC's, invasive hemodynamic monitoring prn, peep prn, diuretics prn, vasodilators prn, I.V. fluids prn, and ℞ precipitating cause, e.g. sepsis. Admit ICU.

(5) Asthma

→ smoker?, exposed to second hand smoke?

→ previous severe asthmatic attacks?/intubations?/admissions to ICU?

→ beware of air hunger, the quiet chest (air entry?), paradoxical respirations, use of accessory muscles, and pulsus paradoxis. Decreased level of consciousness?, respiratory fatigue?, severe respiratory acidosis?, fever?

Severe asthma → PEFR ≤ 80, $FEV_1 \leq 1$, $pO_2 \leq 60$, $pCO_2 \geq 45$

Moderate asthma → PEFR = 80-200, FEV_1 = 1-1.5

→ ℞ ABC's, see also #(7)(A), p.111.

→ measure the PEFR before and after aerosol treatments (specify, with O_2, not medical air), for example, ℞ ventolin® 0.5-1cc + atrovent® 1-2cc + saline 3cc → the initial aerosol ℞ may be followed prn by, 0.33cc ventolin® in 3-4cc saline q20 minutes X 1-6 doses. It may be useful to give saline aerosols between ventolin® aerosols for "pulmonary hydration" (may facilitate the expectoration of thick mucus plugs).

→ pulmicort® may also be added to the initial ventolin®/atrovent aerosol, then as indicated.

→ racemic epinephrine aerosol is also useful for moderate-severe bronchospasm, ℞ 0.5cc 2.25% in 4.5cc saline/100% O_2. *See also #(3), p.59.*

Aminophylline I.V. → give a loading dose prn → 3-6mg/kg with 50cc D_5W over 30 minutes → maintenance 0.2-0.8mg/kg/hr → do theophylline levels before and after prn; combining theophylline and erythromycin is contraindicated → may result in toxic levels of theophylline. Theophylline* is not as popular as it once was, but I still use it frequently.

Solu-cortef® ℞ 3-5mg/kg q6h I.V., or solu-medrol® ℞ 1-2mg/kg q6h I.V.

→ caution: stay well within the recommended doses, plus use the minimal dose and time required (recent out of court settlement {Canadian Medical Protective Association}, the patient developed bilateral avascular necrosis of the hips, following solu-medrol® therapy for an exacerbation of Crohn's disease; informed consent recommended).

Prednisone ℞ 40mg daily x 5-10 days (instead of, or following a course of I.V. steroids).

Antibiotics → if there is evidence of secondary infection, e.g. purulent sputum, pyrexia, sinusitis,† pneumonitis.

$MgSO_4$ → In addition to the standard treatment regimen, consider giving I.V. $MgSO_4$ prn (e.g. adults 2-4$^+$g) for moderate-severe bronchospasm (may alleviate the need for intubation?). *See footnote, p. 111.*

Asthma in pregnancy → ventolin®, theophylline, steroids, and certain antibiotics are ok (e.g. amoxil®, erythromycin) → avoid epinephrine in early pregnancy.

Anxiety?/hyperventilation? and/or subclinical bronchospasm? → pulse oximetry, measure PEFR → improvement with ventolin® aerosol?; pulmonary embolism?, ASA overdose?, metabolic acidosis?

COPD (chronic obstructive pulmonary disease) → measure FEV_1 and FVC.

→ purulent sputum?, pneumonitis?, secondary infection with moraxella catarrhalis?

→ ℞ ABC's, 28%-100% O_2 (caution), ventolin® aerosols prn, theophylline prn, steroids prn, antibiotics prn, monitor with clinical assessments and pulse oximetry/arterial blood gases. In addition, hydrate prn, keep in a position of respiratory comfort, $MgSO_4$? (may alleviate the need for intubation?), admit ICU prn.

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* Reported to result in bronchodilation, decreased respiratory muscle fatigue, and respiratory stimulation in COPD patients. Can Med Assoc J 1992; 147:420-8.

† Concomitant occult/overt sinusitis may aggravate asthma. The treatment of an accompanying sinusitis may alleviate the asthma symptoms, and decrease the need for systemic steriods. Sinusitis: Supplement to CMAJ 1997; 156(6). The first line antibiotic for sinusitis is amoxil® or bactrim. Second line antibiotics include, clavulin®, biaxin®, azithromycin, and cephalosporins. *See also #(2)(E), p. 134.*

→ insist that smokers, not smoke, at least not during their hospital stay (notation on the order sheet?/easy to write the order, but may not be so easy to implement).

VIII. GASTROINTESTINAL AND GENITOURINARY SYSTEMS

(1) ONE

(A) Vasopressin

→ 20 units in 200ml saline, over 40-80 minutes, for bleeding esophageal varices (not with ischemic heart or cerebral vascular disease), and/or sclerotherapy?.

(B) Esophageal perforation

(e.g. trauma/iatrogenic?, Boerhaaves syndrome)

→ ℞ ABC's, 100% O_2 prn, supportive care, and give antibiotics, for example, cefoxitin (mefoxin®) 3g or 40mg/kg I.V. (children), and clindamycin 600mg or 10mg/kg I.V. (children), for the inevitable mediastinitis while awaiting emergency surgery.

(C) Esophageal F.B.

e.g. bolus of meat → try glucagon 1mg I.V. → repeat 2mg I.V. in 20 minutes prn → refer prn (endoscopic intervention prn). Some clinicians are having the patients with esophageal f.b. (food) drink small amounts of soda pop e.g. cola. The gas may dilate the esophagus enough for the food to pass.

→ Button batteries lodged in the esophagus need to be removed emergently.

(D) Peptic Ulcer

→ Helicobacter pylori infection confirmed by gastroscopy/biopsy.

→ ℞ (7 day regimen) Losec® 20mg bid, Biaxin® 500mg bid, and Flagyl® 500mg bid.

(2) TWO

(A) Toxic megacolon

→ complication of ulcerative colitis.

→ air filled colon > 6cm, "thumb printing".

℞ ABC's, supportive care, I.V. ampicillin, clindamycin, and steroids. Immediate referral.

(B) Pseudomembranous enterocolitis

→ usually follows a course of antibiotics, e.g. UTI.

→ clostridium difficile infection.

→ abdominal cramps and diarrhea, ± fever.

℞ ABC's, supportive care, flagyl®, or vancomycin, or bacitracin.

(3) Viral Hepatitis

AntiHAv = hepatitis A antibody → no subsequent carrier state, or chronic liver disease.

HBsAg = hepatitis B surface antigen → persists in carriers.

AntiHBc = hepatitis B core antibody.

Hepatitis non A non B non C, D, E → chronic hepatitis and carrier state → no reliable screening method.

Hepatitis → routine investigations = HBsAg, Igm AntiHBc, Igm AntiHAv, PT, PTT, sgot, and bilirubin. Also antibodies and RNA for the HC, HD, and HE viruses.

HB vaccine → injection of HBsAg → repeat at 1 and 6 months.

→ a hepatitis A vaccine has recently become available. It can be given concurrently with the hepatitis B vaccine (same schedule), but at another site. The second injection can be given at two weeks, if rapid protection is required.

Immune globulin ℞ 0.02-0.06ml/kg for prevention of hepatitis A and non A/non B/non C?, D?, E?

HB immune globulin ℞ 0.06ml/kg for prevention of hepatitis B

→ AIDS/Hepatitis → cytomegalovirus?, toxoplasmosis?

→ Drugs? (e.g. oral contraceptives), or other hepatotoxins (e.g. alcohol, mushrooms, untreated or unsuccessfully treated Tylenol® overdose occurring a few days before).

→ referral to a hepatologist required?

(4) FOUR

(A) Portosystemic encephalopathy

℞ ABC's, supportive care, treat the precipitating cause (bleeding esophageal varices?), cleanse the gut (cathartics, enemas, neomycin, lactulose); flumazenil?

→ spontaneous bacterial peritonitis?

→ Caution: hemorrhoids may be the result of chronic liver disease/portal hypertension (undiagnosed?). Before incising hemorrhoids in the ER, satisfy yourself that the patient does not have, or is not a candidate for, portal hypertension.

(B) Acute pancreatitis

→ gallbladder disease?, alcohol abuse?, hyperlipidemia?, drugs?, trauma?, following an ERCP?

→ with serum calcium less than 7mg/100ml → poor prognosis.

→ ℞ ABC's, supportive care, analgesics prn, Zantac® I.V., ng tube prn, ultrasound prn, admit ICU prn.

→ hemorrhagic pancreatitis?

→ pancreatic pseudocyst?

(C) Infectious diarrhea

℞ ABC's, supportive care, I.V. ringers, or po balanced electrolyte fluids prn. If empiric antibiotics are required, give ciprofloxacin 500mg bid po or 200-400mg q8h I.V. (covers for shigella, salmonella campylobacter, or E. Coli), plus metronidazole 250-750mg q8h po or I.V., if C. difficile, giardia, or amebiasis is suspected. AIDS/diarrhea → consult references.

(5) Renal Failure

→ acute?, chronic?, acute on chronic?

→ prerenal (e.g. shock), renal (e.g. nephritis, acute tubular necrosis) or postrenal (e.g. bladder outlet obstruction).

→ oliguric renal failure (< 500 mL/urine/day), or nonoliguric (> 500 mL/day).

℞ ABC's, balance the electrolytes (e.g. K^+, NaCl), treat the underlying cause, diuretics may convert an oliguric to a non-oliguric failure, limit the fluids to 500ml plus the urine output, limit the protein, adequate nutrition (tube feeding or hyperalimentation prn), dopamine 1-3μg/kg/min prn, dialysis prn, renal biopsy prn.

(6) SIX

(A) Beware of post urinary retention diuresis, testicular torsion (doppler?), and testicular tumors (tumors → painless ± hydrocele → ultrasound and refer)

→ blue-black dot sign = torsion of appendix testis; epididymitis/orchitis?, incarcerated hernia?

(B) Testicular torsion

→ abrupt onset in mostly boys and young men → may present with abdominal pain and vomiting → the testicle is rotated internally (right clockwise, left counterclockwise).

→ distorsion attempt? → rotate the testicle externally (prehn's sign?, inject lidocaine at external inguinal ring?) → immediate referral if the distorsion attempt is unsuccessful.

(C) Paraphimosis

→ reduction attempt, dorsal slit prn, circumcision prn.

(D) Acute pyelonephritis

℞ ABC's, supportive care, ampicillin or cephalosporin, treat any underlying problems, e.g. ureteral stone, diabetes mellitus.

(E) Renal colic analgesia

→ e.g. morphine/demerol® I.V./I.M. Some clinicians are using toradol® (ketorolac) 30mg I.V./I.M. as a first line treatment. Toradol® frequently results in adequate analgesia, or may decrease the total amount of the narcotic required to control the renal colic (my impression).

→ Remember that in addition to renal calculi, renal colic may be caused by blood clots from a bleeding renal carcinoma (a clue may be gross hematuria occurring hours before the renal colic). If an IVP reveals a renal carcinoma, obtain a chest xray, and look for pulmonary metastasis → refer urology, CT scan.

IX. OBSTETRICS AND GYNECOLOGY

(1) Life threatening gynecological emergencies

→ ectopic pregnancy, ruptured hemorrhaging ovarian cyst, ruptured tubo-ovarian abscess, and trauma (e.g. vaginal tear with hypovolemic shock).

(2) Dysfunctional uterine bleeding

→ ectopic pregnancy?, endometritis?, endometriosis?

℞ ABC's, ringers prn, CBC, X match, coagulation profile, serum beta-HCG pregnancy test, IUD?, ultrasound prn, culdocentesis prn, laparoscopic prn, conjugated estrogen (premarin®) 25mg I.V. prn over 10-15 minutes, repeat in 2-6 hrs prn, progesterone 100mg I.M. prn, ovral® prn, D and C prn → pathology report? Do not omit a pregnancy test in women who have had a tubal ligation.

(3) Incomplete abortion (septic?)

℞ ABC's, ringers prn, CBC, X match prn, coagulation profile, antibiotics prn, syntocin 80 units in 1 L ringers, 100cc wide open prn, then 100cc/hr prn → D and C prn. Rh negative? → WinRho SD® (120-300^{+}µg) prn. Postpartum hemorrhage → ℞ as above plus fundal massage prn (bimanual prn), and search for delivery trauma.

→ Remember, abortion can be a very emotionally traumatic event, for both the patient and her partner, and can result in the eventual breakup of their relationship. They may or may not appear upset. Explain abortion's inevitable nature and possible ramifications. Advise then not to hold back their grief.

(4) Chronic hypertension in pregnancy

℞: for example, methyldopa, beta blockers, hydralazine.

(5) Asymptomatic bacteriuria in pregnancy

→ ℞, for example, ampicillin, erythromycin.

(6) Preeclampsia with liver involvement (acute fatty liver)

℞ ABC's → urgent delivery, *see #(7)(B), p. 92.*

(7) Cholecystitis, pyelonephritis, and appendicitis

→ can be confused with one another, particularly in the third trimester.

(8) Third trimester bleeding

→ placenta previa?, abruptio placenta?

℞ ABC's, fetal heart monitor prn → ultrasound and referral → prn examination in the OR with a double setup (do not perform a pelvic or rectal exam in the ER).

(9) Premature breech in labor

℞ ABC's, fetal heart monitor → refer → c/section if the premature labor has not been arrested. *See #(10), p.105.*

(10) Early premature labor

℞ ABC's, fetal heart monitor, bed rest, bolus 1^{+} liters of ringers, $MgSO_4$ 4g in 500cc of ringers I.V. over 10-30 minutes, and/or terbutaline 0.25mg s.c. → refer.

(11) Premature rupture of membranes?

→ leaking vaginal fluid? → nitrazine litmus paper → alkaline?, avoid doing a pelvic exam in the ER → refer.

(12) Questran®

→ ℞ 10-12g/po/daily for cholestatic jaundice of pregnancy.

(13) Heparin

→ ok for use in pregnancy → oral anticoagulants are contraindicated.

(14) FOURTEEN

(A) Emergency delivery

℞ ABC's, monitor the fetal heart → fetal bradycardia? (prolapsed cord?, nuchal cord?) → ℞ 100% O_2, the patient lying on her left side, bolus(es) ringers, and for tetanic contractions give $MgSO_4$ 4 grams in 500cc ringers I.V. over 10-30 minutes, and/or terbutaline 0.25mg s.c. → refer prn, if time permits. Postpartum → remember to keep the newborn warm. Beware of the patient arriving at the ER, in labor, delivery imminent, who at triage makes no mention of, or denies, pregnancy (soon to be grandparents are also unaware). I have seen four such patients in the past ten years, fortunately turning out to be a happy event for everyone involved (the element of surprise is very effective).

(B) Third trimester blunt abdominal trauma

→ abruptio placenta?, ruptured uterus?

→ ℞ ACBC's, 100% O_2 prn, the patient lying on her left side prn (cervical spine ok?), fetal heart monitoring prn, ultrasound prn, consult obstetrics prn, extended observation prn, DIC?

(C) Third trimester cardiac arrest

→ if salvage of a live infant is possible, perform a classical cesarean section after ≤ 4 minutes of unsuccessful BCLS/ACLS, while continuing resuscitation efforts.

→ a desperate situation with minimal time to obtain the services of an obstetrician. You may have to "go it alone."

(15) Pid ± perihepatitis (IUD?)

℞ ABC's, supportive care, analgesics prn, amoxil® 3g + probenecid 1g po, plus vibramycin® 100mg bid po X 2 weeks, or gentamycin and clindamycin I.V. *See also #(A), p.139.*

(16) Sixteen

(A) Candida smear

→ add 2gtts of 10% potassium hydroxide

→ ℞ nystatin prn (or for example, miconazole or fluconazole).

Clue cells = bacteria adhered to epithelial cells → gardnerella vaginitis → ℞ flagyl® 2g po, or flagyl® vaginal cream in pregnancy (caution in the first trimester).

Trichomonas ℞ flagyl® 2g po, or in pregnancy flagyl® vaginal cream (caution in the first trimester).

Chlamydia ℞ vibramycin® 100mg bid po X 7-10 days (erythromycin in pregnancy).

→ chlamydia infection may present as an acute arthritis. *See #(4)(B), p.140.*

Acyclovir* 5-10+mg/kg/q8h I.V., or 200-400-800mg q4-8-12h po (consult references) → for herpes simplex, herpes zoster, or chickenpox, particularly in immunosuppressed patients (acyclovir safe in pregnancy??). Herpes simplex encephalitis requires early presumptive I.V. acyclovir (consult references). Caution: intravenous acyclovir may cause reversible renal toxicity.

Pregnancy prophylaxis → ℞ e.g. ovral® tabs II stat, and repeat in 12 hrs. Give with gravol® (dimenhydrinate) prn for nausea, pregnancy test 1st prn (serum ICON?). Follow-up pregnancy test in 3-4 weeks prn (offer therapeutic abortion prn because of an increased teratogenic risk).

(B) Diclectin® (doxylamine 10mg/pyridoxine 10mg)

→ is approved in Canada for the treatment of the nausea and vomiting of pregnancy, ℞ tabs II h.s., plus tab I a.m. prn, and tab I p.m. prn.

* Famvir® is a new alternative to acyclovir, 500mg tid for seven days, reduce to bid/od with decreased renal function. Valtrex® 500mg bid for five days is another new choice.

X. PEDIATRICS (SECOND OF TWO SECTIONS)

® *See also* Pediatrics (first of two sections), *p. 80*.

(1) Near miss SIDS

→ seizure?, sepsis?, pertussis?, child abuse?

→ ℞ ABC's, 100% O_2 prn, supportive care, refer for immediate pediatric assessment.

→ it is now recommended that babies sleep on their back, or their side.

(2) Pediatric heart disease

Common presentations: cyanosis, murmurs, abnormal pulses, hypertension, syncope, CHF, (infants/dyspnea with feeding?), cardiogenic shock, and tachyrhythmia.

