Welcome to the weird and wonderful world of SGH DIM!

This is written as a **UNOFFICIAL** guide to navigating the waters of SGH DIM by HOs who were very recently just in your shoes. It is a scary but also exciting thing to begin a near posting and we get how you feel. This is a short handbook with all the tips and tidbits that we wish we knew when we started and we hope that this helps you. ***Remember that this handbook is NOT the bible of medicine and that everything should be applied in context to the patient. This is just a general guide. :)***

We are always looking to improve the handbook and there's always space for version 2.0 / 3.0 / 4.0! So please feel free to write in and let us know any feedback / things that might need to be added to this document. (I, for one, would appreciate knowing all the codes for the staff toilets, haha.)

Have a good 4 months and don't mind the turbulence! You'll figure things out! There are always people around willing to help out ;)

XOXOXO

- **Project Hope (Jamie, Albert, Rilong, Rebecca)**

CREDITS!

Thank you to the following people who wrote chapters:

Neurology	Written by Rebecca Hoe and Joshua Loke Reviewed by Tan You Jiang (NEM)
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Gastro	Written by Huang Xiaoting and Jamie Kee Reviewed by Kenneth Loke (GAS)
Respi	Written by Joshua Loke Reviewed by Kenneth Koh (RES)
CVM	Written by Albert Teng Reviewed by Kamalesh Anbalakan (CVM)
Endocrine Electrolytes	Written by Chan Zhi En, Sheena Ng Reviewed by Amanda Lam (ENDO)
Pall med	Written by Jamie Kee Reviewed by Kennedy Ng (DMO)
Hae onco	Written by Ong Zheng Xuan, Jamie Kee Reviewed by Kennedy Ng, Evelyn Wong (DMO)
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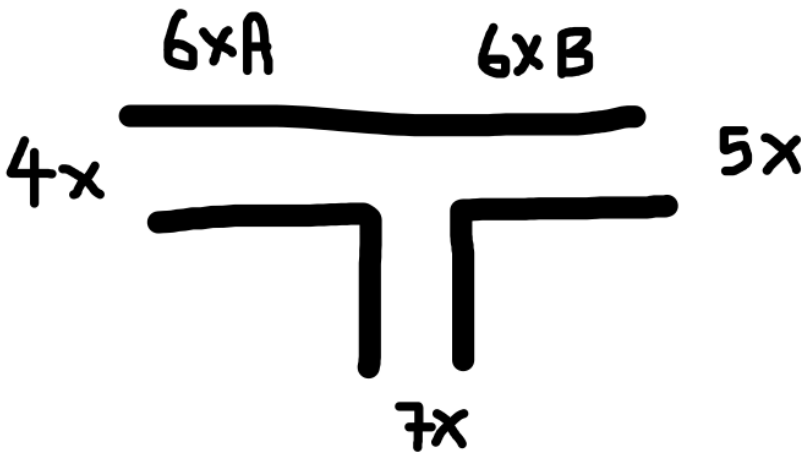
Neurology	Written by Rebecca Hoe and Joshua Loke Reviewed by Tan You Jiang (NEM)

ADMIN

LOCATIONS

Physical orientation	SGH is a maze. No doubt. But there are short cuts everywhere for the knowing HO. You'll hear terms like "meet me at W54 A side". Breaking it down, a simple guide to the wards: the block number is the first number and the back number is the level. E.g. Ward 54 = Block 5 level 4. A side means the side with the smaller numbers and B side the side with the larger numbers. The classical teaching is that level 2 is the global level, i.e., go to level 2 and you can get to ANY block. The life hack is that levels 4, 5, 6, 7, and 9 all have links. A brief summary goes as follows:  The layout only holds true for x = 5, 6, 7. Do note that 66B is off limits because it is an MDRO ward An additional cheat is that Block 4 links to 5 on levels 5 and 6 via a small door at the end of 4A side, hehe!
"Run"	Often, a reg asks you to run somewhere and it is sometimes difficult when you don't know where things are. Here is a brief breakdown of common places: 1. ICU for running of ABG: W45 2. IR to ask for procedures: Block 2, Level 2 en route to the ED and opposite OT 3. Echo: Outside W44
Special wards	42 - Renal ward and dialysis centre (RDC) and RICA 44 - Cardio ward 45 - Wards + MICA/MICU 58, 68 - isolation wards 78 - private ward

TEAMS

<table>
<tr><td>Special teams</td><td>There are different teams that you can get posted to in DIM. These include:
Acute Medical Ward aka W73 (affectionately known as AMW)
Geographic Team (affectionately known as GT)
General Ward Team (affectionately abbreviated to GW)</td></tr>
<tr><td>AMW</td><td>AMW is a unique place, designed for short stays of less than 3 days (ideal version of reality).
Patients usually are all in W73, but when W73 is completely full, there are "outliers/overflows" that may be under you team's care too (basically AMW patients that are in other wards).
It has it's own "operating system" slightly different from the rest of the wards, namely that there is a Multi-disciplinary round (MDT) every morning at 10am.
This means that you meet with nurses, PT, OT, and MSW every morning to find out how to best address the patient holistically.
This is also the time you update nurses about any changes to the team's plan (cough cough Postural BP BD etc), beg for help arranging investigations (please call 2DE) and hash out discharge destinations with PTOT and MSW.
At least 1 HO should attend it everyday (take turns!)
It also has the unique system of being able to arrange for transfers out of the ward for patients who you think will most likely need to stay more than 3 days (e.g. MSSA bacteremia)... put up a ward transfer form (ask your friendly PSA for it) and watch as patients move along to their new ward-homes (gen ward).
As a reminder, especially in AMW, it is of crucial importance to have your discharge summaries updated regularly. Imagine being on the receiving end of a patient with an empty discharge summary in GW!</td></tr>
<tr><td>GT</td><td>GT is GW's affectionate sister. It takes care of patient within a particular ward (Yay less walking! Yay bed cap!).
These include:
<table>
<tr><td>GT1</td><td>W58 Rooms 24 (Beds 1-6), 25, 26</td></tr>
<tr><td>GT2</td><td>W63B DIM female patients and W58 Room 24 (Beds 7-12)</td></tr>
<tr><td>GT3</td><td>W78 DIM patients + GT1 MRSA overflows + surge</td></tr>
<tr><td>GT4</td><td>W54D Rooms 9, 10, 11, 12, 13, 14</td></tr>
<tr><td>GT5</td><td>W53C Rooms 27, 28</td></tr>
<tr><td>GT6</td><td>W63B Male patients and W53C Rooms 25, 26
Note: Patients 65 years old and above in cubicles 16, 17, 18 go under the care of Geriatric medicine</td></tr>
</table>
Note: <u>if a GT patient is transferred out of the ward, they still remain under the care of the GT team</u>
Note 2: some GT teams like W54 have weekly huddles (basically a MDT like AMW) - make use of these!
Note 3: if your patient ends up in MICU / MICA... <u>you still need to see the patient and put up a progress note daily</u>.</td></tr>
<tr><td>GW</td><td>GW can be a sweet journey or a monstrous ride, depending on the ED admissions. The good thing is that you clock a lot of walking steps! You round all patients, unless they happen to fall under GT coverage... heheh. ED lodgers under your consultant are also under your care.
Note: if your patient ends up in MICU / MICA... you still need to see the patient and put up a progress note daily.</td></tr>
</table>

WARD WORK

First day	First day in a new team is always stressful... but thank goodness for the handover document! The handover document is basically a brief summary of the current active issues for each patient and a brief background. If that fails, the discharge summary is your best bet. Most of the time, we try to update it before team changeover to help the new team get a better idea about the patient (pass on the favor and do the same!)
Pre-rounds	Pre-rounds tend to happen around 630am on the first day. Come in, find an MO room with a free computer, then create your team list. Team lists can be created by putting your consultant as the provider and internal medicine as the specialty. Screen shots on how to do so are shown below. Xxx Split the team list with your fellow co-HOs and you should be good to go! Remember to print a copy of the team list (I like the one with the "list of patients with notes"). Usually MOs clerk new cases and HOs round the old cases. However, once you settle in, you can always help to see new cases too! • New cases = patients who have not been seen by any MOs from your team
Formats for rounding	To each their own, but usually it follows the SOAP method - subjective, objective, issues, plans. Always remember to update your issues list!
Rounds	Rounds can go quite fast, but always remember to change the reviewing doctor name to the registrar / consultant who has seen the patient, whichever the higher ranked. Do a favor for your team-mates and edit the plans / reviewing Dr name if they are busy. Or order up investigations / medications! Just be sure to clarify who is doing what through furtive whispers. After rounds, there's usually a breakfast break (consultant dependent), or a re-group in a room to discuss the list - it's essentially a quick run through about the issues and plans. Be warned that there isn't Kentasarus connection in DUKE-NUS... so be sure to write down your to-do list on the rounding list so that you can rattle off and impress everyone.
Post rounds	After break, it's *changes* time. Important things to note are: 1. Don't miss out any blue letters! The earlier they are done, the better - remember that there is another team on the other side of the computer that has to try to see a completely new patient, round with their supervisor, then submit finalized plans... it's a tough life. 2. Make sure your discharges are done early! Staying after 2pm incurs an additional day's worth of charges, which is ok if they requested for pm discharge, but no okay for the patients who have financial difficulties and are just looking to go home asap. After 8pm, its counted as another day's stay (so if someone calls you on call for patient waiting for missed MC... please go and discharge patient haha). 3. It is wise to update patient's families at least once every 2-3 days, even more so if its Friday before a weekend... a confused family is an angry family
Tests	A fast way to order tests is to use prepared order sets! My favourite is ".SICU daily investigations". You can toggle the date and the tests needed. If a test seems out of reach, try searching with % in front (e.g. %folate for all tests containing the word folate in it). For more specific cardiac investigations e.g. Holter, MIBI, you will need a CVM blessing For urgent scans, you will need to call radiology.
Discharges	**Discharge summaries** Do try to update them as regularly as possible! Many things happen during a long stay... A brief layout of a discharge summary (if you've never done one before) includes the broad headings of: • Biodata • Past medical history • Presenting complaint on admission