→ Patients with congenital heart disease, and a right to left shunt, may tolerate blood loss poorly, and may require an early transfusion of packed red cells. In addition, be careful with I.V. therapy → air bubbles → across right to left shunt → systemic air embolism.

→ the B/p cuff should cover 2/3 to 3/4 of the infants' upper arm, or forearm.

1. Tetralogy of Fallot with a hypercyanotic spell

℞ ABC's, 100% O2, knee-chest position, I.V. morphine 0.1-0.2mg/kg/I.V. prn, bolus(es) ringers prn, hypoglycemia?, acidosis?, emergent cardiology consult.

2. Cardioversion → consult anesthesia/cardiology if time permits. *See also #(7), p.84*.
3. SVT (narrow complex)

→ ℞ ABC's, 100% O_2 prn, vagal manoeuvres prn, < 2 years of age ℞ digoxin prn, 5-20µg/kg/I.V./initial digitalizing dose; > 2 years of age, verapamil prn, 0.075-0.15mg/kg I.V.; cardioversion 0.25-1 joules/kg prn (usually synchronized, ± sedation/general anesthesia prn, e.g. valium® 0.2mg/kg I.V. prn). Adenosine 0.1mg/kg/I.V. may be used instead of digoxin or verapamil, and has become the drug of choice for patients under 2 years of age. WPW? → verapamil and digoxin are both contraindicated. *See #(19), p.71*.

4. Atrial fibrillation or flutter

℞ ABC's, 100% O_2 prn, digoxin prn, 5-20µg/kg/I.V./initial digitalizing dose (no digoxin with WPW), procainamide 2mg/kg I.V. prn, up to 10-15mg/kg prn (careful*; see #(13)(A), p.69*), cardiovert prn (usually synchronized, ± sedation/general anesthesia prn).

5. Wide complex tachycardia (including ventricular tachycardia)

℞ ABC's, 100% O_2 prn, lidocaine 1mg/kg/I.V. prn, procainamide prn (see above ℞ atrial fib/flutter), cardiovert prn (usually synchronized, ± sedation/general anesthesia prn). No digoxin or verapamil.

6. Ventricular fibrillation and bradyarrhythmias

→ ℞ similar to adults using pediatric doses, see also #(2)4, (C), (D) (p. 57), #(2)(p. 65), # (4) (p.83), #(7) (p.84).

→ pediatric cardiac arrest is frequently secondary to, for example, respiratory dysfunction or shock.

7. Congestive heart failure → congenital heart disease?, dilated cardiomyopathy?

℞ ABC's, 100% O_2 prn, morphine 0.1mg/kg I.V. prn, lasix 1mg I.V. prn, dopamine prn, digitalize prn.

8. Hypertrophic cardiomyopathy

→ dyspnea, chest pain, syncope, ± physical findings.

→ may result in sudden death.

℞ ABC's, 100% O_2 prn, EKG, echocardiogram, beta or calcium blockers prn, refer.

9. Kawasaki Disease

→ vasculitis (coronaries?), conjunctivitis, lymphadenitis, erythema of lips, tongue, hands and feet.

℞ ABC's, EKG, echocardiogram, gamma globulin, ASA, refer.

(3) Pneumonias

→ cough (may be minimal), ± fever, ± tachypnea, ± rales/rhonchi/bronchospasm.

→ bacterial?, mycoplasma?, chlamydia?, viral?, cystic fibrosis/sweat test?

→ ℞ ABC's, position of respiratory comfort, 100% O_2 prn, ventolin® aerosols prn, hydrate prn, antibiotics prn, refer prn.

(4) Gonorrhea in children = sexual abuse.

℞ amoxil® 50mg/kg, plus probenecid 25mg/kg to one gram, and child protection.

(5) Antibiotics

Amoxil	℞ 40+mg/kg/day
Erythromycin	℞ 50+mg/kg/day
Clarithromycin	℞ 15mg/kg/day
Keflex®	℞ 50+mg/kg/day
Keflin®	℞ 50+mg/kg/day
Cloxacillin	℞ 50+mg/kg/day

(6) Sepsis and meningitis in children

→ See also #(1) p.80, #(5)(A) p.141.

→ begin antibiotic treatment < 30 minutes, or as soon as feasible.

℞ ABC's, 100% O_2 prn, supportive care, antibiotics, dexamethasone? (decreased incidence of permanent hearing loss with meningitis?)*. Hypoglycemia?, septic shock?, DIC?, seizures? increased intracranial pressure?

→ infants may present with fever, irritability, lethargy, and poor feeding (fever may be absent).

→ beware of herpes simplex encephalitis. *See #(5)(B), p.142.*

Antibiotic regimen #1:

< 7 days of age	gentamycin 5mg/kg/day/q12h/I.V. and ampicillin 100mg/kg/day/q12h/I.V.
> 7 days < 1 month	gentamycin 7.5mg/kg/day/q4h/I.V. and ampicillin 200mg/kg/day/q4h/I.V.
> 1 month	ampicillin 300mg/kg/day/q4h/I.V. and chloramplenical 100mg/kg/day/q4h/I.V.

or Antibiotic regimen #2:

* I.V. dexamethasone beginning just prior to the antibiotics is now recommended by some clinicians (0.6mg/kg/day).

claforan® (cefotaxime) 80-200mg/kg/day/I.V. (q12-8-6-4h), plus in the 1st three months of life ampicillin 100mg/kg/day/I.V.

Meningitis prophylaxis

℞ rifampin → adults 600mg bid X 2 days.

→ 1 month to 12 years of age, 10mg/kg/bid X 2 days.

→ < 1 month, 5mg/kg/bid X 2 days.

(7) SEVEN

(A) Asthma

→ ± secondary infection → bronchospasm(± cough, ± audible wheezing), bronchoedema, and increased mucus production → hypoxemia, respiratory acidosis, and metabolic acidosis → may progress to respiratory/cardiac arrest.

℞ ABC's, position of respiratory comfort, humidified 50-100% O_2 prn, ventolin® ± atrovent® aerosols prn/racemic epinephrine aerosols prn, $MgSO_4$?* (may alleviate the need for intubation?), steroids prn, theophylline prn, hydrate prn, antibiotics prn. Monitor with clinical assessments, PEFR, pulse oximetry, and arterial blood gases. Extended stay in the ER?, admit ICU? *See also #(8)-(10) pp. 112-112, #(5) p. 97, footnote p. 98, #(2)(E) p. 134.*

→ rule out other less common causes of wheezing, for example, bronchiolitis, foreign body, cystic fibrosis, CHF → stridor not wheezing?; asthma trigger?, e.g. allergy, infection, smoker/second hand smoke†; previous severe asthmatic episodes/admissions to ICU?

(B) Bronchiolitis (respiratory syncytial virus)

→ may progress to apnea.

→ RSV rapid slide test/culture

* Intravenous magnesium therapy for moderate to severe pediatric asthma: J Pediatr 1996; 129:809-14. The study dose of $MgSO_4$ was 25mg/kg (maximum 2g).

† I tell parents that a local pediatric chest specialist says, "No smoking in the house, no smoking in the car."

℞ ABC's, position of respiratory comfort, humidified 50-100% O_2 prn, ventolin® aerosols prn, and other bronchodilators prn (*See also #(8)-(10), pp. 112-112*), hydrate prn, ribavirin aerosols.

(8) Aminophylline

℞ 5-7mg/kg/I.V. loading dose prn

→ maintenance 0.6-1.2/kg/hr/I.V.

→ before and after theophylline levels prn

→ theophylline 5mg/kg/qid/po

→ some pediatricians use aminophylline only in the seriously ill.

(9) Corticosteroids

→ *See also #(5), p.97*

Solu-medrol® ℞ 1-2mg/kg/I.V./q 6h prn

Solu-cortef® ℞ 3-5mg/kg/I.V./q 6h prn

Decadron® ℞ 0.25-0.6mg/kg/I.V./I.M. q 6h prn

Prednisone ℞ 1-2mg/kg/po/OD X 3-5 days (short course for asthma)

→ patients who develop chickenpox within three weeks of receiving steroids, may require intravenous acyclovir.

(10) TEN

(A) Adrenaline 1:1000

℞ 0.01ml/kg to maximum of 0.3cc s.c.

(B) Aerosols

→ measure the PEFR before and after each aerosol treatment (if feasible).

→ with O_2 when available, rather than medical air, be specific.

℞ e.g. ventolin® 0.03cc/kg to 0.5-1.0cc + atrovent® 0.5-1.0cc (5-12yrs) + saline 3cc → the initial aerosol treatment may be followed prn by ventolin®, 0.01cc/kg in 3cc saline q 20 minutes X 6 doses.

→ ℞ e.g. racemic epinephrine 0.5cc 2.25% in 4.5cc saline.

(C) Antibiotics

→ have no role in asthma except when bacterial infection is documented (e.g. sinusitis, pneumonitis), or strongly suspected (e.g. toxic appearing patient).

(11) Reye's syndrome

→ liver and brain dysfunction

→ elevated blood ammonia, hypoglycemia, no jaundice, cerebral edema → the liver biopsy is diagnostic.

→ ℞ ABC's, supportive care, immediate referral.

(12) Mannitol 20%

→ for emergency ℞ of increased intracranial pressure/cerebral edema.

→ ℞ 5-10cc (1-2g)/kg/I.V. over 30-60 minutes (caution).

→ *See also #(1), p.168.*

(13) Infantile spasms

→ ℞ ABC's, supportive care, urgent pediatric neurology consult (the EEG will be abnormal).

(14) FOURTEEN

(A) Seizures in children

® *See also #(5), p.84*

→ focal component?, secondary cause? (e.g. febrile?, meningitis?, trauma?, child abuse/shaken baby syndrome?, hypoglycemia?/chemstrip, alcohol?, overdose/drugs?, inadequate anticonvulsant therapy/compliance?, intracranial hemorrhage?, brain tumor or abscess?). Aspiration of stomach contents?, and/or head/neck injury? from seizure/fall. Do not confuse decerebrate posturing with seizures.

Status epilepticus → the distinct possibility of permanent neurological damage if the seizures are not terminated within 30-60 minutes (subtle seizure activity?).

→ fever, leukocytosis, ↑CPK, metabolic acidosis (bicarb prn).

1. ℞ ACBC's, 100% O_2 → blood work → chemstrip, anticonvulsant levels, etc., hypo/ hypernatremia?, hypocalcemia?, hypomagnesemia?, hyperkalemia?, myoglobinuria?
2. Dextrose 10-25% 2ml/kg/I.V. prn. (thiamine prn, pyridoxine prn).

→ seizures increase the brain's requirements for glucose.

3. Valium® 1mg/year of age to 10mg, or 0.2mg/kg/I.V. (rectal route prn 0.5mg/kg)
4. Dilantin® 15mg/kg/I.V. (loading dose) over 30-60 minutes (with cardiac monitoring).
5. Repeat valium® prn to a total dose of 2.6mg/kg/I.V.
6. Add phenobarb 15mg/kg/I.V. prn (loading dose).
7. Add lidocaine 2mg/kg/I.V. prn → 1mg/kg/hr drip.
8. General anesthetic prn.
9. EEG? → seizure arrest real or apparent? (continuous EEG monitoring prn).
10. CT scan?, MRI?, LP? (after the seizures are terminated).

(B) Febrile seizures

℞ ABC's, 100% O_2 prn, dextrose I.V. prn, valium® I.V. or per rectum prn, tylenol® rectal suppositories prn, cooling prn (no rubbing alcohol); rule out, for example, hypoglycemia, sepsis/meningitis, trauma, alcohol poisoning, drug overdose, e.g. salicylates.

(15) Fifteen

Campylobacter	→ ℞ erythromycin 50mg/kg/day/po
Yersinia	→ ℞ bactrim®: 3mg trimethoprim + 15mg sulfamethoxazole/ kg/bid/po
Clostridium difficile	→ ℞ flagyl® 25mg/kg/day/po

(A) Child abuse

→ psychological, physical, sexual, and neglect

→ Discrepancies in history/physical?, atypical injuries and locations?, e.g. cigarette burns, buttock contusions; multisystem injuries?, e.g. CNS, skin, bone, abdomen; evidence of neglect and poor supervision?, e.g. failure to thrive, alcoholic or drug abusing parents; evidence of sexual abuse, e.g. gonorrhea (HIV status?).

→ shaken baby syndrome → coma/seizures, ± retinal hemorrhages, ± new or healing rib/extremity fractures, ± other injuries.

→ Munchausen's by proxy, e.g. apnea spells, sepsis, poisoning.

→ bruises → red-blue (1 day old) → green (5 days) → yellow (7 days) → brown (10 days)

→ remember that mongolian spots or folk remedies may simulate bruises.

→ coagulation studies?, skeletal survey?, CT scan?, MRI?

→ parent/caretaker volunteers that they were abused as a child?

℞ ACBC's, supportive care, rule out legitimate injuries/illness, e.g. accidental burns, leukemia; treat other problems, e.g. injuries, STD (sexually transmitted disease); pregnancy test/prophylaxis prn (ovral® prn), colposcopy/forensic examination prn (photos prn), child protection, appropriate reporting, counseling, admit prn.

→ postscript → society continues to pay an ever increasing price (e.g. violence, substance abuse, family discord, and other dysfunctional behaviours), for the inappropriate care, neglect, and abuse of its children (my impression).

(16) Seventeen

→ beware of entrapment/tourniquet injuries of the penis and digits in infants (e.g. hair, clothing material).

XI. ENDOCRINOLOGY AND HEMATOLOGY

(1) Unexplained? hypoglycemia

→ Pancreatic or other tumors?, drugs?, e.g. alcohol; endocrine disorder?, e.g. myxedema; surreptitious administration of insulin or oral hypoglycemic agents?

→ seizures?, coma?, confusion or bizarre behaviour?

→ do a serum glucose, a serum insulin, insulin antibodies, and c-peptide levels prn.

℞ ABC's, I.V. dextrose prn → 5, 10, 25, or 50% prn, glucagon 1-5mg I.V. prn, Solu-cortef® 250mg I.V. prn, and diazoxide 300mg I.V. prn over 30minutes. Treat other problems, e.g. hypothyroidism. Alcoholics require thiamine 100mg I.M./I.V.

→ hypoglycemia may simulate a CVA, especially in the elderly (including focal deficits).

→ ketotic hypoglycemia can occur in children 1-5 ± years of age.

Oral hypoglycemic agents → beware of prolonged hypoglycemic effect (hours, days).

(2) Diabetic ketoacidosis (DKA)

→ undiagnosed diabetic?

→ hyperglycemia, dehydration, electrolyte loss, and metabolic acidosis.

→ kussmaul breathing?, vomiting?, coma?, shock?, other problems?, e.g. pneumonitis, trauma. Preexisting medical problems?, e.g. chronic renal failure plus DKA may result in life threatening hyperkalemia.

→ ℞ ABC's, I.V. fluids/lytes (K^+ prn, bicarbonate prn, NaCl prn {saline, ringers}, phosphate?, Mg?, Ca?), low dose I.V. insulin drip, and ℞ precipitating cause, e.g. UTI, MI, trauma. Use a flow sheet (assessments, investigations {e.g. blood gases, lytes, glucose}, and therapeutic measures).

→ Admit ICU prn → the patient may require invasive monitoring, e.g. history of CHF.

→ Give boluses of normal saline/ringers for dehydration/shock (20mL/kg in children).

→ Add 40meq KCl/liter to 0.5-N saline once urine output begins (if not hyperkalemic), or before if the T waves are flat (serum K^+ pending) or the serum K^+ is low.

→ Beware of an initial hyperkalemia, e.g. concomitant acute or chronic renal failure (peaked T waves and wide QRS) → emergency Rx prn → sodium bicarbonate 1meq/kg/I.V. prn, calcium gluconate 10% 5-10mL I.V. prn (0.2mL/kg in children), bolus regular insulin 10 units I.V. (0.1 unit/kg in children), and bolus normal saline 1-2liters (20mL/kg in children).

→ give sodium bicarbonate 1-2meq/kg I.V. prn for pH < 7.1 (over ½-2 hours, no I.V. push except if the patient is critical: caution → be on the alert for hypokalemia, hypomagnesemia, and paradoxical cerebral acidosis/edema).

→ replace ½ of the fluid (+ maintenance), and electrolyte deficits over the 1st 8-12 hours (after the initial saline boluses prn). The total deficits may be Na 9 mEq/kg, K^+ 2-6 mEq/kg, and fluids 100mL/kg. The patient may also require $MgSO_4$, calcium, or phosphate. *See also #(17)-(22), pp. 62-64.*

Regular insulin (low dose I.V. drip)

Rx children → 0.1unit/kg/hr/I.V.

adults → 5-10units/hr/I.V.

→ also give an initial I.V. bolus of insulin equal to a one hour's dose.

When serum glucose is reduced to 250mg (14mmol/L), add dextrose to I.V., and continue I.V. insulin until acidosis clears, then give insulin/sliding scale s.c. (as follows).

SLIDING SCALE REGULAR INSULIN qid s.c.

serum glucose			insulin (dose may vary)
5 - 10	mmol/L	(90 - 180mg/100mL)	Rx 2-4 units s.c.
10 - 15	mmol/L	(180 - 270mg/100mL)	Rx 4- 6 units s.c.
15 - 20	mmol/L	(270 - 360mg/100mL)	Rx 6- 8 units s.c.
20+	mmol/L	(360^+mg/100mL)	Rx 8-10 units s.c.

(3) Alcoholic ketoacidosis

→ hyperventilation, dehydration, electrolyte loss, metabolic acidosis.

Rx ACBC's, thiamine, 50% dextrose prn, D5ringers, bicarb?, phosphate?, and treat other problems, e.g. pancreatitis, alcohol ± other drug withdrawal.