	• Physical examination on admission • Initial investigations on admission • Issues and progress during stay in ward • Medication changes • Discharge plan (TCUs etc)
Essential components of a discharge	1. MC – logo paper necessary 2. Prescription (Rx manager) – wireless 3. Discharge summary – logo paper not necessary Do note that • All papers need to be signed (or risk the ire of the SN who will call you non-stop) • Late discharges (___pm) incur a half-day charge; discharges after 8pm incur a full day charge • All results should be acknowledged
Transfers	If transferring from SGH team to SGH team (eg take over by specialty team), update the discharge summary to reflect all the latest issues leading up to the transfers. You don't need to actually discharge the patient (eg order discharge medications). Just put in a progress note "agreeable for transfer under provider: ___, specialty: ___". • Note: For NHC (Cardio) transfers, please note that you actually have to discharge the patient for real before transferring to NHC ward 44
Comm hosp	If transferring from SGH to community hospital, discharge them and print out the complete discharge summary (detailed version). Also, provide at least 2 months of medications! • Fun fact: currently only AMKCH can support inpatient dialysis

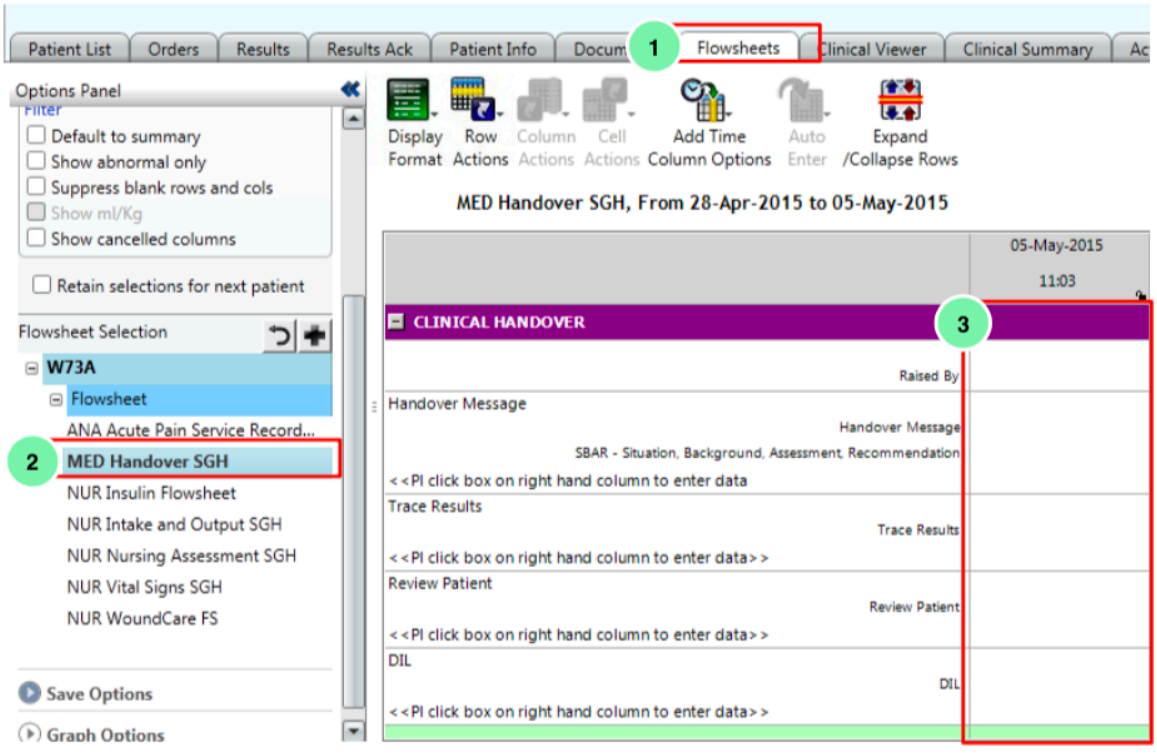
Exits

Most teams do an exit round at 3-4pm. Be sure to:

- Review patients who need reviewing
- Have a look-through the vitals
- Trace blue letter replies
- Trace investigations

This is the time to update on the issues flagged up in the morning.

Remember to ask if any handovers need to be done to the on-call!



It is wise to also put plans for any fever spikes for complicated patients, or the extent of care + cause of death for DIL patients. You will understand when you are on call...

For DIL patients, do give the on-call a physical phone call as well.

REFERRALS

Blue letters	• Cut off time for blue letters are 4pm on weekdays (HAE cuts off at 2pm) • If weekend / PH referrals need to be made, they should be **urgent and the on-call registrar should be CALLED**

Reviews	• First thing you want to do is make sure it's a blue letter and not a review.
	• Review = still on follow up with the specialty
	• You can check for outpatient appts via Tools > outpatient appt > all (institution)
	• Call the team SR under the consultant who saw the patient or the consultant straight if no SR is available
	• For CVM and Renal, reviews have specific MOs dedicated to certain blocks
	  ◦ Cardio review MOs operate on weekends until 12:30pm
	  ◦ Do note that for renal, if your team is referring for dialysis support while inpatient, a new blue letter needs to be put up, even if the patient has been on active outpatient follow up with Renal
	  ▪ If the patient does not need emergency dialysis, please do not refer after 4pm
	• Operator 'o' will be your best friend as he/she can tell you:
	  ◦ Who the team SR under xx consultant is
	  ◦ Who is the cardio/ renal review MO for block xx

AIC	• Usually done for nursing homes, day rehab, etc. • Go to Tools > AIC to access it • Usually we will need to fill in the medical report section and "ready" it
Allied health	• PT/OT/ST referrals have to be ordered in the system as per how you order investigations / medications • MSW referrals are usually done by the nurses so do let them know

PHONE NUMBERS (may be out of date)

Blood	Blood bank 3666/4852 **BTS MO 91864133**	Admin	BMU 4821/4822/2202/4393 Client service 4950 MRO 4306 Renal coordinator 5180
Labs	Biochemistry 4653/4915 Coagulation 4681 Cytology 7589 Haematology 4628/ 4629 Bacteriology 4913/4908 Fungal 4910 Immunology 4922 HIV 6712 TB lab 62221391 /6576 7655 VDRL 4960 Virology IF 4998/ serology 4941 Respiratory virus PCR 6920 Cytology 4954 MicroB 4908 Histology 4930 EGFR 6920 (NUH 67724175/ 65165825) Cytogenetic 4650 Flow cytometry 6024 Molecular 6920 / BCR/ABL/ VNTR - 6008 NUS lab 67785171 Anti factor-Xa 6022 Cas 4951 Pml rara 4008	Pharm	Haem pharmacy 4559 / fax no. 6280 Inpatient pharmacy 5155 ACC pharmacist 96228229 Oncology pharmacy 6436- 8138/ 8139 Drug advice 4112 Outpatient NCC pharmacy 6436-8091/ 8282
Ix	XR 5135 CT scan 4236 Inpatient CT 4283 CT listing 4283 / 3587 CT scan [reporting room] 5460 CT scan radiographer 6906 CT scan [reporting room - neuro] 4236/6062 XR [Reporting] 4232/ 4235 MRI [General] 4236/ 4225 5725 to push forward MRI [Reporting] 2186/3811/3409/4273 Ultrasound 5138 IR schedule 3941/ 3960 2DE [inpatient] 5577 2DE [outpatient] 67048410 MIBI 67048181 Nuclear 4203/3838 MAG3 5357 PET 5357 Bone scan 4203 Vascular lab [W58] 5614 Vasular DVT NHC 4396 Lung function 3559 Imaging cd 4232 EMG/EEG 4509 Gut & liver 4547 INS 4776 Audiologist 6874 / 6872 Neuro lab 4509 Angio 3941/ 3960	ICUs	MICU: 4450 Medical ICA: 6105 SICU: 4222 NICU: 5333 / 5139 / NICA 5967 CTVS ICU: 4240 CCU: 4440 Renal HD: 4420 Surgical HD:6982/6983 (58) /3769 (57) Neuro HD: 5967 Isolation ICU/HD 2510/2543
GS	OT reception 4365/4565 EOT 4365	Allied health	MSW 4885 Physio 4130

	Elective OT 4364 Uro Centre 6830 Endo 3986/3990/ 6978/6979 INS 4776		
Clinics	A (DIM/RCCM) 4307 B (Endo) 4315 CDLD 6730 G 6728 H (Ortho/plastics) 4335/4373 K (Haem) 4345 M (Renal/Geri) 4353 O&G 5920 Dental 4334 ENT 4327/4331 Eye Room 3596 Haem centre 3515		

ON CALL GUIDE

<table>
<tr><td>General info</td><td>The dreaded call. Please sleep enough the day before. A sleepy HO is a HO prone to mistakes. (Trust me, I know). Make sure before you start your call that you eat a prophylactic dinner at 4:50pm! Also, when in doubt, escalate!</td></tr>
<tr><td>What to expect</td><td>You will be called a lot - by the end of your posting you should be a master at urgency stratification. Always see the dangerous ones first (in no order of importance)
Collapse / LOC
Hypotensive
Desaturation
Septic
GCS drop
Etc
And always remember to let your MO know if you think patient is sick / has potential to turn sick / unsure about management - don't care about face, care about patient!!</td></tr>
<tr><td>Pre-call</td><td>Drop a text to your MO on call to let them know that you're on call today and ask how they like to run their calls e.g. seeing new cases together or HO to see first etc.