(4) Lactic acidosis

→ hyperventilation, weakness, otherwise unexplained high anion gap (e.g. salicylates), lactic acid ≥ 7mmol/L. Methanol poisoning?

℞ ABC's, I.V. fluids, bicarb prn to pH 7.2^{+} (careful: paradoxical CSF acidosis, hyperosmolality); hemodialysis prn, and ℞ underlying cause, e.g. sepsis, near drowning.

(5) Nonketotic hyperosmolar coma

→ underlying heart or renal failure?

→ weakness, dehydration, confusion to coma.

℞ ABC's, I.V. fluids/lytes (substantial loss), low dose I.V. insulin drip, and ℞ precipitating cause, e.g. CVA, pneumonitis. *See also #(2), p.116.*

(6) Thyroid storm

→ signs of thyrotoxicosis, plus fever, dehydration, and cardiovascular, CNS, and GI dysfunction (beware of apathetic hyperthyroidism in the elderly).

→ initial blood work (e.g. T3, T4, free thyroxin, cortisol).

℞ ABC's, supportive care, I.V. fluids/lytes, 50% dextrose prn, multivitamins prn, cooling/Tylenol® prn (no ASA), treat the precipitating cause (e.g. pyelonephritis), and specific treatment, as follows, ℞:

1. Propylthiouracil (inhibits thyroid hormone synthesis, and T4 → T3 conversion) → 900-1200mg po stat → 300mg q6h prn

→ then 300-600mg/day X 3-6 weeks.

2. Iodine solution (blocks hormone release) → start 2 hours after the propylthiouracil has been given → 30 gtts po/day X 10-14 days.
3. Inderal® (beta blockade) 1mg I.V. prn, to total of 10mg

→ 20-120mg q6h po (blocks thyroxin's peripheral effects, and T_4 to T_3 conversion).

4. Solu-cortef® 250mg q6h I.V. for "stress", also blocks thyroxin release, and peripheral T_4 to T_3 conversion.

5. Plasmapheresis prn, dialysis prn, RAI (later prn).

→ patient requires admission to ICU.

(7) Myxedema coma

→ manifestations of hypothyroidism, plus CNS, respiratory, cardiovascular, and metabolic dysfunction. The elderly may have an atypical presentation.

→ do routine bloodwork, EKG, chest x-ray, plus T_4, T_3, TSH, and cortisol levels.

→ you may have to initiate specific ℞ before laboratory confirmation.

→ ℞ ABC's and supportive care, 50-100% O_2 prn, 50% dextrose prn, ringers prn, Solu-cortef® 100-500mg q4-6h I.V., thyroxin 500μg I.V. (after the initial dose of Solu-cortef®), then 100μg I.V. daily. Treat any other problems (e.g. hypothermia, hyponatremia), or precipitating cause, for example, pneumonitis, UTI. Caution with underlying heart disease, ℞ of hypothyroidism may precipitate CHF/angina/MI. ICU admission is required.

(8) Adrenal crises

→ abrupt cessation of prednisone therapy?

→ sepsis?/anticoagulant therapy?/adrenal hemorrhage?

→ lethargy, fever, shock, nausea, vomiting.

→ the diagnosis of subacute adrenal failure is often missed, or delayed.

→ order routine bloodwork, plus ACTH and cortisol levels (also do ACTH testing if appropriate).

→ ℞ ABC's, D5saline boluses prn, bicarb prn for hyperkalemia, Solu-cortef® 500mg I.V. (initial dose), dopamine prn, and treat any precipitating cause that may have converted a chronic adrenal insufficiency into an acute crises, e.g. pneumonitis, trauma.

(9) Nine

(A) Platelets

→ ABO matching is not required → 10 packs of platelets will raise the platelet count by approximately 40-50,000, children ℞ 0.2 packs/kg body wt.

→ platelet count greater than 50,000 is OK; less than 20,000 is critical, e.g. substantial risk of CNS hemorrhage.

→ follow with frequent platelet counts prn. *See #(11), p.120.*

(B) Fresh frozen plasma

→ ABO matching is required: contains all the clotting factors (1 unit/cc).

(C) Cryoprecipitate

→ no ABO matching is required: contains factor 8, fibrinogen (5-10units/cc), and Von Willebrand's factor. Normal fibrinogen levels = 200-400 mg/dl. *Caution*: *can your blood agency assure the safety of their cryoprecipitate?* (e.g. HIV, HB, HC).

(10) Hypoprothrombinemia

→ e.g. excessive warfarin therapy → ℞ vitamin K 2.5-25mg po/s.c./I.M. → repeat prn. Caution: I.V. vitamin K has reportedly resulted in anaphylactoid like reactions, and death.

(11) ELEVEN

(A) Idiopathic? thrombocytopenia purpura

→ acute?, chronic?; DIC?, drugs? (e.g. antibiotics), infection? (e.g. infectious mono), alcohol? (resolves with abstinence?), AIDS?, neoplasm?, collagen disease?, transfusion reaction?, idiopathic?

→ ℞ ABC's, platelets prn, immune globulin prn, steroids prn, ℞ any underlying cause.

→ platelets (10 packs/adults) may have to be given before and after the initial dose of the immune globulin (400-1000mg/kg/I.V.). Frequent platelet counts prn. *See #(9), p.119.*

(B) Thrombotic thrombocytopenic purpura

→ thrombocytopenia, hemolytic anemia, red cell fragmentation; systemic, neurological, and renal manifestations.

℞ ABC's, plasmapheresis, platelets prn, prbc's prn.

→ early intense plasmapheresis can be crucial for patient survival.

(C) DIC (Disseminated Intravascular Coagulation)

→ may have an acute or subacute presentation

→ DIC screen: platelet count, PT, PTT, fibrinogen, fibrin degradation products.

℞ ABC's, treat the precipitating cause (e.g. sepsis, trauma, shock, burns, heat stroke, head injury, transfusion reaction, cancer, obstetrical problems), I.V. heparin prn, PRBC's prn, FFP or cryoprecipitate prn, and platelets prn. Fibrinogen should be kept above 150mg/dL (15 bags of cryoprecipitate → approximate increase of 100mg/dL in the fibrinogen level), and the platelet count kept above 50,000 (10 packs platelets → an increase of 40-50,000 in the platelet count/children 0.2 packs/kg body wt). Caution: *See also* Cryoprecipitate, *#(9)(C), p. 120.*

(12) Hemophilia

℞ ABC's, local pressure ± local thrombin prn, desmopressin (DDAVP) 0.3μg/kg I.V. prn (for hemophilia A, or type I von Willebrand's disease, consult references), factor VIII/IX concentrate prn, cryoprecipitate 18-45units/kg q8-12h prn, up to 80 units/kg prn with intracranial bleeding, or serious trauma, (circulatory factor VIII/IX inhibitors present?).

→ Fresh frozen plasma (FFP) may be used, but may result in volume overload.

→ give prophylactic factor VIII/IX concentrate prn with head injury or major trauma.

→ also ice packs, ace bandages, splinting, analgesics (I.V. narcotics?), and steroids prn.

→ hemophilia occurs in males only, von Willebrand's disease occurs in both sexes.

→ Caution: *See also* Cryoprecipitate, *#(9)(C), p. 120.*

(13) THIRTEEN

(A) Autoimmune hemolytic anemia

→ etiology, for example, drugs, collagen diseases, infectious mono, mycoplasma infection, mushroom poisoning.

℞ ABC's, prednisone/solu-cortef® prn, PRBC's prn, treat the underlying problems, e.g. discontinue causative drugs.

(B) Sickle cell crises

→ thrombotic, hemolytic, aplastic, or splenic sequestration crises; sepsis, and acute chest syndrome.

℞ ABC's, 50-100% O_2 prn, analgesics prn (I.V. narcotics?), I.V. fluids prn, PRBC's prn (partial exchange transfusion?), and folic acid (5-20^{+}mg daily). Treat infection (salmonella septic arthritis?), and metabolic acidosis if present. Beware of drug addiction and drug seeking behaviour. Autosplenectomy?

(C) Acute leukemia

℞ ABC's, supportive care: beware of infection, thrombocytopenia, and DIC. Refer immediately.

(D) Infectious mononucleosis

→ beware of upper airway obstruction, encephalitis, hepatitis, thrombocytopenia, and splenic enlargement (may rupture from minor trauma).

℞ ABC's, supportive care, analgesics/antipyretics prn, prednisone prn, platelets prn. Avoid contact sports with splenomegaly. Concomitant strep. infection?

→ infectious mononucleosis often simulates bacterial tonsillitis.

(14) Massive blood transfusions

→ watch for a decrease in the coagulation factors (give FFP & platelets prn), ARDS (use micropore filters), hypothermia (warm transfusion products), and hypocalcemia (give calcium gluconate 10% 1-10ml slowly I.V. prn).

(15) Transfusion reactions

→ febrile reactions (use washed, leucocyte poor, PRBC's), allergic reactions (e.g. urticaria, anaphylaxis), delayed reactions (e.g. serum sickness, hepatitis B), or hemolytic reactions. Hemolytic reactions are the most life threatening, and may result in, for example, anaphylaxis, shock, DIC, renal failure. Using washed PRBC's prevents most allergic reactions.

(16) Sepsis in immunosuppressed patients

→ triple antibiotic therapy

℞ e.g. claforan® (cefotaxime) + tobramycin + clindamycin

→ *See also* Septic Shock, *p. 76.*

(17) Emergency complications of malignancy

℞ for example, upper airway obstruction, pericardial tamponade, thrombocytopenia and hemorrhage, adrenal insufficiency and shock, acute tumor lysis syndrome, superior vena cava syndrome, acute spinal cord compression, CNS problems (e.g. seizures), hypercalcemia, SIADH, hyperviscosity syndrome, granulocytopenia, immunosuppression, infection, opportunistic infection, and sepsis.

→ inadequate pain control is a frequent urgent/emergent problem of malignancy (call your palliative care consultant prn).

Remember that patients with moderate/severe chronic pain* may appear exhausted and depressed, rather than anxious. Trust the patient's assessment of the severity of their pain (e.g. zero to ten = none to the most severe). Like migraine sufferers, patients with chronic pain syndrome or cancer pain may need parental analgesics for "breakthrough pain."

Examples of the drugs and treatment modalities used (in combination prn) for chronic cancer pain (e.g. bone and/or neuropathic pain, and/or visceral pain) are: (1) morphine → regular dosing, plus prn for breakthrough pain, no fixed upper limit dosage, addiction rare with cancer pain, (2) codeine, (3) NSAIDs, (4) acetaminophen, (5) amitriptyline, (6) carbamazepine, (7) dexamethasone, (8) antiemetics (e.g. prochlorperazine, metoclopramide, dimenhydrinate), (9) radiotherapy, (10) chemotherapy, and (11) nerve blocks. NSAIDs are useful for bone pain; tricyclic antidepressants, corticosteroids, and anticonvulsants are useful for neuropathic pain.

→ In addition to morphine and codeine, other useful narcotics are: hydromorphone, oxycodone, fentanyl (may be given transdermally), and demerol® (short term only). Do not forget to put the patient on a regimen of a stool softener and a bowel stimulant. Except for the initial relief of pain (e.g. morphine 10mg plus gravol® 50mg plus toradol® 30mg I.M.), try to avoid giving analgesics via the intramuscular route for chronic cancer pain.

* The denial of chronic pain. Editorial by Dr. Robert Teasell. Pain Research and Management. Vol 2, no. 2, summer 1997.

XII. CENTRAL NERVOUS SYSTEM (SECOND OF TWO SECTIONS)

® *See also* Central Nervous System (first of two sections), *p. 77.*

(1) Headache

→ new headache?, acute and recurrent?, chronic?, progressive?, level of consciousness?, nausea/vomiting? (glaucoma?), pyrexia?, meningeal irritation?, focal signs?, photophobia?

→ beware of headaches in young children (neoplasm?)

→ pain in front of the external auditory meatus = fifth cranial nerve, and above the tentorium.

→ pain behind the external auditory meatus = 9, 10, and 11th cranial nerves, and below the tentorium.

Severe migraine[*] (rebound analgesic-induced headache?)

→ first satisfy yourself that this is not an intracranial hemorrhage/neoplasm, e.g. "Are you sure this is your migraine?" "Yes, I am positive." → continue your complete assessment.

→ try I.V. stemetil® (compazine, prochlorperazine) 10-20mg, or nozinan® (methotrimeprazine) 10-25mg, in 500-1000cc ringers over 30minutes, followed by 500-1000cc ringers wide open[†] → prn benadryl® 50mg I.V./I.M. for agitation, or dystonic reactions, or prevention of same.

This stemetil®§ regimen may also be useful for viral gastroenteritis (some patients say it's "like magic"). Stemetil® (10-20mg) and nozinan® (25-50mg) may also be given I.M.

Another alternative analgesic for severe migraine, or other causes of severe pain (e.g. renal or biliary colic), is the NSAID ketorolac (toradol®) 30mg I.M./I.V. (caution: allergic reactions; GI hemorrhage ↑ elderly). The response to parenteral toradol® can vary from remarkable pain relief, to absolutely no pain alleviation (but decreases the amount of narcotic required?). It is non-sedating, and is particularly useful in unaccompanied patients, who if discharged, may wish to drive themselves home.

[*] Some migraine sufferers complain that they are made to feel like "criminals" in the E.R. (especially if they ask for Demerol). I must admit that I have eyed some "legitimate" patients suspiciously.

[†] A similar regimen using haldol® 5mg and normal saline has recently been described.

→ Other examples of non-narcotic ℞ of migraine are: ASA, Tylenol®, NSAIDs, gravol®, ergotamine (DHE), sumatriptan*, 100% O_2, nifedipine, I.V. fluids, maxeran®, 1mL intranasal 4% xylocaine (cluster migraine), chlorpromazine, phenergan®, dexamethasone → narcotic required?, e.g. demerol® I.M. plus gravol® or stemetil® or nozinan® I.M. Beware of contributing to narcotic addiction and drug seeking behaviour. Always complete your assessment of the patient, before confronting them with their drug seeking behaviour (at times, it is very difficult to resist an initial confrontation).

Some emergency departments are attempting to all but eliminate the use of narcotics for the treatment of migraine headaches. I agree that the use of narcotics should be discouraged, but I can see no sense in switching the patient who gets the occasional injection of demerol® (which works, that's why they ask specifically for it), to another medication. If you offer only non-narcotics to this distressed patient, they may feel that they were coerced† into accepting another medication, and should any adverse reaction occur, they may think, "lawyer." On the other hand, don't be an "easy mark" for a narcotic or benzodiazepine prescription (or injection). The most I give "to go" is 5 tablets from the ER drug cupboard (no prescription), and refer them to their own physician for reassessment (some patients make a living off selling their prescribed narcotics/sedatives). In addition, unless contraindicated, prescribe NSAIDs (e.g. ibuprofen 400mg qid prn X 3-5days), to take in combination with the narcotic (prn) or tylenol® (prn). This is general analgesic advice not limited to migraines.

§Stemetil® is one of my favourite drugs. I have used "barrels of the stuff" I.V. mixed with ringers, and the only adverse reaction I have encountered to date is agitation, which has been quickly terminated with benadryl® 50mg intravenously. I find Stemetil useful for migraines, migraine-like headaches but not yet diagnosed as such, and the "flu" with nausea, vomiting, diarrhea, abdominal pain, and headache. I have also used it for "abdominal. pain nyd," as a symptomatic treatment, while the patient is waiting for the investigations to be completed. On occasion, after the stemetil®/ringers infusion has been completed, the

* Ergotamine and sumatriptan are both contraindicated in patients with coronary artery disease, or Prinzmetal's angina.

† Bioethics for clinicians: 4 Voluntariness. Can Med Assoc J Oct. 15, 1996; 155(8), p. 1083-1086.

abdominal tenderness has been localized, making the diagnosis evident, e.g. acute appendicitis, gallbladder disease. Caution: the agitation from I.V. stemetil®/ringers, can be, on rare occasions, severe. For example, one patient, approximately five minutes after telling myself that she felt fine, ripped out her I.V., and without being seen by the nursing staff, "took off down the street," and in a near panic state called her mother from a pay phone. The patient, accompanied by her mother, returned to the ER, and fortunately we were able to "smooth it over" (her migraine was gone).

Trigeminal neuralgia ℞ analgesics prn, tegretol® prn, dilantin® prn (initially I.V. prn), refer prn → do not give erythromycin to patients on tegretol® → toxic levels of tegretol®. Also beware of tegretol® induced neutropenia.

Meningitis → *See #(5), p.141.*

Subarachnoid Hemorrhage "worst headache I have ever had" (unique headache, but not always severe) → sudden onset?, on anticoagulants?, hemophiliac?

→ Mental status may be depressed, or fluctuate due to intracranial vasospasm; ± nuchal rigidity, ± focal signs. Beware of warning leaks with bizarre, transient symptoms, e.g. pressure in one ear plus headache. CT scan negative? → lumbar puncture prn.

℞ ABC's, manage increased intracranial pressure prn → intubate prn and hyperventilate with 100% O_2 to a pCO_2 of 25-30 prn, 50% dextrose 50cc or 1cc/kg I.V. prn, mannitol 20% 5-10cc/kg/I.V. prn, lasix 1-2mg/kg/I.V. prn, dexamethasone (decadron®) prn, initial dose 1mg/kg to 50mg I.V., (plus Zantac® 50mg I.V. for stress ulcer prophylaxis?); valium® and/or dilantin® I.V. prn for seizures or prevention of same → immediate neurosurgical referral.

Space occupying lesion → headache is constant, progressive, prolonged, and nonthrobbing ± focal signs ± focal seizures → CT scan, or MRI and refer (e.g. brain abscess?, astrocytoma?, Ca of the lung with cerebral metastasis?).

Traumatic headache *(See #(1), p.168)* → epidural?, acute or chronic subdural?