For HO 1-5: Before 8pm, your MO will be MO 1-5. After 8pm, contact your night float MO (6-9).
For HO sub spec: Your MO will stay the same throughout the entire night</td></tr>
<tr><td>Call coverage</td><td>Ward coverage is as follows:<table><tr><th>Type of MO Call</th><th>Ward Coverage</th></tr><tr><td>Haematology / Oncology MO & HO</td><td>W48, W72, W77</td></tr><tr><td>Renal MO & HO</td><td>W42, W64</td></tr><tr><td>Neurology MO & HO</td><td>Neurology Inpatients in W74/NICU/Overflows</td></tr><tr><td>Respiratory & Critical Care Medicine (RCCM) MO</td><td>Medical ICU, Medical Intermediate Care Area (MICA) & MICU/ MICA overflows</td></tr><tr><td>MO1 (Half-Call),
MO6 (Night-Call) & HO1</td><td>W43, W44,W45, W46, W47</td></tr><tr><td>MO2 (Half-Call),
MO7 (Night-Call) & HO2</td><td>W52, W54, W55, W56, W57, W58, A&E Lodge</td></tr><tr><td>MO3 (Half-Call),
MO8 (Night-Call) & HO3</td><td>W63, W65, W66, W53</td></tr><tr><td>MO4 (Half-Call)
MO9 (Night-Call) & HO4</td><td>W74, W75, W76, W78, W67, W68</td></tr><tr><td>MO5 (Half-Call),
MO10 (Night-Call) & HO5</td><td>W73</td></tr></table>HO1-5
You will have to clerk all new cases and see passives under your coverage that are under the specialties of medicine (except cardiology and neurology).
HO2 has to clerk new cases in ED who have been there for >4H without having been seen (the ED will call you)
HO Neuro/Haemonco/Renal
For Neuro, you only need to cover neuro patients
For Haeonco - Renal, you will have to cover ALL specialties, except neuro and cardio, under your ward coverage</td></tr>
<tr><td>Where to sleep</td><td>On call rooms are located on Level 9. Just go up to Level 9 and turn left at the first turning. Walk down the corridor and you should see the registrar's rooms flanked by two lit up corridors. Our medical HO rooms tend to be at second corridor.
Exception: HO5's call room is just outside W73 and is REALLY cold.</td></tr>
<tr><td>Timings</td><td>All new cases admitted after 4:30pm have to be clerked by you (and also sometimes those who have been admitted before ... if the primary team has yet to see them... don't blame them too much, usually its because they were only wheeled to the ward after 4:30pm.)
You can stop seeing new cases usually at 630 (official time 730), unless they are unstable and need early ward review. (On weekends, your call starts at 12 on Saturday and 730 on Sunday.)</td></tr>
<tr><td>For new patients</td><td><table><tr><td>What to do</td><td>1. Remember to let your MO knows about new cases early!
Half call MOs have to see all cases that come in before 8pm, so they would want to know early to help you clerk if you're busy so that they can go home on time hahaha. :P
2. Preclerk the patient</td></tr></table></td></tr>
</table>

		• Essentially, look through their past medical history on NEHR / from previous discharge summaries 3. Order up old medications • Usually this can be done quite easily via Rx Manager, but remember to look at their NEHR for a more recent set of medication changes - NEHR captures medication given by all the health clusters and not just Singhealth, which is useful if your patient follows up at NHGP 4. Clerk the patient • A useful template is as follows: Biodata (Age, ADLs, Brief family set-up / occupation, smoking / drinking) Past medical history Presenting complaint Physical exam Initial investigations Events in ED 5. Come up with a plan • A useful way to organise your plan is by: (1) Nursing (2) Investigations (3) Management (4) Referrals
	Special cases	1. Nursing home patients • Sometimes, such patients may be minimally communicative. Do look for a memo and a NH report that usually is appended to the file 2. Home hospice patients • If patient was referred by Home hospice, do give the doctor / nurse in charge a call 3. Uncommunicative patients / delirious patients • If patient is uncommunicative and family is not around, do give them a call unless it is really late at night
For unwell patients, note:		• Questions you should ask • What are the patient's vitals? • What are the patient's current issues? • What is the patient's resuscitation issues? (DNR Maxward vs escalation to ICU) • Has anything been handed over? • Have a low threshold to escalate! Your MO is always a phone call away (also, please call your MO and don't text them if the patient is sick!)
DIL patients		DIL (dangerously ill) patients need to be accompanied if they are being transported (make sure you have your defib on hand and any drugs needed yknow... just in case)
Deaths		Deaths are signed up by the MO on call, but, often times, you are the front liner managing their hypotension / bradycardia / desat etc. Make sure that you let family know early in their deterioration to ask them gently to make their way to the hospital (for those already DNR Maxward). Prepare the patient's NRIC (if not already in the care of the nurses). Get the long ECG strip marking asystole ready for your MO if possible. Offer condolences :(

AUTHORS

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COMMON CTSPS

FEVER

History	• Note: Usually we take fever as temperature > 38 degrees
	• Signs of bacteremia – Chills and rigors
	• Identify source of infection
	  • CNS: Headache, Focal neurological deficits, photophobia, neck stiffness
	  • Respiratory: Pleuritic chest pain, Shortness of breath, Cough, Sputum
	  • Genito-urinary: Dysuria, Hematuria, Frequency
	  • Intra-abdominal: Abdominal pain, Nausea/ Vomiting, Diarrhea
	  • Thrombophlebitis: Pain or discharge at current/ex-IV access sites
	• Current antibiotics and last cultures done
	  • If last cultures and escalation of antibiotics is within 48 hours and patient clinically responding but still having fever, may need to give time for antibiotics to work