Temporal arteritis (age 50^{+}?) → headache, systemic symptoms, tender temporal artery, decreased ipsilateral visual acuity, sed. rate 50^{+} → ℞ (on clinical impression), steroids e.g. prednisone 50mg OD; NSAIDs, analgesics, → biopsy (semi-urgent) → blindness, CVA, or seizures may result if the patient does not receive timely steroids.

Post LP headache → beware: tension and/or migraine headache?, meningitis?, subarachnoid hemorrhage? → manage appropriately.

→ ℞ ABC's, bedrest, I.V. fluids prn, analgesics/antinauseants prn, blood patch prn.

→ I have found that the stemetil® drip (10mg in 500cc ringers), works.

Acute cerebellar hemorrhage → headache, alert → vertigo, vomiting, unable to stand, truncal ataxia → progressing to coma, ± decerebrate posturing, ± pinpoint pupils, ± eyes deviated away from the side of the lesion.

→ ℞ ABC's, ℞ hypertension prn, and increased intracranial pressure prn → the patient requires immediate neurosurgical decompression (also for traumatic posterior fossa hemorrhage).

Occipital neuralgia → fingertip tenderness over the occipital nerve(s) → may have a dramatic relief of the pain with the injection of the tender site(s) with, for example, 3-5cc 2% xylocaine plus 1cc of depo-medrol® (don't forget to tell them it hurts!) → similar results with local injections of xylocaine/depo-medrol® may also be achieved with, for example, an acutely painful tendonitis/bursitis of the shoulder, elbow, or knee. (The xylocaine/depo-medrol® injection being directed at the point of maximum tenderness; one of the "medical magic tricks" performed in the ER).

(2) Stroke syndromes

→ plus head/neck injury from fall?, hypoglycemia?, diabetes?, hypertension?, carotid artery disease?

TIA (resolves in < 24hrs), and RIND (resolves in 1-28 days).

→ ℞ ABC's, ASA prn, ticlid® (ticlopidine) prn, anticoagulants?, refer prn.

CVA

→ Thrombotic stroke (history of TIA?), and Embolic stroke (carotid artery disease?, carotid bruits?, atrial fibrillation?)

→ Rx ABC's, supportive care, CT scan prn, MRI prn, lumbar puncture prn, anticoagulants prn (cardiac emboli?), refer prn. Thrombolytic therapy (tPA, not streptokinase) is now being utilized for thrombotic stroke (less than 3 hours old, no contraindications present, CT scan ok, e.g. no hemorrhage).

→ Hemorrhagic stroke: e.g. subarachnoid, intracerebral, and cerebellar hemorrhages (*see also #(1), p.125-128*). Rx ABC's, supportive care (for example, management of seizures, increased ICP, hypertension), CT scan, and immediate neurosurgical consultation.

→ Hypertensive hemorrhagic stroke → reduce the diastolic blood pressure to the 100 range. → see also #(7)(A), p. 92.

→ the eyes are deviated towards an inactive cortex lesion (e.g. CVA), and away from an active cortex lesion (e.g. seizure), or an infratentorial lesion.

(3) Seizures in adults

→ focal component?, secondary cause? (e.g. meningitis?, trauma?, hypoglycemia? {chemstrip?}, alcohol?, overdose/drugs?, inadequate anticonvulsant therapy/compliance?, intracranial hemorrhage?, brain tumor or abscess?). Aspiration?, and/or head/neck injury? from seizure/fall, posterior shoulder dislocation?. Do not confuse decerebrate posturing with seizures.

Status epilepticus → the distinct possibility of permanent neurological damage, if the seizures are not terminated within 30-60 minutes (subtle seizure activity?).

→ pyrexia, leukocytosis, ↑CPK, metabolic acidosis (bicarb prn).

Rx ACBC's, 100% O_2 → bloodwork (+ chemstrip)→ anticonvulsant levels etc., hypo/ hypernatremia?, hypocalcemia?, hypomagnesemia, hyperkalemia?, myoglobinuria?

→ Thiamine 100mg I.V. prn (pyridoxine prn, *see #(17)(B), p.151*)

→ Dextrose 50% 50cc I.V. prn (seizures increase the brain's requirements for glucose).

→ Diazepam 5-10mg I.V. prn. (rectal route prn, e.g. 20mg)

→ Dilantin® 1g or 15mg/kg I.V. prn over 30-60 minutes (loading dose → monitor → watch for hypotension, bradycardia, or conduction defects).

→ Phenobarbital 15mg/kg/I.V./prn (loading dose).

→ Lidocaine 2-3mg/kg/I.V./prn, then 2-4mg/min.

→ Lorazepam 2-4mg I.V. prn (diazepam alternate).

→ Sodium valproate 600mg qid prn, via an ng tube.

→ May use a diazepam drip, 100mg in 500cc D_5W at 40cc(8mg)/hr (with patient intubated).

→ General anesthetic prn.

→ EEG → seizure arrest real, or apparent? (continuous EEG monitoring prn).

→ CT Scan?, MRI?, LP? (after the seizures are terminated)

(4) FOUR

(A) Guillian - Barré syndrome

→ acute ascending peripheral neuropathy → maximal paralysis within hours to one week → may present with vague lower extremity weakness/parathesias, and decrease/loss of knee/ankle reflexes.

℞ ABC's, supportive care, refer, plasmapheresis.

(B) Tick paralysis

→ the presentation is similar to Guillian - Barré syndrome.

℞ ABC's, supportive care, remove tick.

(C) Bell's palsy

→ solitary, unilateral facial nerve paralysis (including forehead)

℞ supportive care, prednisone (e.g. 50mg od x 1 week), protect eye prn, refer prn. Rule out other etiologies, e.g. otitis-mastoiditis, stroke, multiple sclerosis, trauma, parotid tumor.

(5) Acute myopathies

→ reflexes and sensation are OK, elevated CPK?, hypo/hyperkalemia?, myoglobinuria?.

℞ ABC's, supportive care, consult references, refer.

(6) SIX

(A) Myasthenia gravis

→ neuromuscular junction dysfunction.

→ tensilon® test: 2mg I.V. → repeat 4mg X 2 prn → have atropine ready.

Myasthenic crises → inadequate dose of medication, too much medication, refractory to meds, or infection/stress/trauma.

℞ ABC's, atropine prn, Solu-cortef® prn, withhold meds prn until the tensilon® test is positive, and treat the precipitating cause, e.g. UTI.

→ unlike myasthenia gravis and botulism, with the Lambert-Eaton syndrome, the hand grip strength increases with repetition, the so-called upwards staircase phenomenon (may occur with Ca of the lung).

(B) Botulism

→ multiple victims?

→ food borne, wound, and infantile.

→ neuromuscular junction dysfunction.

→ toxin/organism in food, wound, or stool.

→ descending paralysis, negative tensilon® test.

→ EMG demonstrates the downward "staircase" phenomenon.

→ ℞ ABC's, gastric lavage/charcoal/sorbitol prn, supportive care, ventilatory support prn, parenteral nutrition prn, antitoxin prn, wound excision prn, antibiotics prn (not aminoglyosides).

XIII. EENT - SKIN - JOINTS - ALLERGY

(1) ONE

(A) Alkali ocular burns

→ require prolonged irrigation prn (hours, days), for liquefaction necrosis. Wood ashes are alkaline, and can result in permanent ocular damage (a pediatric case recently described in the CMAJ).

→ ocular alkali burns are also associated with automobile air-bag activation (CMAJ, Oct1/95;153/7).

(B) Corneal ulcers

→ herpes zoster?, herpes simplex?

℞ herplex gtts prn, refer.

(C) Acute central retinal artery occlusion

→ sudden, unilateral, painless loss of vision, and a very pale retina → ℞ (<30-60minutes) needle decompression (by consultant), ocular massage, bolus heparin I.V. (5-10,000 units), tPA?

(D) Acute central retinal vein occlusion

→ monocular decrease in vision → engorged veins and retinal hemorrhages → refer immediately.

(E) Acute angle closure glaucoma

→ headache, nausea, vomiting, severe eye pain, red eye, steamy cornea, mid-dilated and non-reactive pupil, and of course, increased intraocular pressure (marble hard eye?, tonometry). The patient may present with a headache ± nausea, vomiting, and not complain of a painful eye.

℞ ABC's, supportive care, plus the following:

→ pilocarpine 2% gtts q30 minutes.

→ diamox® 500mg I.V.

→ mannitol 20% 500cc I.V.

→ immediate ophthalmology referral for surgical intervention.

(F) Beware

→ of chlamydial conjunctivitis (erythromycin/tetracycline/ung + po), hyphemas (↑ intraocular pressure?), subtle retinal detachment, intraocular foreign bodies (e.g. hammering metal against metal), iridocyclitis, optic neuritis (multiple sclerosis?), periorbital/orbital cellulitis, and blowout or depressed fractures (fracture? → subconjunctival hemorrhage with no lateral and/or medial white sclera?, check eye movements → diplopia?; infraorbital hypothesia?, subcutaneous or orbital emphysema?, CT scan required?). Caution: do not use topical ophthalmic steroids (refer; topical steroids can result in corneal perforation), and do not give topical ophthalmic anesthetics for home use (well, maybe a "few" drops to go, e.g. abrasion of cornea, welding flash burn/may prevent a premature return visit).

(2) TWO

(A) Facial fractures

→ for example, Lefort I, II, or III; orbit, zygoma, mandible

→ upper airway obstruction?, CSF leaks?

→ ℞ ACBC's, 100% O_2 prn, refer.

→ nasal fracture → always check for septal hematomas.

(B) Epiglottitis

→ is also a disease of adults. *See #(9)(C), p.86.*

In addition, beware of pharyngeal abscesses, tonsillitis/pre-existing tonsillar hypertrophy, and Ludwig's angina. *See also #(9), p.85.*

(C) Sudden idiopathic nerve deafness

℞ prednisone 50mg od, refer.

(D) Acoustic neuroma

→ gradual/sudden, unilateral hearing loss/tinnitus, vertigo/dizziness, veering gait, unilateral facial paralysis

→ signs of increased intracranial pressure. ℞ ABC's, MRI/neurosurgical intervention.

(E) Acute otitis media (bacterial)

℞ decongestants prn, analgesics prn, antibiotics, and follow-up. For acute sinusitis use a similar regime plus topical/systemic decongestants X 2-3days. *See also footnote (†), p. 98.*

→ be on the alert for the complications of otitis/sinusitis, e.g. mastoiditis, meningitis, brain abscess, orbital cellulitis, cavernous sinus syndrome, sepsis.

→ prophylaxis for recurrent otitis media, ℞ zithromax® 10mg/kg/weekly.

(3) THREE

(A) Only avulsed permanent teeth can be reimplanted.

(B) Dental infections with visible facial edema

→ ℞ penicillin and flagyl®, or clindamycin alone.

→ give initial dose(s) I.V., depending on the severity.

(C) Post-dental extraction pain ("dry socket")

→ try sprinkling clindamycin on the site (from an open capsule), followed by moist packing. Dental consult prn.

(4) Erythema multiforme

→ may progress to Steven-Johnson syndrome (erythema multiforme major).

℞ ABC's, treat the underlying cause, discontinue possible causative drugs, steroids prn, antibiotics prn, biopsy prn, to burn centre prn (Steven-Johnson syndrome). *See also* Urticaria*, #(7)(C), p. 136.*

(5) FIVE

(A) Toxic epidermal necrolysis

→ children usually less than 6 years → more superficial → due to staph toxin

→ adults → deeper usually due to a drug → biopsy?

℞ ABC's, discontinue possible causative drugs, antibiotics prn, treat as 2nd degree burns, to burn center prn (application of a temporary skin substitute?).

(B) Poison ivy

℞ ABC's, prednisone 50-60mg OD tapered over 2-3 weeks, Burow's solution compresses prn.

(C) Pityriasis Rosea

℞ ABC's, symptomatic treatment, prednisone prn.

(6) Joints

→ Caution: an acute inflammatory monoarthritis is infection until proven otherwise, (overlying cellulitis?). The presence of crystals, or a negative gram stain, does not exclude a septic joint. Err on the side of I.V. antibiotics with staph coverage (plus an orthopedic consult).

→ quick joint assessment → hand grip, scratch back, cross legs, knees, ankles & gait.

Preparation for joint aspiration (concomitant blood cultures prn plus CBC and uric acid?)

→ surgical soap → 2% iodine → 99% alcohol → sterile drape.

Synovial fluid → mnemonic CAPS

C = cells, cultures, crystals

A = appearance (cloudy?, bloody?)

P = protein

S = sugar, gram and other stains

Urate crystals are needle shaped, calcium pyrophosphate (pseudo-gout) are rhomboid shaped.

Acute gout ℞ NSAIDs, e.g. indocid® 50mg or naprosyn® 500mg tid po X 3 days, and other analgesics prn.

→ other ℞ options → intra-articular or po steroids, colchicine.

→ uric acid may not be elevated during an acute gout attack. Do not initiate allopurinol during an acute episode of gout.

Beware of acute low back pain with urinary incontinence ± neurological findings.

→ contralateral leg pain with straight leg raising?

→ central disk protrusion?, primary/secondary neoplasm?, abscess?, hematoma?

→ presumptive decadron® prn, 1mg/kg/I.V. to 50mg, and/or antibiotics prn.

→ emergency myelogram/CT myelogram/MRI/immediate surgery prn.

→ spinal cord compression may also occur in the cervical or thoracic spine. The pain may be minimal or absent.

→ Polymyalagia rheumatica → predominantly shoulder/hip pain → age/sed rate 50^{+} → may get dramatic relief with prednisone 10-15mg/day.

(7) Allergy and associated disorders

→ several mechanisms, e.g. IgE dependent, IgG immune complex, direct histamine release, prostaglandin inhibition.

(A) Anaphylaxis

→ upper airway obstruction, and/or bronchospasm, and/or shock.

℞ ABC's, 100% O_2, epinephrine I.V.(shock?)/s.c. prn, racemic epinephrine or ventolin® aerosols prn, mast prn, ringers 2-4^{+}L prn, benadryl® I.V./I.M. prn, Solu-cortef® I.V. prn, atropine I.V. prn, aminophylline I.V. prn, dopamine I.V. prn, norepinephrine I.V. prn, extended observation prn, admit prn. Arrange a referral for possible future desensitization?

→ ACE inhibitors (e.g. captopril) can cause angioedema which may not respond to adrenaline etc., and may require aggressive airway management.

(B) Hereditary angioedema

→ ℞ ABC's, epinephrine prn, Solu-cortef® prn, Clq esterase inhibitor concentrate I.V. for deficiency of same (or fresh frozen plasma).

(C) Urticaria

→ ℞: adrenaline prn, 1:1000 0.3cc s.c. (non-sedating), and/or tagamet® 300mg I.M. (non-sedating), and/or benadryl® 50mg I.M. (sedating), or po benadryl®/tagamet® for mild episodes → steroids? *See also* Erythema multiforme, *#(4), p. 134.*

(D) Sulfite allergy patients

→ require first dose monitoring when given a sulfite-free status drug, because trace amounts may have been present in the raw materials.

(E) Epipen®

→ allergy therapy auto-injector (epinephrine 1:1000)

→ ℞ for patients with severe allergic reactions to insect bites/stings, food, drugs, and other allergens. Also indicated for severe asthma, and idiopathic or exercise induced anaphylaxis. Patients must carry it with them at all times.

XIV. INFECTIONS

→ Immunocompromised?, e.g. splenectomy, chemotherapy, AIDS.

(1) Tetanus

℞ ABC's, supportive care, I.V. diazepam prn, I.V. pancuronium prn, continuous lumbar epidural anesthesia prn, 3000-10,000 units tetanus immune globulin I.M., pen G 4-8[+]m units/day/I.V., tetanus toxoid, surgical debridement, quiet room, admit ICU prn.

(2) Gas gangrene

℞ ABC's, supportive care, pen G 10-30m units/day/I.V., plus cefoxitin (mefoxin®) 100mg/kg/day/I.V., plus gentamycin 4mg/kg/day/I.V., debridement, HBO_2 (100%) at 3 atm X 90min X 3 over 24 hours, tetanus prophylaxis, admit ICU prn.

(3) THREE

(A) Toxic shock syndrome

→ *See also* Septic Shock, *p.76*.

℞ ABC's, supportive care, cultures (staph. aureus toxin), cephalosporin, dopamine prn. DIC?, ARDS?, emergent infectious disease consultation, admit ICU.

→ consider giving immune globulin, e.g. 400-1000mg/kg/I.V. daily.[*]

→ rifampin po for the carrier state

Group A beta-hemolytic streptococcal infection can result in a bacteremia, and a toxic shock like syndrome (Jim Henson's disease), which may be accompanied by severe local tissue destruction (a frighteningly rapid life-threatening infection). Severe pain is frequent in both disorders. The treatment is similar plus debridement prn. Obtain an immediate surgical consultation if a necrotizing lesion[†] is present, e.g. lower leg. As with toxic shock syndrome, consider giving immune globulin in addition to antibiotics.

[*] Case report Clinical Infectious Diseases (Dec. 21, 1995). A multi-centre prospective trial is now in progress.

[†] Necrotizing fasciitis/cellulitis that does not receive surgical intervention is universally fatal, e.g. Fournier's gangrene.

→ There is a preliminary report of a possible association between chickenpox, ibuprofen, and this severe form of streptococcal infection.

→ If you are unsure of the bacterial etiology, giving the serious ill patient an initial dose of claforan® 2g I.V., plus tobramycin 2mg/kg/I.V., plus clindamycin 600mg I.V., following the ABC's and blood/other cultures, would be a reasonable thing to do. Critically ill patients should start antibiotic treatment within 30 minutes, regardless of how many investigations have been completed.

→ beware of the patient with cellulitis and disproportional pain.

(B) Bacterial endocarditis

→ acute or subacute

→ rarely fungal

→ fever, murmur?, emboli?

→ congenital heart disease?, abnormal valves?, prosthetic valves?, I.V. drug abuse?

→ echocardiogram?, cultures (e.g. blood, Janeway lesions?).

→ ℞ ABC's, supportive care, antibiotics, refer emergently.

(C) Malaria

→ beware of resistant strains of P. falciparum

→ ℞ ABC's, supportive care, quinidine plus doxycycline, exchange transfusions?, refer.

→ the patient may require admission to the ICU.

(4) FOUR

(A) Gonorrhea

→ disseminated?, for example, pustular skin lesions, septic arthritis.

→ cultures, smears, e.g. cervical, urethral, rectal, pharyngeal, blood, pustular skin lesions.

Outpatients → ℞ (uncomplicated, localized) amoxil® 3 grams po + probenecid 1 gram po, or Rocephin® (ceftriaxone) 250mg I.M. (or Ig I.V.? to avoid a particularly painful Rocephin® I.M. injection)→ both regimens are followed by vibramycin® 100mg bid po X 10 days. Allergic to penicillin? → spectinomycin 2g I.M. plus vibramycin® 100mg bid po X 10 days, or erythromycin alone 500mg qid po X 10 days (erythromycin is safe during pregnancy).

Inpatients → ℞ ABC's, supportive care, analgesics prn, and I.V. antibiotics e.g. Rocephin® I.V., plus vibramycin® I.V. or po, or gentamycin and clindamycin I.V. Both regimens are followed by vibramycin® or clindamycin p.o.

→ follow up for gonorrhea, chlamydia, herpes, syphilis, and AIDS.

(B) Lymphogranuloma venereum

→ chlamydia (lymphadenitis, pid, ± perihepatitis, ± conjunctivitis, ± joint involvement).

℞ ABC's, supportive care, analgesics prn, incision and drainage prn, vibramycin® 100mg bid po X 2weeks (or initially I.V.), or erythromycin 0.5-1g q6h I.V., or gentamycin and clindamycin I.V., followed by clindamycin or vibramycin® po.

(C) Chancroid

→ hem. ducreyi → painful genital ulcers.

℞ erythromycin 500mg qid po X 10 days (or bactrim®).

(D) Granuloma inguinale

→ painless genital ulcers.

℞ tetracycline 500mg qid po X 10days (or vibramycin® 100mg bid po, or erythromycin 500mg qid po X 15 days).

(E) Syphilis

℞ benzathine penicillin 2.4m I.M., or tetracycline 500mg qid po X 15days.

(F) AIDS (Acquired immune deficiency syndrome)

→ spread via contaminated body fluids or blood products

→ occurs in heterosexuals too!

→ T_4 count: ≥500 → monitoring, health promotion, appropriate vaccines, e.g. influenza; 500-300 → mild immune dysfunction (AZT?); 300-200 → moderate dysfunction (PCP prophylaxis?); 200-100 → moderate-severe dysfunction; ≤100 → severe dysfunction, (watch closely for infections and malignancies).

→ Bacterial, viral, fungal, and protozoal infections, and malignancies.

→ life threatening problems → pneumonitis (PCP?), CNS (e.g. infection, tumor, seizures?), sepsis, dehydration, and thrombocytopenia.

→ Fever, ± weight loss, ± diarrhea → frequent causes → PCP, MAI, TB, CMV, hepatitis B, herpes, and lymphomas.

→ PCP ℞ ABC's, supportive care, 100% O_2 prn, ventolin® aerosols, steroids?, bactrim® I.V. → po → alternate ℞, pentamidine 4mg/kg/day.

→ prophylactic therapy for PCP with bactrim® po, or pentamidine aerosols, or dapsone po.

→ fluconazole (Diflucan®), I.V. or po, is indicated for localized or extensive/systemic candidiasis, or cryptococcal meningitis (also useful for prophylaxis, consult references).

Assessment → history/physical, septic workup including syphilis, toxoplasma, coccidioides; aerobic, anaerobic, fungal, and viral cultures, plus stools for ova and parasites.

HIV prophylaxis (e.g. needle stick injuries, sexual assault), ℞ AZT 200mg/5 times/day, plus zalcitabine 0.75mg tid for a period of four weeks. If possible, start treatment within two hours of exposure. Consult references, recommendations may change.

(5) Five

(A) Bacterial meningitis in adults

→ acute or subacute

→ critically ill patients → start antibiotic treatment within 30 minutes, regardless of how many investigations have been completed. Beware of the early bacteremic stage with fever alone, which may respond initially to symptomatic treatment (significant pyrexia? → has been suppressed with a recent antipyretic?, toxic?, preexisting immunocompromised state?, focus of infection? → septic workup? → presumptive antibiotic therapy prn). Patients with sepsis/meningitis may also have a concurrent focus of infection, e.g. UTI.

→ Patients with seizures, a decreased level of consciousness, papilledema, or focal signs, require a CT scan before deciding whether to proceed with the lumbar puncture → L.P. contraindicated in bleeding disorders (DIC present?).

→ The elderly may present with fever and delirium only.

Lumbar puncture → cloudy CSF → start antibiotics immediately (after blood cultures).

→ xanthochromic = bleeding > 6hrs old

→ CSF pressure, normal = 150 ± 33mmH_2O

→ take 4 tubes of CSF (total of 10-15ml)

→ protein, normal = 38 ± 10mg dl; concomitant CSF/serum glucose ratio, normal = 0.6; cell count, normal = 0-5monos/cc; stains and cultures (plus concomitant blood cultures).

→ counter-current immunoelectrophoresis (CIE) is capable of identifying strep. pneumonia, Hem. Influenza, or meningococci in the CSF.

Bacterial meningitis ℞ ABC's, 100% O_2, supportive care, valium®/dilantin® prn (seizures?), dexamethasone I.V. prior to the antibiotic?, claforan® (cefotaxime → caution with penicillin allergy) → 2g q4h I.V., or 80-200mg/kg/day; septic shock?, DIC?, ARDS?, brain abscess? immediate infectious disease consultation, admit ICU.

→ add ampicillin (2g q6h I.V.) if listeria monocytogenes is suspected, or tobramycin (3-5mg/kg/day/I.V.) for pseudomonas aeruginosa.

→ give acyclovir I.V. concurrently, if your differential diagnosis includes herpes simplex encephalitis (see below).

→ Caution: immunosuppressed/compromised? (AIDS?), CSF shunt?, head trauma/CSF leak?, post-op neurosurgery?, severe penicillin allergy? → consult references/infectious disease specialist regarding the choice of antibiotics (with a minimum of delay in the initiation of treatment).

(B) Herpes simplex encephalitis

→ ℞ ABC's, supportive care, early presumptive acyclovir I.V. (5-10$^+$mg/kg q8h in ringers infused over 1 hour), consult references.

XV. POISONING

(1) Poisoning

→ call poison control prn (Poisindex® ?).

Toxic syndromes → for example, anticholinergic, anticholinesterase, cholinergic, extrapyramidal, hemoglobinopathies, metal fume fever, narcotic/sedative, sympathomimetic, and withdrawal.

Decontamination → gastric lavage prn, and/or charcoal (activated 1g/kg), ± cathartic prn (e.g. premixed activated charcoal 25g/sorbitol 90g per container), repeat gastric lavage, and/or charcoal ± sorbitol prn; decontaminate skin prn, (e.g. organophosphates, hydrofluoric acid; protect rescuers), and eyes prn (e.g. irrigate with normal saline). Other methods of decontamination include whole bowel irrigation prn (e.g. heavy metals, sustained release preparations → e.g. colyte® by ng tube), hemodialysis prn (e.g. salicylates), charcoal hemoperfusion prn (e.g. theophylline), and gastrotomy prn (e.g. iron tablets).

→ Patients with a decreased level of consciousness may need to be intubated before the gastric lavage (however the gastric tube may promptly wake them up!).

→ Some clinicians advocate charcoal before and after gastric lavage (other recommendations include charcoal ± sorbitol q4h, or continuous gastric charcoal infusion at 12g/hr/adults)..

→ Specific antidotes (e.g. atropine, narcan®) may have to be given before decontamination.

→ Beware of drug concretions (plain x-rays?, Ba swallow?), e.g. iron, ASA, theophylline SR.

→ Syrup of ipecac is a home remedy only.

→ Street drugs have frequently been adulterated.

→ Poisonings may be via the intravenous route, e.g. heroin; needle tracks?

→ Multiple drug ingestions are frequent, and the history is often unreliable. A minimum drug screen for acetaminophen, salicylates, and ethanol is required (tricyclics? barbiturates?). Increased anion gap and/or osmolar gap?, metabolic acidosis? Beware of sustained release preparations (radiopaque?), e.g. theophylline, and patients that are already taking MAO inhibitors (hypertensive crises?).

→ patients have been known to continue their overdosing in the ER. Search prn → make sure that no drugs are available to them, e.g. pockets, purse.

→ Adopt a non-judgmental caring attitude when dealing with alcohol and drug abusers, and overdose patients (not always easy). Beware of additional problems, e.g. hypoglycemia, diabetes, pneumonia, hypothermia, pregnancy, concomitant trauma, e.g. subdural hematoma. Remember to obtain a psychiatric consult prn in overdose patients.

The majority of drug overdose patients have an uneventful several hour long stay in the ER, and can then be discharged to their family physician's care. If the patient also has alcohol "on board," hydration with 1-2 liters of ringers over 1-2 hours, then 125-250cc/hr, often expedites their recovery (my impression). Conversely, there are patients who require early, aggressive, "life support," and if they recover, psychiatric intervention (assuming they intentionally overdosed).

→ See also #(23)-(30), pp. 164- 166.

(2) Tricyclic overdose

→ CNS depression, seizures, anticholinergic, and cardiotoxic.

℞ ABC's, supportive care, gastric lavage prn → charcoal ± sorbitol q2-4h prn, bicarb 50meq I.V. prn (1meq/kg), I.V. fluids prn (e.g. ringers), norepinephrine prn, valium® prn, dilantin® prn, lidocaine prn, hemoperfusion with activated charcoal prn, extended cardiac monitoring prn, admit ICU prn.

(3) THREE

(A) Phenothiazine overdose

→ CNS depression, anticholinergic, cardiotoxic, alpha blocker, extrapyramidal, and infrequently the neuroleptic malignant syndrome (*see #(3)(C), below).*

→ Intact tablets may be visualized on plain abdominal. x-rays.

→ ℞ ABC's, supportive care, gastric lavage prn → charcoal ± sorbitol q2-4h prn, benadryl® I.V. prn, lidocaine I.V. prn, I.V. fluids prn (e.g. ringers), norepinephrine I.V. prn, valium® I.V. prn, admit ICU prn.

(B) Physostigmine

→ a controversial antidote for central and peripheral anticholinergic effects. Useful for unstable patients not responding to conventional therapy, ℞ 0.5-1mg I.V., consult references. *See also #(23)(B), p.155.*

(C) Neuroleptic Malignant Syndrome

→ Fever, tachypnea, tachycardia, hypertension, muscle rigidity (elevated cpk), metabolic acidosis, myoglobinuria.

℞ ABC's, tylenol® prn, cooling prn, supportive care, dantrolene prn (skeletal muscle relaxant), bromocrystine prn (dopamine agonist), benadryl® prn (for rigidity), valium® prn, inderal® prn, nifedipine prn, consult references, refer, admit ICU.

→ treat the pyrexia aggressively.

(D) Serotonin syndrome

→ usually as a result of an interaction between MAOIs and serotonergic agents, e.g. prozac®. Narcotics may also be a causative factor.

→ delirium, rigidity (elevated cpk), fever, hypertension, seizures, coma.

℞ ABC's, narcan® prn, tylenol® prn, cooling prn, supportive care, chlorpromazine prn, valium® prn, dilantin® prn, rivotril prn (for myoclonus), nifedipine prn, inderal® prn, consult references, refer, admit ICU.

→ treat the pyrexia aggressively.

(4) Lithium overdose

→ CNS manifestations, e.g. ataxia, seizures.

℞ ABC's, supportive care, gastric lavage prn, saline prn, bicarb prn, dialysis prn.

(5) Barbiturate overdose

℞ ABC's, 100% O_2 prn, gastric lavage prn → charcoal q2-4h prn, supportive care, bicarb prn, dialysis prn.

(6) Dilantin® overdose

→ CNS, GI, and cardiopulmonary toxicity.

℞ ABC's, cardiac monitoring, 100% O_2 prn, gastric lavage prn → charcoal q2-4h prn, atropine prn, fluid loading prn, inotropics prn, pacing prn, charcoal hemoperfusion prn, admit ICU prn.

(7) SEVEN

(A) Narcotic overdose

℞ ACBC's, 100% O_2 prn, thiamine prn, dextrose prn, supportive care, decontaminate prn, narcan® 2^+mg I.V. prn (restrain patient first? → acute withdrawal?) → ℞ coexisting problems prn, e.g. cellulitis, alcoholism, trauma.

→ titrate the narcan® in suspected narcotic addicts, to just adequately reverse the respiratory and CNS depression only, avoid inducing withdrawal.

Narcan® is also useful for acute epigastric pain secondary to codeine, morphine, and related drugs. Remember that the narcan® may wear off before the narcotic.

(B) Benzodiazepine overdose

℞ ACBC's, 100% O_2 prn, thiamine prn, dextrose prn, supportive care, decontaminate prn, flumazenil (adults) 0.3mg q 1 minute prn to 2mg (restrain patient first? → acute withdrawal?; careful with concomitant tricyclic overdose → seizures?) → ℞ other problems prn, e.g. injuries, hypothermia, alcohol abuse.

(8) Clonidine overdose

→ miosis is a helpful sign when the diagnosis is in question.

℞ ABC's, 100% O_2 prn, supportive care, gastric lavage prn → charcoal prn ± sorbitol; narcan® prn; ℞: respiratory depression, seizures, bradycardia, hypothermia, hypotension, hypertension prn. *See also #(3) (p. 77), #(10) (p. 93).*

(9) Nine

(A) Methanol poisoning

→ formic acid is the toxic metabolite.

→ intoxication followed by coma, metabolic acidosis, renal failure, and blindness.

→ early presumptive treatment with ethanol, before the acidosis develops is the optimum. A prolonged wait for the serum methanol level before commencing the ethanol therapy, may be fatal or result in serious sequelae.

→ concomitant injuries?

℞ ACBC's, 100% O_2 prn, supportive care, gastric lavage prn → charcoal prn, bicarb prn to a pH of 7.2^+, 10% ethanol D_5W 6cc/kg/I.V. bolus, then 0.6-1.6cc/kg/hr (maintain an ethanol blood level of 100mg/100mL), folic acid prn, early dialysis prn.

(B) Ethylene glycol poisoning

→ toxic metabolites (glycolic and oxalic acid), and calcium oxalate precipitates.

→ intoxication followed by coma, seizures, metabolic acidosis, renal, and cardiopulmonary failure.

→ once the ethylene glycol has been metabolized, calcium oxalate monohydrate crystals in the urine (needle shaped), may be the only real-time means of confirmation of the diagnosis.

→ concomitant trauma?

℞ ACBC's, 100% O_2 prn, supportive care, bicarb prn, ethanol I.V. (see methanol poisoning, above) calcium gluconate 10% I.V. prn, thiamine prn, pyridoxine prn, early dialysis prn. As with methanol poisoning, early presumptive therapy with ethanol may be crucial.

(10) TEN

(A) Digoxin toxicity

→ iatrogenic?, suicide attempt?

→ therapeutic level 0.5 - 2.0 ng/ml

→ arrhythmias, GI effects, and hyperkalemia.

℞ ABC's, 100% O_2 prn, gastric lavage prn → charcoal 1g/kg (± sorbitol) → 0.5g/kg q4h prn, plus the following as appropriate:

→ specific therapy is Digoxin Fab fragments (Digibind®) → one vial binds 0.6mg of digoxin → give 10 vials I.V. initially if ingested dose is unknown → also a formula using serum levels is available (e.g. from poison control).

→ SVT, *See #(5), p.66.*

→ Bradycardias ℞ atropine prn, pacing prn, Fab fragments.

→ Ventricular tachyarrhythmias and ectopics ℞ lidocaine prn, dilantin® 15mg/kg (loading dose), $MgSO_4$ 2-4g I.V. prn, Fab fragments, last resort cardioversion (10-25J).

→ Hyperkalemia ℞ Fab fragments, plus standard hyperkalemic ℞ except no calcium (*see #(19), p.63*).

→ Hypomagnesemia ℞ $MgSO_4$ 2-4g I.V. prn.

(B) Beta blocker overdose

→ bradycardias, hypotension, and CHF (± hypoglycemia).

℞ ABC's, 100% O_2 prn, gastric lavage prn → charcoal prn ± sorbitol, glucagon prn, atropine prn, I.V. fluids prn, dopamine/dobutamine prn, isoproterenol prn, pacing prn, valium® prn (for seizures, no dilantin®), 50% dextrose prn, charcoal hemoperfusion/hemodialysis prn. *See also #(10)(D), below.*

(C) Calcium blockers overdose

→ bradycardias, hypotension, and CHF

℞ ABC's, 100% O_2 prn, gastric lavage prn → charcoal prn ± sorbitol, calcium gluconate prn, glucagon prn, atropine prn, I.V. fluids prn, dopamine/dobutamine prn, isoproterenol prn, pacing prn, valium® prn (for seizures, no dilantin®). *See also #(10)(D), below.*

(D) Glucagon

℞ 3-10mg I.V., then 2-5mg/hr for beta or calcium blocker overdose.

→ pediatric dose = 0.02mg/kg I.V. prn.

→ consult references.

(E) Theophylline toxicity

→ iatrogenic?, suicide attempt?

→ therapeutic 55-100μmol/L, sustained release tablets?

→ sympathomimetic toxicity.

→ nausea, hypertension, hypotension, arrhythmias, seizures, and hypokalemia.