Exam	• Skin – cellulitis • Heart - murmurs • Lung – reduced air entry, crepitations • Abdomen • Previous and current IV cannula sites • Neurological examination if CNS symptoms; Kernig's and Brudzinski for meningitis

Ix	• Check last CBG (sepsis may precipitate hypo/hyperglycemia)
	• FBC, UECr, LFT
	• Inflammatory markers (CRP, Procal) + Blood cultures
	• Cultures as per history
	  • UFEME + Urine cultures
	  • Sputum grain stain + Sputum cultures (if indicated)
	• CXR
	• Respiratory swab if suspecting a upper respiratory viral infection (i.e bloods and inflammatory markers are unremarkable)
	• KIV lumbar puncture, to be discussed with senior

Mx	• Assess if patient is ill / hemodynamically unstable
	  • Inform MO STAT
	• Stabilize patient as required
	  • Oxygen supplementation
	  • Fluid resuscitation
	  • Strict I/O charting with IDC (if indicated)
	• Increase parameter monitoring as needed
	• Initiate intravenous broad-spectrum antibiotics as per hospital guidelines for system specific infection
	  • Culture directed once cultures and sensitivities are out

HIGH BP

Notes	• Commonly, a lot of the calls for SBP >180 are due to poorly controlled hypertension. Nurses will usually let you know if the patient is symptomatic or not. If symptomatic or patient is admitted for a hypertension related complication, please do see patient early to evaluate.
	• Hypertensive crisis (SBP>180, DBP>120)
	  • Urgency = no end organ damage
	  • Emergency = evidence of end organ damage

Hx	• Rule out hypertensive emergency
	  • Hypertensive encephalopathy
	  ○ Headache, n/v, non-specific neurological symptoms, seizure, coma
	  • Stroke
	  ○ Focal numbness / weakness, dysarthria
	  • Acute Coronary Syndromes, aortic dissection, acute pulmonary edema
	  ○ Chest pain, SOB
	  • Acute Kidney Injury

	○ Oliguria, hematuria
Exam	• Fundoscopy for papilledema/retinal hemorrhage • Full neurological exam • Fluid overload, R-R delay to suggest dissection, new murmurs

Ix	• NOT routine - only if any signs of hypertensive emergencies, targeted to systems
	  • CT brain
	  • CXR, Trop T, ECG
	  • UECr, UFEME

Mx	• Inform senior if hypertensive **emergency**
	• Increase parameter monitoring as needed
	• Blood pressure lowering agents - try to use different classes / top up existing class if not yet max dose
	  • ACEI/ARB
	  ○ Caution with renal impairment
	  • Calcium channel blockers
	  ○ Safest to start on call for chronic HTN, usually amlodipine 2.5mg then top up as needed
	  • Vasodilators (direct) - hydralazine
	  ○ Useful for ERSF/CKD patients
	  • Beta blockers
	  ○ Oral not much BP effect
	  ○ IV infusions - Esmolol, labetalol (need HD monitoring, please do not start on your own)

LOW BP

Notes	• Definition: SBP <90 or drop in baseline BP, usually HR >100 (reflex tachycardia)
	• Causes of shock
	  • Obstructive (cardiac tamponade, tension PTX, PE)
	  • Cardiogenic
	  • Distributive (anaphylactic, septic)
	  • Hypovolemic/hemorrhagic
	  • Neurogenic

Hx and exam	• Look for cause of hypotension
	  • Fever, chills, rigors suggesting infection
	  • Poor oral intake, increased fluid losses (diarrhea etc) suggesting dehydration
	  • Melena, PR bleeding etc suggesting hemorrhage
	  • Chest pain, SOB, hemoptysis, syncope suggesting obstructive cause
	  • LL swelling, JVP elevation, crepitations, SOB suggesting overload
	  • New medications, angioedema, wheeze, rash suggesting anaphylaxis

Ix	• Look at I/O charts, renal function, previous 2DE • Cardiac biomarkers + ECG • FBC, UECr • Lactate • Screen for infection: CRP, procalcitonin • Septic work up if suspecting infection • CXR

Mx	• Check extent of care of patient! (Important to know if full active or for comfort care)
	• Increase parameter monitoring as needed
	• ABCs
	  • Ensure IV access
	• Fluid resuscitation (judicious if prone to overload)
	  • **If patient not overloaded, start IV drip and retake parameters after 30mins**
	  • Normal saline is standard for emergency fluid resuscitation
	  • KIV colloids if not improving
	• Stop anti-hypertensives
	• Inform MO if hypotension is not fluid responsive
	  • KIV HD for inotropes if fluid resuscitation not working
	• Definitive management will depend on etiology of hypotension
	  • Anaphylasis
	  ○ Alert MO
	  ○ Ensure airway patent