℞ ABC's, 100% O_2 prn, gastric lavage prn → charcoal ± sorbitol/repeated prn, valium® prn, dilantin® prn, phenobarb prn, lidocaine prn, beta blockers prn, K^+/lytes prn, Zantac® prn, whole bowel irrigation?, charcoal hemoperfusion/hemodialysis prn (serum levels > 400-500 μmol/L).

(11) Cocaine poisoning

→ sympathomimetic toxicity ± life threatening arrhythmias.

℞ ABC's (coronary artery spasm?), charcoal prn, valium® I.V. prn, dilantin® prn, inderal® I.V. prn, labetalol I.V. prn, cardioversion prn; physical restraints prn.

(12) Alcohol withdrawal

℞ ACBC's, thiamine 100mg I.M./I.V. daily (prevent/treat Wernicke's syndrome, e.g. confusion, ataxia and ophthalmoplegia), dextrose I.V. prn, valium® 5-10mg I.V. prn, or 20mg q1h po prn until the patient settles, fluids prn, lytes prn (NaCl?, K^+?), multivitamins (vitamin K?), $MgSO_4$* 4g slowly I.V. or I.M. prn, phenobarbital I.V. prn, Zantac® I.V. prn, restraints prn, treat any other problems, e.g. sepsis, cellulitis, pneumonia, pancreatitis, GI bleeding (Mallory Weiss syndrome?), subdural hematoma, neck injuries, fractures, myoglobinuria?, hyper/hypokalemia? Refer to the alcohol and drug detoxification unit when medically fit.

(13) Ethanol poisoning

→ ± trauma?, other medical problems?

* the value of the routine use of $MgSO_4$ in alcoholic withdrawal is now being questioned (in any case, send off a blood sample for a magnesium level before giving same).

→ Rx ACBC's, 100% O_2 prn, thiamine 100mg I.M./I.V. prn, dextrose I.V. prn, ativan® prn, haldol® prn, physical restraints prn, dialysis prn.

→ children may develop hypoglycemia (less frequent in adults).

→ unless contraindicated 2-3 litres (10-20mL/kg bolus(es) prn in children), of ringers lactate ± 5% dextrose over 2-3 hours almost always has a positive therapeutic effect, most notably on the mental status (improved hydration/decrease in serum osmolarity?). My impression is that this ringers regimen frequently changes a "fxxx this and fxxx that" type of person, into a "yes sir!, no sir!, thanks everyone, sorry for acting like such an idiot" type of person.

(14) Isopropanol poisoning

→ ± trauma?, ± other medical problems?

Rx ACBC's, 100% O_2 prn, thiamine prn, dextrose prn, ringers prn, ng suction prn, I.V. Zantac® prn (prone to hemorrhagic gastritis), dialysis prn. *See also #(12), (13), p.149.*

(15) Amphetamine overdose

→ sympathomimetic toxicity ± life threatening arrhythmias.

Rx ABC's, 100% O_2 prn, thiamine prn, dextrose prn, gastric lavage prn → charcoal ± sorbitol prn, valium® I.V. prn, dilantin® I.V. prn, cooling prn, inderal®/metoprolol I.V. prn, lidocaine prn, nitroprusside I.V. drip prn, haldol® 5-10mg I.M./I.V. ± ativan® 1-2mg I.M./I.V. q15-60minutes prn. Physical restraints?; myoglobinuria?

(16) Phencyclidine abuse (PCP)

→ sympathomimetic and cholinergic toxicity, ± life threatening arrhythmias.

→ paranoid, violent.

Rx ABC's, charcoal ± sorbitol prn, valium® I.V. prn, cooling prn, antihypertensives prn, Rx arrhythmias prn, haldol® 5-10mg I.M./I.V. ± ativan® 1-2mg I.M./I.V. q15-60minutes prn. Physical restraints?; myoglobinuria?

(17) SEVENTEEN

(A) Salicylate poisoning

→ oil of wintergreen*?, enteric coated?/ sustained release tablets?

→ Resp. alkalosis, metabolic acidosis, gastritis; CNS, CVS, pulmonary, and liver toxicity.

→ aggressive management, as there appears to be a critical CNS concentration.

→ use the nomogram for acute overdoses only (need a minimum of 2-3 serum levels).

→ may have normal salicylate levels with chronic salicylate toxicity (lethargy, dehydration, metabolic acidosis).

℞ (acute overdose) ABC's, gastric lavage prn → charcoal ± sorbitol repeated prn, I.V. fluids/lytes prn (hypokalemia?), 50% dextrose I.V. prn, bicarb I.V. prn (careful, give slowly) to a urine pH of 7.5, lasix prn, Zantac® 50mg I.V. q6-8h prn, vitamin K 10mg I.M. prn, valium® prn, early? hemodialysis prn, admit ICU prn.

→ Pediatric patients → D_5 0.33NS, plus 25 mEq $NaHCO_3$/L, plus 20-40meq KCl/L (once urine output begins, if not hyperkalemic) at 5-15 mL/kg/hr → additional $NaHCO_3$ 1-2meq/kg prn (careful). Hypoglycemia?

→ salicylates are ionized in an alkaline medium, and ionized salicylates not taken up by the tissues, or reabsorbed in the kidneys.

→ maintain an alkaline urine output of 3-6$^+$cc/kg/hr.

(B) Isoniazid Poisoning

→ seizures, coma, metabolic acidosis.

→ ℞ ABC's, decontaminate prn, supportive care, valium® prn, bicarb prn, pyridoxine 5g I.V. q15minutes prn (gram for gram of isoniazid) for seizures, or coma; charcoal hemoperfusion?

* one teaspoon (5mL) of oil of wintergreen (methyl salicylate), contains the equivalent amount of salicylate found in twenty-one 325mg ASA tablets (6825mg).

(C) Camphorated oil poisoning

→ used predominantly as a chest rub for "colds."

→ if ingested, can result in seizures and respiratory depression.

→ as little as 5mL can be fatal in a child.

→ may also be absorbed via inhalation, or intact skin.

℞ ABC's, 100% O_2 prn, intubate prn, supportive care, valium® I.V. prn, dilantin® I.V. prn (15mg/kg loading dose), phenobarb I.V. prn (15mg/kg/loading dose). *See also #(14), p.113, #(3), p.129.*

(18) Acetaminophen overdose

→ GI, liver, and renal toxicity.

→ use the nomogram for acute overdoses only (need a minimum of 2-3 serum levels).

→ mucomyst® (acetylcysteine) is the antidote.

℞ ABC's, supportive care, gastric lavage prn, alternate po mucomyst® and charcoal q2h prn, daily liver and renal studies.

Mucomyst® 140mg/kg/po, then 70mg/kg/po q4h X 17 doses, or I.V. 20% mucomyst®, (useful in patients with protracted vomiting, plus no charcoal/mucomyst® conflict, plus a shorter treatment time of 20 versus 68 hours).

Initial I.V. dose	→ 0.825ml of 20% mucomyst®/kg in 500cc D_5W, over 1 hour.
2nd dose	→ 0.275ml/kg in 500cc D_5W, over 4 hours.
3rd dose	→ 0.55ml/kg in 1000cc D_5W, over 16 hours.

→ mucomyst® is worth trying even 2-3 days post toxic overdose.

→ nausea may require that the rate of the initial I.V. infusion of the mucomyst® be decreased. Give antiemetics prn.

(19) NINETEEN

(A) Iron poisoning

→ GI bleeding, shock, metabolic acidosis, coagulopathy, and multiple organ dysfunction.

℞ ABC's and supportive care (for example, ringers prn, bicarb prn, blood products prn, 50% dextrose prn), gastric lavage prn, whole bowel irrigation prn (x-rays will demonstrate the iron tablets), deferoxamine mesylate 15mg/kg/hr/I.V. prn to 6 grams/day (until the urine is no longer pink = no free plasma iron) → give the deferoxamine on clinical impression, before the serum iron level is back (maintain an adequate urine output) → continue the deferoxamine if the patient is put on charcoal hemoperfusion/dialysis; gastrotomy prn.

(B) Heavy metal poisoning

→ consult references, e.g. lead, arsenic, mercury.

→ All interfere with enzyme activity by attaching to the sulfhydryl groups, resulting in neurological, cardiovascular, gastrointestinal, hematological, and renal manifestations ± others.

→ Diagnosis → e.g. bluish gingival and long bone lead lines, metallic flecks on abdominal. x-rays, basophilic stippling of RBC's, elevated blood lead levels, elevated 24 hour urine arsenic or mercury levels. Arsenic poisoning may result from naturally occurring contaminated well water.

→ ℞ ABC's → treat, for example, seizures, arrhythmias, hypotension, renal failure → decontaminate prn, e.g. gastric lavage prn, charcoal prn, whole bowel irrigation prn, chelation therapy prn (for example, BAL, $CaNa_2$ - EDTA, D-penicillamine, 2,3-DMSA), dialysis prn. Prevent reoccurrence. Evaluate family, significant others, and coworkers prn.

(20) Tar and asphalt burns

℞ ACBC's, cool with H_2O prn, use neosporin®/polysporin® ung to dislodge from skin, burn care.

(21) TWENTY-ONE

(A) Hydrocarbon poisoning

→ epinephrine contraindicated.

→ remember to decontaminate the skin prn.

(1) Liquid petroleum distillates, e.g. kerosene → gastric lavage only if it contains a toxic substance, e.g. pesticide; look for chemical pneumonitis (delayed 24hrs?).

℞ ABC's, 100% O_2 prn, and supportive care.

(2) Gases, e.g. propane → asphyxia, intoxication, arrhythmias.

℞ ABC's, 100% O_2 prn, and supportive care. Hyperbaric O_2?

(3) Solvents, e.g. benzene, epoxy

→ chemical pneumonitis, seizures, systemic toxicity, aplastic anemia.

℞ ABC's, 100% O_2 prn, valium® prn, lavage prn, charcoal prn, and supportive care.

(4) Halogenated hydrocarbons, e.g. methyl chloroform, carbon tetrachloride

→ CNS toxicity, hepatitis, nephritis.

℞ ABC's, lavage prn, charcoal prn, and supportive care.

(B) Irritant gases e.g. chlorine, phosgene.

→ upper airway obstruction, lower airway injury, chemical pneumonitis, and pulmonary edema.

℞ ABC's, 100% O_2 prn, racemic epinephrine/ventolin® aerosols prn, and supportive care. Admit ICU prn.

(22) Caustic ingestions

→ for example, lye → liquefaction necrosis; acids → coagulation necrosis.

→ upper airway obstruction?

℞ ABC's, 100% O_2 prn, I.V. Zantac®, esophageal perforation? → presumptive antibiotic therapy prn (e.g. mefoxin® 3g or 40mg/kg I.V., and clindamycin 600mg or 10mg/kg I.V.) → refer immediately (e.g. endoscopic exam?). Steroids?? Remember that patients with esophageal burns may not have oral lesions. Button batteries lodged in the esophagus need to be removed emergently.

(23) TWENTY THREE

(A) Organophosphate and carbamate poisoning

→ inhibition of acetylcholinesterase.

→ decrease in serum cholinesterase (20-50% of normal level = mild toxicity, 10-20%= moderate toxicity, less than 10%= severe toxicity).

→ ports of entry (e.g. insecticides) are predominately skin, lungs, and GI.

→ muscarinic effects (parasympathomimetic), nicotine effects (motor), and CNS effects (e.g. seizures, coma, cardiopulmonary depression).

→ mnemonic: DUMBELS: diarrhea, urination, miosis, bradycardia, bronchorrhea, bronchospasm, excitation, lacrimation, salivation.

℞ ABC's, support ventilation prn, 100% O_2 prn, ventolin® aerosols prn, atropine I.V. prn (atropinization), decontamination of patient (wear gloves and protective clothing prn), I.V. pralidoxime chloride prn.

→ large doses of atropine may be required (antimuscarinic only).

→ give pralidoxime chloride on clinical impression.

→ 1-2g, or 20-50mg/kg, over 30min → repeat in 2 hours prn (serum cholinesterase level?), then q12h prn.

→ pralidoxime is antimuscarinic, antinicotinic, and counters the CNS cholinergic effects.

→ ℞ seizures with valium® prn; arrhythmias with ACLS drugs prn, pacing prn, cardioversion prn. Antihypertensives prn, hyperglycemia?

(B) Anticholinergic poisoning

→ e.g. benadryl®, dimenhydrinate, mushrooms.

→ anxious, dilated pupils.

→ they babble back when you speak to them.

→ they pick with their fingers, at you, the bed sheets, the air, or whatever is available.

→ tachycardia, hypertension, arrhythmias, seizures, coma.

℞ ACBC's, supportive care, lavage/charcoal/sorbitol prn, ringers prn, bicarb prn, physostigmine prn (for example, ℞ of SVT, hypertension, or seizures, careful!, consult references), lidocaine prn, dilantin® prn, valium® prn, refer prn, admit ICU prn. Do not use physostigmine with tricyclic antidepressant overdose.

→ concomitant trauma?

XVI. ENVIRONMENTAL INJURIES

(1) Frostbite

℞ ABC's, active external rewarming, ℞ like burns; tetanus prophylaxis prn, narcotics prn, antibiotics prn, ASA prn, delay surgery, rhabdomyolysis?, hyperbaric O_2?

→ only rewarm if there is no chance of refreezing during transport.

(2) Hypothermia

32 - 35°C → excitation stage (inappropriate behavior, e.g. hiding from rescuers, combativeness)

< 32°C → adynamic stage

< 30°C → shivering stops

℞ careful handling, ACBC's, warm 100% O_2, reverse trendelenburg prn, cardiac cathader/rectal probe temperature monitoring prn, active core rewarming prn, warm saline boluses prn (40-45°), thiamine prn, dextrose prn, lidocaine prn, bretylium prn, narcan® prn, flumazenil prn, Solu-cortef®/decadron®? prn, tagamet® prn, tetanus prophylaxis prn, associated trauma or disease?, alcohol or drug abuse?, myxedema coma?, continue CPR until body temperature is 30-34°C ("no one is dead until warm and dead"). Watch for complications, for example, ventricular fibrillation, increased intracranial pressure, renal failure, sepsis, GI bleeding, hyperkalemia, pancreatitis, DVT, ARDS, DIC. Admit ICU prn.

→ defibrillation ineffective with core temperatures < 30°C, only one attempt at a time, consider lidocaine, consider bretylium.

→ mild hypothermia may require external warming only.

→ examples of active core rewarming are: warm (40-45°C) → O_2, I.V. fluids, gastric or rectal lavage, peritoneal dialysis, extracorporeal rewarming. *See also #(17) p.161, #(2) p. 57, #(16)(A) p. 70.*

(3) Heat cramps, heat syncope

→ ℞ ABC's, rest in cool environment, hydrate prn with I.V. NS, or electrolyte drinks. Rule out heat stroke.

Heat exhaustion

→ headache, nausea, weakness, dehydration, pyrexia

→ Rx ABC's, rest in cool environment, hydrate with 1-2 liters D_5saline (20mL/kg bolus(es) in children), rule out heat stroke.

(4) Heat stroke

→ life threatening, multiple organ dysfunction.

→ may present with seizures, coma, or bizarre behavior.

Rx ABC's, 100% O_2 prn, supportive care, I.V. valium® prn, active external and core cooling (reduce body temperature to 39°C). Arrhythmia?, myoglobinuria?, hypoglycemia?, hyperkalemia?, DIC? Rule out other causes, e.g. thyroid storm. Admit ICU.

(5) Rabies

→ rare in rodents.

→ skunks, bats, raccoons, cows, dogs, foxes, and cats are the frequent carriers.

Rx ABC's, wound care, tetanus prophylaxis prn, antibiotics prn, and the following:

→ post exposure prophylaxis

→ irrigate the wound with 70% alcohol

→ rabies immune globulin 20 units/kg, 1/2 in the wound, 1/2 in the buttocks

→ human diploid cell vaccine 1mL @ 0, 3, 7, 14, and 28 days, then do serum antibody titers

→ repeat 1mL prn

→ if possible, observe the animal for 2 weeks, and do a postmortem if the animal dies.

(6) Hymenoptera stings

→ local, toxic, anaphylactic, and delayed serum sickness reactions.

→ Rx ABC's, 100% O_2 prn, Rx allergic/anaphylactic reactions (s*ee #(7)(A),(C),(E), pp.136-137*), local treatment/remove stinger.

(7) Pus caterpillar sting

→ Rx ABC's, supportive care → remove the stingers with cellophane tape

→ 10% calcium gluconate, 1-10ml slowly I.V. prn for pain.

(8) Tick-borne disease

Rocky mountain spotted fever (Rickettsia Rickettsii) → systemic symptoms → rash begins on second to fifth day on wrists, ankles, and feet, and spreads centrally (may become purpuric).

℞ ABC's, 100% O_2 prn, supportive care, antibiotics, e.g. tetracycline, doxycycline, or chloramplenical po or I.V. prn (skin biopsy and immunofluorescent antibody staining?). DIC?

Lyme disease → tick borne spirochete.

→ Stage I: 7± days after tick bite

→ erythema chronicum migrans ± systemic symptoms.

→ Stage II: 4^+ weeks

→ neurological manifestations (± focal signs), ± A-V block, ± other multisystem manifestations, e.g. hepatitis.

± Stage III: 4^+ weeks → arthritis, ± neurological signs.

Diagnosis → search for tick

→ specific antibody titer (stages II, III).

℞ ABC's, an antibiotic for 10-30 days, e.g. tetracycline, vibramycin® (first choice for non-CNS lyme disease), erythromycin, amoxil®, PenV, or I.V. ceftriaxone (for CNS involvement).

Tick paralysis → ascending, flaccid paralysis.

℞ ABC's, supportive care, remove tick.

(9) Black widow spider bites

→ history of a bite may be absent

→ CNS excitement, muscle spasms, pain, paresthesias, hypertension, vomiting.

→ complications, e.g. seizures, shock, ascending paralysis, coma, respiratory arrest.

℞ ABC's, supportive care, analgesics prn, corticosteroids prn, tetanus prophylaxis prn, valium® prn, 10% calcium gluconate, 1-10cc slowly I.V. prn for pain, antivenim prn.

(10) Brown recluse spider bites

→ local lesion, ± systemic manifestations, ± complications, e.g. seizures, shock, hemolysis, DIC.

℞ ABC's, supportive care, analgesics prn, corticosteroids prn, valium® prn, dapsone 25-50mg qid X 1 week (G6PD screen prn), antibiotics prn, local wound care, tetanus prophylaxis prn, and hyperbaric O_2 prn. Admit ICU prn.

(11) Reptile bites

→ pit viper or coral snakes?

→ envenomation?, paresthesias?

→ hemopathic, neurotoxic, and systemic effects.

℞ ABC's, 10% calcium gluconate, 1-10cc slowly I.V. for seizures (plus valium® prn), bolus(es) of ringers prn, multiple doses of antivenim prn (consult references), blood products prn, tetanus prophylaxis prn, antibiotics prn, local lidocaine ± epinephrine (if not contraindicated) prn, analgesics prn (no ASA), steroids prn, keep part dependent prn, and repeated measurement of circumference of involved extremity prn, remove jewelry prn, surgery prn (compartment syndrome?), admit ICU prn, DIC?, myoglobinuria?

(12) Arizona scorpion sting

→ cholinergic → opiates are contraindicated.

℞ ABC's, atropine prn, antivenim prn, benadryl® prn, wound care, tetanus prophylaxis prn, admit ICU prn. *See also #(23)(A), p.154.*

(13) THIRTEEN

(A) Marine misadventures

→ for example, near drowning, divers' problems, trauma, foreign body, envenomation, infection.

℞ ACBC's, primary, secondary, or tertiary wound closure prn, tetanus prophylaxis prn, cephalosporins prn, hyperbaric O_2 prn, admit ICU prn. *See #(2), p.156, #(17), p.161.*

Spine puncture wounds ℞ ACBC's, supportive care, lidocaine prn, demerol® prn, antivenim prn if available, and local hot water ℞ prn (45-50°C X 7-90 minutes); debride and explore prn, tetanus prophylaxis prn, antibiotics prn (e.g. Bactrim®), admit ICU prn.

Coelenterate stings ℞ ABC's, supportive care, and local vinegar.

Sponge poisoning ℞ ABC's, supportive care, and local vinegar.

(B) Stingray

→ envenomation and local trauma, ± near drowning.

→ severe pain, bleeding, ± multisystemic manifestations.

→ ℞ ACBC's, supportive care, local hot water ℞ prn (45-50°C X ½- 1hr), local or regional lidocaine block prn, debridement prn, tetanus prophylaxis prn, antibiotics prn (e.g. Cipro®), steroids prn, admit ICU prn.

(C) Portuguese Man of War

→ envenomation, ± near drowning.

→ pain, bullae, ± multisystemic manifestations.

→ ℞ ACBC's, supportive care, irrigate wound with saline → vinegar, shave off nemacysts, local and systemic steroids prn, tetanus prophylaxis prn, admit ICU prn.

(D) Sea Urchin

→ envenomation, ± near drowning.

→ pain, ± multisystemic manifestations.

→ ℞ ACBC's, supportive care, local hot water ℞ prn (45-50°C X ½- 1hr), lidocaine prn, debride and explore prn, tetanus prophylaxis prn, antibiotics prn, steroids prn, admit ICU prn.

(14) High altitude illness

Acute mountain sickness	℞ bedrest, 100% O_2, diamox®, descent prn, HBO_2?
High altitude pulmonary edema (HAPE)	℞ bedrest, 100% O_2, descent, HBO_2?
High altitude cerebral edema (HACE)	℞ bedrest, 100% O_2, descent, HBO_2?
High altitude retinopathy	℞ bedrest, 100% O_2, descent, HBO_2?

(15) Dysbarism

Barotrauma of descent → squeeze → barotitis media → rupture of TM? → rupture of round or oval window? → perilymph fistula? → refer ENT.

Barotrauma of ascent

→ Alternobaric vertigo.

→ Pulmonary over pressure syndrome (POPS) → mediastinal or subcutaneous emphysema?, pneumothorax?, air embolism?

→ Air embolism (dramatic symptoms in < 10minutes) → e.g. CNS and/or cardiovascular manifestations.

→ Nitrogen narcosis.

→ Decompression sickness → nitrogen bubbles → "the bends" (joints, skin), "the chokes" (pulmonary arterial system), CNS manifestations (e.g. coma); shock.

→ ℞ ACBC's, 100% O_2, extreme trendelenburg prn, I.V. fluids prn, analgesics prn, immediate recompression prn, and ℞ other problems, e.g. injuries, DIC.

(16) Blast injuries

→ TM rupture?

→ ℞ as multiple trauma

℞ ACBC's, treat specific injuries, hyperbaric O_2 prn (HBO_2).

(17) Near drowning

℞ ACBC's, 100% O_2, ventolin® aerosols prn, reverse trendelenburg prn, supportive care, hyperbaric O_2?, antibiotics?, decadron®?, admit ICU prn; immersion in warm or cold water?, hypothermia?, associated injuries? (e.g. head and/or cervical spine/cord), alcohol and/or drug abuse?, suicide or homicide attempt?, MI?, CVA?, hypoglycemia?, seizure?, child abuse?, *see also #(2), p.156, #(13), p.159, #(15), p.161, #(18), p.162.*

→ "No one is dead until warm and dead." (30-34°C)

→ A successful resuscitation may be followed by a delayed multiple system failure (e.g. ARDS, DIC, increased intracranial pressure, lactic acidosis). *See also #(4), p.97, #(11)(C), p.121, #9, p. 37, #(4), p.118.*

(18) Delayed immersion syndrome

→ delayed pulmonary edema? (usually symptoms < 4 hours).

→ Rx as ARDS. *See also #(17), p.161, #(4), p.97.*

(19) Burns

→ Remember the smoke threats: (1) heat (e.g. upper airway obstruction), (2) asphyxiants (e.g. CO, cyanide), and (3) airway and pulmonary irritants, (e.g. carbon ± toxic chemicals, phosgene → upper airway obstruction, bronchospasm, pulmonary edema).

→ occurred in closed or open space?, toxic combustion gases?

→ first degree burns (erythema, pain), second degree burns (erythema, pain, blistering), or third degree burns (pale, leather-like, painless, absent sensation).

→ Rule of 9's for adult body surface estimate:

head and arms	9	X 3	=	27 %
trunk	18	X 2	=	36 %
legs	18	X 2	=	36 %
genitalia			=	1%
				100%

→ children (child abuse?, e.g. scalds) → head and neck 15-20%, arms 10% X 2, trunk 20% X 2, legs 10-15% X 2. Consult burn estimate charts prn.

→ palmar surface of patient's hand equals approximately 1% of total body surface.

→ beware of burns of face, eyes, ears, hands, feet, and perineum.

→ Rx ACBC's, 100% O_2 prn, pulse oximetry/ABG's prn, inhalation injury? (serial chest x-rays prn), upper airway edema?, early prophylactic intubation prn (early laryngoscopic/bronchoscopy?), racemic epinephrine/ventolin® aerosols prn, CO poisoning?, cyanide poisoning? (? presumptive sodium thiosulfate 25% 1mL/kg/I.V.), hypovolemic shock?, lactic acidosis?, emergency escharotomy prn (neck, chest,

extremities), Xmatch prn, ringers prn (children 20mL/kg bolus(es) prn), blood products prn, ℞ other trauma plus new and preexisting medical problems prn (alcohol or drug abuse?), analgesics prn (e.g. I.V. morphine), antibiotics prn (I.V. prn), ng/foley prn, tetanus prophylaxis prn, flow sheet prn, local burn care/appropriate dressings prn, remove watch and jewelry prn, clean dry sheet prn, I.V./po tagamet® prn (stress ulcer prophylaxis), to burn centre prn. Patients may develop a delayed chest infection or sepsis (upper airway obstruction and pulmonary edema may also have a delayed onset).

→ I.V. ringers 4ml X kg X % burn/day → 1/2 in the first 8 hours after the burn, the rest in the next 16 hours → maintain an adequate urine output (1cc/kg/hr for children to 50^{+}cc hr for adults; myoglobulinuria?). This is in addition to bolus(es) of ringers for hypovolemic shock (follow the electrolytes). Inadequate fluid resuscitation can also result in acute renal failure, which may be fatal.

→ *See also #(20), (21), (22), pp. 163-164.*

(20) Chemical burns

℞ ABC's → irrigate with large volume of water, consult references for specific antidotes, e.g. hydrofluoric acid burn ℞ topical and s.c. 10% calcium gluconate prn.

→ *See also #(19), (21), (22), pp.162-164.*

(21) Electrical injuries

→ AC/DC current?

→ immediate threats: cardiac and/or respiratory arrest.

→ may have progressive intravascular thrombosis, and/or rhabdomyolysis, ± renal failure, ± other injuries (e.g. cervical spine), ± myoglobinuria, ± hyperkalemia, ± hypovolemic shock/acidosis, ± entrance/exit wounds.

℞ ACBC's, 100% O_2 prn, supportive care, saline boluses prn, ± dopamine prn, escharotomy/ fasciotomies prn, extended cardiac monitoring prn, tetanus prophylaxis prn, to burn centre prn. *See also #(19), (20), (22), pp.162- 164, and #(18), p.173*

(22) Lightning injuries

→ ℞ as multiple trauma → secondary cardiac arrest due to prolonged respiratory arrest; electrical injuries, blast injuries, burns, CNS damage

→ ℞ ACBC's, 100% O_2 prn, tetanus prophylaxis prn, plus specific ℞, to burn centre prn.

→ *See also #(19)-(21), pp.162-163.*

(23) Acute exposure to toxic agents

℞ ACBC's, 100% O_2 prn, protect rescuers, decontamination, consult references, specific ℞.

(24) TWENTY-FOUR

(A) Cyanide poisoning

℞ ABC's, 100% O_2, amyl nitrite inhalation, 3% sodium nitrite 0.2mL/kg to 10mL, sodium thiosulfate 25% 50ml (1mL/kg) I.V. (converts cyanide to nontoxic thiocyanate), vitamin B_{12a}?, charcoal prn, HBO_2 prn.

(B) Hydrogen sulfide gas poisoning

→ cellular asphyxiant similar to cyanide.

℞ ABC's, 100% O_2, 3% sodium nitrite, 0.2mL/kg to 10ml, HBO_2 prn.

(25) Methemoglobinemia

→ exposure to, for example, nitrates, nitrites, sulfas, mushrooms.

℞ ABC's, 100% O_2, remove causative agent, 1% methylene blue prn 0.1cc/kg/I.V. → repeat in 1hr prn then q4-6h prn, exchange transfusions prn, HBO_2 prn.

(26) Sulfhemoglobinemia

→ exposure to, for example, phenacetin, acetanilid.

→ irreversible → ℞ ABC's, 100% O_2, remove causative agent, exchange transfusions prn, HBO_2 prn.

(27) TWENTY-SEVEN

(A) Phenol poisoning

→ absorbed through the skin → multisystem toxicity.

℞ ABC's, copious H_2O irrigation, wash with glycerol, repeat H_2O irrigation.

(B) Phosphorus burns

℞ ABC's, copious H_2O irrigation, debridement.

(28) Carbon Monoxide poisoning

→ other victims? (e.g. co-workers, family members), flu-like symptoms?

→ treat on clinical grounds while obtaining a carboxyhemoglobin level (have a low threshold for doing COHB levels. Smoker?).

→ contamination of the cellular cytochrome systems may continue after the COHB has returned to a low level → do not hesitate to contact your local hyperbaric consultant prn.

℞ ACBC's, 100% O_2, COHB level, HBO_2 prn. Myoglobulinuria?

→ remember that the family with the "flu" may have CO poisoning (e.g. malfunctioning gas/oil heater/furnace → "the CO flu" that can result in death or permanent neurological impairment).

(29) Radiation Injuries

→ Nausea and vomiting in less than 2 hours indicates an exposure of 400^+ rem.

→ Lymphocyte count at 48 hours:

> 1200 = good prognosis

300-1200 = fair prognosis

< 300 = poor prognosis.

→ Potassium Iodine (begin in less than one hour if possible)

< 1 year 65mg daily/po x 2 weeks

> 1 year 130mg daily/po x 2 weeks.

→ Rx ACBC's, protect rescuers, decontamination, protective isolation prn, CBC/platelet count q6h prn, supportive care, appropriate consultations prn.

(30) THIRTY

(A) Mushroom poisoning

→ nausea and vomiting beginning > 6hrs after ingestion may indicate a potentially lethal group → identify the mushroom(s) if possible (multiple type ingestion?) → pictorial reference?, mycologist?, multiple victims?

Group I → liver and/or renal impairment (amatoxin).

Rx ABC's, supportive care, decontamination, I.V. fluids prn, pen G I.V. prn, dialysis prn. Liver transplantation?

Group II → anticholinergic intoxication

Rx ABC's, decontamination, supportive care, physostigmine? *See also #(23)(B), p.155.*

Group III → methemoglobinemia, or hemolytic anemia, or isoniazid like poisoning.

Rx ABC's, decontamination, 1% methylene blue, 0.1ml/kg I.V. prn, or PRBC's prn, or pyridoxine 1-5g I.V. prn as indicated. *See also #(25), p.164, #(13)(A), p.121, #(17)(B), p.151.*

Group IV → cholinergic

Rx ABC's, atropine prn (antimuscarinic only), decontamination, supportive care. *See also #(23)(A), p.154.*

Group V → antabuse® like reaction

Rx ABC's, decontamination, supportive care.

Group VI → dysphoric state

Rx ABC's, decontamination, supportive care, valium® prn. Cortinarius mushrooms may be mistaken for "magic" mushrooms, and if ingested can result in acute renal failure. The clue is that the patient does not experience the "magic" with cortinarius mushrooms. Caution: the patient may not volunteer, or may deny, the ingestion of mushrooms.

Group VII → GI effects only, onset < 2hrs

Rx ABC's, decontamination, I.V. fluids prn, supportive care, pyridoxine I.V.?

(B) Poisonous plants

→ pictorial references?, botanist?

→ toxins, for example, calcium oxalate, cyanide, digitalis, anticholinergics, nicotine and like, GI toxins.

→ ℞ ABC's, decontaminate, supportive care, specific ℞.

(C) Illness associated with seafood

→ multiple victims?

1. Infections

- Bacterial e.g. cholera, salmonella, shigella, staph, bacillus cereus, E. Coli, botulism.
- Viral e.g. hepatitis A, norwalk.
- Parasitic e.g. fluke, tapeworm.

℞ ABC's, supportive care, consult references prn, specific ℞ prn, e.g. antibiotics, antitoxins; admit ICU prn.

→ the above also applies to non-seafood food poisoning, for example, salads/staph. aureus, poultry/salmonella, hamburger/bacillus cereus/E. Coli (may develop hemorrhagic colitis/hemolytic-uremic syndrome, *See #(10)(B), p.87*).

2. Intoxications, for example, paralytic shellfish poisoning, diarrhetic shellfish poisoning, scombroid fish poisoning (histamine poisoning), ciguatera (multisystem manifestations). Beware of a fulminating sensorimotor polyneuropathy.

℞ ABC's, intubate and ventilate prn, supportive care, gastric lavage/charcoal/sorbitol prn, consult references prn, specific ℞ prn, e.g. antivenim; admit ICU prn.

(D) Traveler's diarrhea

℞ cipro® 500mg bid or bactrim tabs II bid; ± peptobismal.

XVII. TRAUMA

(1) Trauma

→ Rx ACBC's, supportive care, treat the specific injuries, and any preexisting medical conditions, e.g. diabetes mellitus. Is the patient on anticoagulants? Obtain an ethanol level prn. Be on the lookout for child abuse.

→ injuries are the result of a suicide attempt?, e.g. motor vehicle accident → or the MVA was a result of: alcohol and/or drug abuse?, MI?, CVA?, seizure?, narcolepsy?, hypoglycemia?

Head injury (+ neck injury?) → mild = Glasgow scale 13-15, moderate = 9-12, severe = 3-8; loss of consciousness?, combative?, memory or focal deficit?, rectal exam? (anal sensation and sphincter tone?).

→ Head injury can result in upper airway obstruction but rarely shock (e.g. an infant with an arterial bleed from a scalp laceration). If shock is present, look for another etiology (e.g. fractured pelvis).

→ All significant head injuries require CT scanning or MRI → e.g. epidural hemorrhage? (may require stat burr holes before scanning), subdural hemorrhage?, subarachnoid hemorrhage?, intracerebral hematoma?, cerebral contusion or laceration?, depressed skull fracture?, basilar fracture? (blood behind TM?, CSF leak?), penetrating injury? (do not attempt to remove the F.B. in the ER, e.g. arrow).

→ Avoid hypoxemia, hypercapnia, agitation, seizures, pyrexia, and cerebral edema.

→ Rx ACBC's, 100% O_2 prn, pulse oximetry prn, thiamine prn, dextrose prn, narcan® prn, flumazenil prn, maintain a systolic pressure > 80 (boluses of ringers prn → maintenance rate once stabilized), arterial blood gases prn, intubate prn, and hyperventilate prn with 100% O_2 to a pCO_2 25-30, mannitol prn 20% 5-10cc/kg/I.V. (caution), decadron® prn/initial dose 1mg/kg/to 50mg I.V. (plus Zantac® 50mg I.V. q8h for stress ulcer prophylaxis); seizures? (or prophylaxis) → I.V. valium® 5-10mg prn and/or I.V. dilantin® 15mg/kg/loading dose/prn, neuromuscular blockade prn; hyperglycemia?, fibrinogen < 250? → FFP/cryoprecipitate prn*; Rx pyrexia; antibiotics prn, analgesics prn, head elevated 30°, immediate

* See Cryoprecipitate, #(9)(C), p. 120.

neurosurgical consultation prn. Haldol® 5-10mg I.V. prn is useful for uncontrollable agitation (concomitant cervical spine injury?).