	○ IM adrenaline (1:1000) 0.5ml, IV hydrocortsone 100mg Q6H, IV diphenhydramine 25mg, salbutamol nebs if bronchospasm • Hemorrhagic ○ Alert MO ○ GXM and arrange for transfusion • Septic ○ Alert MO ○ Initiate abx ○ Paracetamol, cold compress • Cardiogenic ○ Alert MO ○ Ensure nil ACS ○ Do not give excessive amounts of fluid if noted to be in cardiogenic shock (worsens the stress on the heart)

DESATURATION

Priority	See IMMEDIATELY, especially if large desaturation
On phone	• Current saturations and INO2 requirements any desaturation? Vitals stable? • Is patient in respiratory distress? • Reason for admission? Any Concurrent illnesses or comorbidities? • EOC status • Ask for ECG and also to stand-by ABG syringe and blood taking equipment
Hx and exam	• Look for cause of desaturation • Cardio • Acute coronary syndrome • Pulmonary edema • Tamponade • Respiratory • Hospital Acquired Pneumonia • Pulmonary embolism • Asthma/COPD • Pneumothorax • Lung collapse/mucous plugging • Intake/output chart • Past medical history • Previous heart failure/poor ejection fraction • Renal failure • Asthma/COPD • Review morning entry and clinical notes, IO charting, CXR and blood test results, EOC status
Ix	• Blood tests: • ABG (pro-tip: grab 2 patient sticky labels, run to MICU (Ward 45) with ABG ask either MICU MO or Respiratory technician to help run ABG), NOTE FiO2- helps you to calculate FiO2 (see below) • Cardiac enzymes + ECG • FBC, UECr, • KIV Pro-BNP, inflammatory markers • Order portable CXR and get nurses to call for portable CXR
Management	• NBM, paras Q1hrly • Escalate FiO2 delivery (NP àVM àNRM) • Regular suctioning • Inform MO immediately if patient is diaphoretic, using accessory muscles for breathing, drowsy, cyanosed, tripoding, having stridor or wheezing or has silent chest • TREAT THE UNDERLYING CAUSE! INCREASING INO2 WILL NOT ADDRESS THE UNDERLYING CAUSE OF DESATURATION • Asthma/COPD ○ Nebs (saline/salbutamol/ipratropium) q4-6hrly regular/PRN ○ IV hydrocortisone 100mg q8hrly ○ +/- antibiotics – especially if COPD exacerbation or high inflammatory markers • Pneumonia ○ IV antibiotics • Fluid overload (CCF/Renal failure)

	○ IV/PO furosemide • KIV chest PT • Consider intubation or NIV • Consider intubation or NIV • Will need senior to decide • Indications for intubation (shift to ICU for ventilation and monitoring) • Airway – protect airway • Breathing – to aid with ventilation and oxygenation • Clinical course – deteriorating condition/ tiring out and may collapse soon • Indications for Non-Invasive Ventilation (shift to HD for NIV and monitoring) • Fluid overload • T2 RF from COPD/OSA • Review regularly
Useful	Estimated FiO2 from various supplemental O2 devices: • NP: up to ~40% - max 4-6L (FiO2 = 21% + NP flow rate x3) e.g. patient on 2L/min NP will be receiving: 21 + 2x3 = 27% of FiO2 • VM: 35-50% • Non-rebreather mask (NRM): 100% Calculating PF ratio • PF ratio = Pao2/ Fio2 x100 • ARDS: ○ Mild 200-300 ○ Moderate Pao2/ Fio2 100-200 ○ Severe Pao2/ Fio2 <100

CHEST PAIN

Priority	• Should be attended to as soon as possible, especially if severe and worsening.
Hx	• SOCRATES • Typical chest pain includes • Substernal crushing chest pain • Worse on exertion • Relieved with rest/ sublingual GTN • Associated symptoms of SOB/ diaphoresis/ palpitations, Nausea/ vomiting
Exam	• Heart – muffled heart sounds, JVP, new murmurs • Lungs – for signs of heart failure • Calves - bilateral edema
Ix	• STAT investigations: ECG • Cardiac biomarkers + ECG • If high risk and suspecting STEMI à do ECG every 15-30 minutes for dynamic ECG changes • FBC, Renal panel, PT/PTT, GXM • CXR • 2DE
Mx	• Increase parameter monitoring as needed • Symptomatic treatment • Sublingual GTN x 3 • IV GTN infusion 10mcg/min – need to be in CCU • Treatment -> **alert your MO** -> Call cardio reg • DAPT (Aspirin, Plavix) ○ For STEMI (ticagrelor instead of Plavix) • KIV IV Heparin vs S/C Clexane for high risk NSTEMI • Risk factor reduction • Beta-blocker, Statins

ABDO PAIN

Note	Need to review if severe abdominal pain TRO surgical abdomen/ medical emergency
On the phone	Ask for STAT: Hypocount + ECG
DDX	• BY LOCATION