(2) Spine/cord injuries

→ often an anxiety producing diagnostic problem.

→ the patient may have a multiple level injury.

→ Rx ACBC's → avoid excessive traction or movement → Rx all suspected spinal fractures as unstable until proven otherwise (immobilize) → x-rays negative? → CT scan prn, MRI prn (soft tissue injury?), refer prn.

If spinal injuries with neurological deficit are less than eight hours old, consider giving bolus of solu-medrol® (methylprednisolone) 30mg/kg/I.V. followed by 5.4mg/kg/hr/I.V. for 23 hours (plus Zantac® I.V. for stress ulcer prophylaxis).

Spinal shock → flaccid paralysis → reflexes return with spastic paresis.

Spinal neurogenic shock

→ autonomic dysfunction with loss of sympathetic tone → hypotension, bradycardia, priapism. → Rx ACBC's, supportive care, ringers prn, dopamine prn, consult urology prn.

Sacral sparing → incomplete lesion → partial recovery possible.

Prevertebral space at C3, C4 → normal =< 5mm.

Anterior cord syndrome → loss of motor function, and pain and temperature sensation.

Central cord syndrome → motor weakness more pronounced in the hands and arms, as compared to the legs. Patient may complain of severe pain in both arms.

→ solu-medrol® I.V.? *See* Spine/cord injuries *above.*

Brown-Sequard syndrome

→ motor and vibration → deficit ipsilateral

→ pain and temperature → deficit contralateral

Remember:

1. When you are assessing the cervical spine/cord think of the mnemonic ABC's → **A**lignment, (e.g. the four spinal lines), **B**ones, **C**artilage (children), and **S**oft tissues (cord, ligaments, disks, vessels/bleeding).

2. Cord injuries can occur without a fracture or dislocation (e.g. spinal epidural hemorrhage → requires immediate neurosurgical intervention; central cord syndrome, distraction injuries, shaken baby syndrome).
3. "Physiological subluxation" can occur under 16 years of age.
4. Blankets may be required to cover the spinal board (torso portion), to compensate for the increased flexion of the cervical spine, caused by the relatively larger head in children.
5. Children tend to have upper cervical spine injuries, versus lower cervical spine injuries in adults. Pediatric cervical spines are more adult like after 8 years of age.
6. Patients with possible cervical spine/cord injuries, and transient symptoms plus negative x-rays, need continued immobilization/investigations (e.g. MRI)/admission.
7. Jefferson fracture (C_1), Hangman's fracture (C_2), and odontoid fractures are not uncommon (careful, an overlying upper incisor can simulate an odontoid fracture).
8. The depth of the prevertebral space in children at C_3 = < 2/3 the C_3 vertebral body.
9. Torticollis versus rotary subluxation:

→ Rotary subluxation has sternomastoid spasm with the chin pointing ipsilaterally.

→ Torticollis has cervical spinal muscle spasm with the chin pointing contralaterally.

10. Finally, if you feel uncomfortable about "clearing" a cervical spine/cord injury, refer the patient to neurosurgery, and don't let the consultant talk you out of it.

(3) Neck injuries

→ for example, airway obstruction (expanding hematoma?), cervical spine and/or cord, arteries, veins, air embolism, A-V fistulas, brachial plexus, and other nerves (fracture 1st, 2nd ribs?), larynx, pharynx, esophagus.

℞ ACBC's, endoscopy prn, plain and contrast x-rays prn, angiography prn, CT scan prn, MRI prn, neck exploration prn (do not remove penetrating foreign bodies in the ER).

(4) Thoracic trauma

℞ ACBC's → minute ventilation should be 1.5-2 X normal. CT scan?

→ Clamp the chest tube, and take the patient directly to the OR, if the bleeding continues through the chest tube, and the vital signs remain or become poor.

(5) Sucking chest wounds

→ requires that an occlusive dressing be placed over the wound, and a chest tube be placed at a separate site.

(6) Massive subcutaneous emphysema

→ chest tube?, bronchoscopy?, linear skin incisions?

(7) Fracture 1st or 2nd ribs or sternum

→ pericardial tamponade?, myocardial contusion?, pulmonary contusion?, bronchial tears?, major vascular injury (e.g. traumatic rupture of the aorta?/mediastinal widening?).

(8) Flail chest

→ pulmonary contusion? → ℞ ACBC's, 100% O_2, intubate prn, peep?

(9) Myocardial contusion

→ EKG and CPK-MB may be normal.

→ ℞ ACBC's, 100% O_2, supportive care/treat similar to acute myocardial infarction (may develop arrhythmias, usually within 24 hours). *See #(7), p.171.*

(10) Systemic air embolism

→ can occur with chest injuries plus positive pressure ventilation.

℞ ACBC's, thoracotomy, HBO_2 prn.

(11) Intrabronchial bleeding

℞ ACBC's, suction prn, bronchoscopy prn, double lumen endotracheal tube prn, surgery prn.

(12) Pneumomediastinum

→ injuries to? trachea?, major bronchi?, pharynx?, esophagus? → mediastinitis?

(13) Diaphragmatic rupture

→ bowel in chest?, pleural effusion?, blurring of diaphragm?

℞ ACBC's, CT scan?, chest tube and peritoneal lavage prn → lavage fluid through chest tube? → surgery.

(14) Pericardial tamponade

→ cyanosis from the neck up?

→ impaired venous return and cardiac filling → tachycardia, hypotension, (may be orthostatic only), muffled heart sounds, ± distended neck veins, ± paradoxical pulse, ± clear lung fields.

℞ ACBC's, large bolus of ringers prn (0.5-2liters), echocardiogram and/or CT scan if appropriate prn, immediate? pericardiocentesis prn → leave intracath in for repeated aspiration prn, subxiphoid pericardial window prn, thoracotomy prn.

(15) Thoracic duct injury

→ ℞ ACBC's, chest tube → surgery prn.

(16) Abdominal trauma

→ alcohol and/or drug abuse?, concomitant head or neck injury?, preexisting disease?, CT scan?, angiography?

→ ℞ ACBC's, supportive care, surgery prn.

Problems → missed injuries, retroperitoneal injuries/hemorrhage, concomitant chest/abdominal injuries, pelvic injuries, hypothermia, and coagulopathy. Beware of the lap seatbelt contusion with no other apparent injuries → may have an intra-abdominal injury (e.g. small bowel perforation) → observe for 12-14 hours prn. Lap belts may also be associated with back injuries.

Instilling 10-20cc of I.V.P. contrast solution via a catheter into an abdominal stab wound, followed by an x-ray, may be a useful procedure to determine whether or not the abdominal cavity has been violated (if the abdominal series failed to demonstrate any free air).

Diagnostic peritoneal lavage (DPL) → ng, foley, and abdominal series first (CT scan?) → 10cc blood = positive test → if negative (or positive but you want to determine if the lavage fluid drains through the chest tube), instill ringers 20ml/kg to 1 litre → aspirate → positive if > 500 wbc's, or > 100,000 rbc's, or > 200 amylase, or bile, bacteria, feces, or vegetable matter present. DPL is usually not required if laparotomy is inevitable, e.g. free air in abdomen.

(17) Bullets

→ greater than 2500 ft/sec = high velocity, and may cause damage to the surrounding area outside the bullet tunnel (e.g. femoral artery) → low velocity ≤ 2500ft/sec, and can be treated like a stab wound. Shotgun blasts from < 7ft cause a large single entry tunnel injury.

(18) Trauma to the GU tract

→ hematuria? (*myoglobinuria? → positive dipstick for blood but no RBC's seen on microscopic exam → specific testing for myoglobin).

℞ ACBC's, IVP prn, urethrogram prn, cystogram prn, consult urology prn, CT Scan?, angiography?

Urethrogram → instill 10cc of 50/50 contrast solution/water soluble lubricant → traction on the penis → oblique x-ray of penis and pelvis.

Cystogram → 500ml of the contrast solution → children 5ml/kg → raise the contrast solution to 2 feet above the bladder → take an A-P film with the bladder full → take a film with the bladder empty → wash out the bladder with saline, and take another film.

IVP (intravenous pyelogram) → 100ml of the contrast solution, or for children 2ml/kg, and take 5,10, and 20 minute films.

*Myoglobinuria ℞ ACBC's, I.V. fluids, hyperkalemia?, bicarb prn, high urine output, lasix prn, mannitol prn, dialysis prn. Alkalination of the urine increases the solubility of myoglobulin.

Testicular contusion or rupture?

→ ultrasound, refer prn, surgery prn.

(19) Fractures and dislocations

→ Pathological fracture?, open fracture?, neurovascular injury?, e.g. radial nerve, popliteal artery.

→ Watch for a lunate dislocation (volar), perilunate dislocation (dorsal), ± fracture and/or dislocation of the scaphoid, isolated scaphoid fracture, fractures of the middle phalanges or metacarpals with rotation, fracture of the proximal phalanges, and volar plate injuries (refer all of the above to a hand surgeon).

→ fractures and dislocations may require early adequate analgesia (e.g. narcotics I.V.).

→ Early reduction/splinting/casting of fractures/dislocations will decrease, or alleviate the need for further analgesia (the "best analgesic"). Beware of compartment syndromes, e.g. fractured tibia.

→ Check casts in 24-48 hours, or before prn.

→ Beware of a posterior shoulder dislocation (epilepsy, ethanol, electricity).

→ Check the axillary nerve, before and after reducing an anterior shoulder dislocation.

→ Knee dislocation → injury to the popliteal artery?

→ Traumatic hemarthrosis of the knee → think crucriates /menisci/ collateral ligaments/ fracture (fat globules?).

→ Wrist fractures are frequently ℞ with an external fixator.

→ Injury of the long thoracic nerve? → serratus anterior paralysis → winging of the scapula (interesting but I have never seen it).

(20) Hand injuries and infections

→ normal stance? (position of rest)

→ position of function?

→ Flexor profundus tendon → stabilize the mcp and pip joints, then flex the tip.

→ Flexor sublimis tendon → extend and stabilize all but the testing finger.

→ Ulnar nerve → abduct the extended index finger.

→ Median nerve → abduct the thumb.

→ Radial nerve → extend the fingers with the wrist extended.

→ All nerve lacerations, most tendon lacerations, and serious hand infections (diabetic?) need referral to a hand surgeon. Beware of the high pressure injection injury, burns, frostbite, foreign bodies, boutonniere deformity, acute carpal tunnel syndrome, and electrical and crush injuries.

(21) Pelvic fractures

℞ ACBC's, unstable fracture? → give ringers and PRBC's promptly prn.

Associated problems → hemorrhage, other injuries → for example, intra-abdominal, urinary tract, gynecologic, diaphragm, nerve root → also infection and thrombophlebitis.

(22) Children

→ orthopedic injuries → child abuse?

→ separation of the distal femoral, or proximal tibial epiphysis → circumferential tenderness → refer (Osgood-Schlatter's disease?, chrondomalacia patellae?).

→ slipped capital epiphysis of the hip (may present with knee pain) → refer (Legg-Calvé-Perthes?). Beware of the supracondylar fracture of the elbow, and growth plate injuries (both may have subtle x-ray findings).

→ (on the lighter side), after reducing a "pulled elbow" (a "medical magic trick"), gently restrain the "good arm," and see if the child will reach for a popsicle with the "bad arm" (giving a child a treat, seems to make them {and their parents}, think that you are not such a "bad guy" after all).

(23) Watch for compartment syndromes

→ of the arms, legs, and feet, secondary to fractures and soft tissue injuries, (disproportionate pain with rest and passive stretching). Beware of crush injuries. Split all tight, painful casts.

→ compartment syndromes need immediate surgical intervention.

(24) Calcaneal fractures

→ look for associated knee, hip, pelvis, and back injuries.

(25) Watch for rupture of the ankle syndesmosis

→ patient may have heard a "pop" → pain with bilateral compression of the malleoli, and with dorsiflexion → serious long term effects → refer. Beware of ankle dislocations → reduce immediately to prevent skin necrosis.

(26) Pediatric hemorrhagic shock

→ hypotension is a late sign → give packed red blood cells (10mL/kg), if the patient requires greater than 20-40ml/kg of ringer's lactate.

(27) Wounds

→ including animal bites.

→ ℞ ACBC's, local or regional anesthetic (e.g. infraorbital, ulnar, and tibial nerve blocks) → irrigate-debride-irrigate, primary or delayed repair, drainage prn, tetanus prophylaxis prn, antibiotics prn (initial dose(s) parenteral?), appropriate dressings prn, rabies prophylaxis prn, and ℞ other problems. Beware of penetrating joint injuries, e.g. knee.

→ Antibiotics (e.g. cephalosporins) for impact wounds, or wounds greater than 3-6 hours old, or wounds contaminated with pus, feces, saliva, dirt, or vaginal secretions → also patients with valvular heart disease, orthopedic prostheses, wounds involving lymphedematous areas, or immunosuppression (e.g. chemotherapy, splenectomy).

→ Skin sutures out in less than eight days, or the patient may develop needle puncture scars.

XVIII. PSYCHIATRIC DISORDERS

→ ± medical problems?, ± drug overdose?, ± alcohol/drug abuse? → all psychiatric patients require "medical clearance."

→ Patients with delirium have vivid hallucinations, whereas chronic psychotics can be somewhat indifferent to their hallucinations. Disorientation in psychiatric disorders tends to be more person than time, vice versa in metabolic disorders.

→ Depressed/suicidal patients may also be homicidal. Depression is under-diagnosed, particularly in the elderly. Fatigue may be the chief complaint.

℞ ACBC's, supportive care, ℞ other problems, for example, multiple drug overdose, poorly controlled diabetes; psychiatric consult/voluntary/involuntary admission prn*.

→ Schizophrenic patients → dangerous to themselves or others?

℞ ACBC's, supportive care, antipsychotics prn, injuries?, other medical problems?, psychiatric consult/voluntary/involuntary admission prn.

→ Paranoid patients → high risk for violence if unstable; weapons?, alcohol/drug abuse?

℞ ACBC's, supportive care, physical/chemical restraints prn (e.g. haldol® 5-10mg ± ativan® 1-2mg I.M./I.V. prn), psychiatric consult/voluntary/ involuntary admission prn.

→ Manic patients are a high risk for violence, especially if you "cross them". If they tend to make you laugh with them, schizophrenia is unlikely.

℞ ACBC's, supportive care, haldol®/ativan® prn, psychiatric consult/voluntary/involuntary admission prn.

→ Lethal catatonia syndrome

- → acutely psychotic
- → refuses all food/fluids.
- → fever, tachycardia, acrocyanosis, mutism, rigidity, stupor → coma.
- → caution: the patient may suddenly become violent.

* Certifying patients for involuntary psychiatric admission is an unpleasant task. If you make it clear to the patient (if appropriate), that their only choices are voluntary, or involuntary admission, the patient will often opt for the voluntary route. In addition, if you tell the patient that you have no choice, but "to do what you have to do," for their safety (and maybe others), they seem less likely to hold a grudge (my impression).

℞ ABC's, supportive care, haldol® prn, refer, ECT prn, admit ICU prn.

→ Beware of contributing physical symptoms/signs to hysteria. For example, dyspnea/pulmonary embolism; hyperventilation/anxiety/salicylate poisoning; parathesias/multiple sclerosis.

Conversion disorders are typically characterized by a lack of concern by the patient, do not follow the normal neuroanatomical relationships, are free of injury, and there is no incontinence.

→ Psychogenic Fugue → self-limited

→ rule out organic causes of amnesia, e.g. alcoholic blackouts.

→ Dementia → reversible? (e.g. drugs, metabolic, subdural hematoma, depression).

→ Alcohol withdrawal

Autonomic hyperactivity	→ 6-8 hours
Hallucinations	→ 24 hours
Seizures	→ 1-2 days
Global confusion	→ 3-5 days

→ Haldol® 5-10mg I.M./I.V. ± ativan® 1-2mg I.M./I.V. q15-60minutes prn → useful for combative patients

→ Acute dystonias ℞ benadryl® 1mg/kg to 50mg I.V./I.M.

→ Akathisia ℞ cogentin® 2-4mg I.V./I.M.

→ Alpha adrenergic blockage, e.g. from an overdose of chlorpromazine.

℞ ABC's, ringers ± norepinephrine.

→ Xanax® 0.25-0.5mg bid-tid prn; Buspar® 5-15mg bid-tid prn.

→ Ativan® (lorazepam) po, SL, IM, or I.V. 1-2mg prn.

→ SSRIs (selective serotonin re-uptake inhibitors), e.g. Prozac® → beware of adverse behavioral changes, increased suicidal risk, and adverse interaction with tricyclics, tegretol®, haldol®, and MAOIs. In addition, there are reports of SIADH (inappropriate secretion of antidiuretic hormone)/hyponatremia associated with the use of SSRIs. CMAJ Sept. 1, 1996; 155(5), p.519-527.

→ MAOIs → foods containing tyramine; demerol®, and a multitude of other drugs (e.g. cold preps) are contraindicated → hypertensive crises → stop MAOI → mild crises → ℞ chlorpromazine 25-50mg IM prn → severe crises → ℞ phentolamine 5mg I.V. prn, plus see #(7)(A), p.92, #(3)(D), p.145.

→ Lithium therapy may result in hypothyroidism.

→ Hypothyroidism may present as a depression.

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A Request for Feedback

Candid comments, and suggestions for future editions will be gratefully received. I hope you have enjoyed this brief “guided tour” through Emergency Medicine.

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Please Note: It is advisable to obtain up-to-date information from pharmaceutical monographs for use and dosage, before administering drugs. Antibiotic recommendations may vary with locale and time (consult your local infectious disease experts prn).

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