	<table><tr><td>RIF</td><td>Appendicitis, diverticulitis, merkel's diverticulitis, terminal ileitis (IBD), closed loop obstruction, urinary stones, ovarian torsion, ectopic pregnancy, pelvic inflammatory, testicular torsion</td></tr><tr><td>LIF</td><td>Diverticulitis + above</td></tr><tr><td>RHC</td><td>Hepatitis, cholecystitis, cholangitis, pneumonia, AMI</td></tr><tr><td>LHC</td><td>Splenic vein thrombosis, pneumonia, AMI</td></tr><tr><td>Epigastric</td><td>Pneumonia, AMI, gastritis, pancreatitis, AAA, DKA</td></tr><tr><td>Central</td><td>AAA, DKA, mesenteric ischemia</td></tr><tr><td>Flanks</td><td>Pyelonephritis, renal stones, ureteric stones</td></tr></table>

History	• SOCRATES
	• Associated symptoms
	  • Chest pain/ SOB/ Diaphoresis/ Palpitations
	  • Nausea/ Vomiting/ Diarrhea
	  • PR bleed/ Melena
	  • Fever/ Chills/ Rigors

Exam	• Be sure to examine the abdomen!
	  • Rebound tenderness
	  • Voluntary vs involuntary guarding
	  • Bowel sounds
	• Genitalia examination - look for hernias
	• DRE if indicated

Ix	• Investigations depend on clinical suspicion
	  • Cardiac biomarkers + ECG
	  • FBC, Renal panel, Liver panel
	  • Pancreatic enzymes (Amylase, lipase)
	  • If suspecting DKA: Ketones
	  • If surgical abdomen, ischemic bowel: Lactate, PT/PTT, GXM
	  • Septic work up if suspecting infection
	  • Erect CXR
	  • Supine AXR/KUB
	  • CT abdomen and pelvis if persistent abdominal pain/ surgical abdomen

Mx	• Increase parameter monitoring as needed
	• Serial abdominal examination
	• Symptomatic treatment – be sure to rule out surgical abdomen
	  • Painkillers according to WHO pain ladder
	• Inform senior if surgical abdomen or medical emergency
	• Definitive management will depend on etiology of abdomen pain
	  • Call GS registrar urgently if surgical abdomen
	  • DKA/HHS (See endocrine section)
	  • Pancreatitis (pain relieve, fluid resuscitation, KIV abx if septic)
	  • Constipation (clear bowels with laxatives e.g. lactulose, senna, bisacodyl, fleet if needed)
	  • IBD (See gastro section)
	  • Infections (pain killers, abx)

ALTERED MENTAL STATE (AMS)

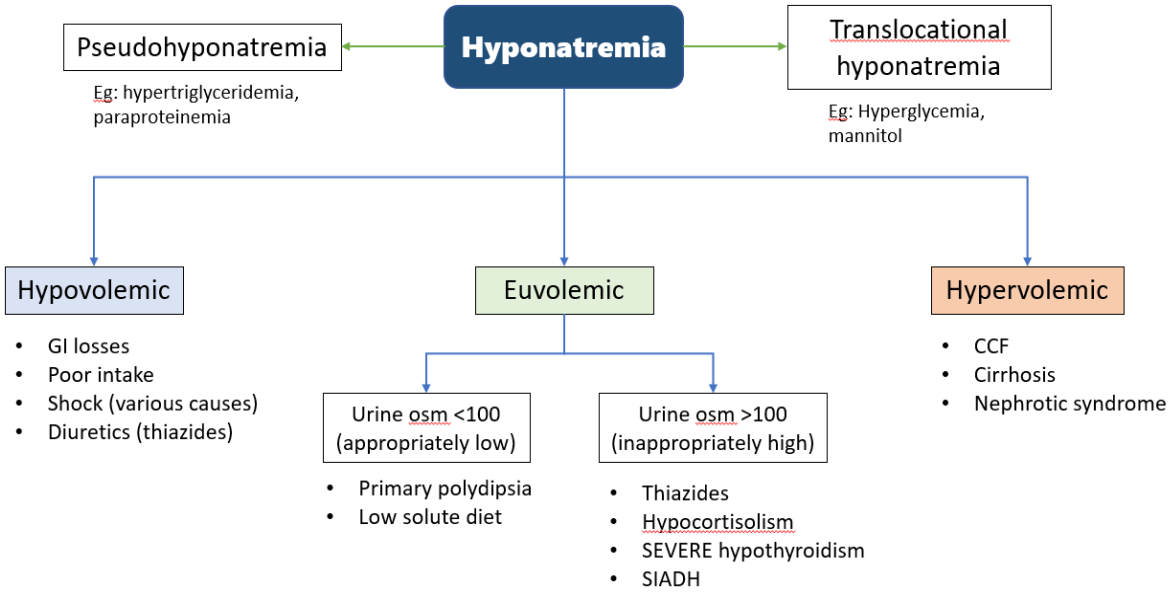
Note	• AMS includes Confusion, Inattention, Disorientation, Unusual Behavior, Delirium • Common presentation in elderly for a variety of conditions
On the phone	• Ask for ECG, Hypocount

Hx and exam	• Often difficult to obtain history from patient but can try
	• Assess GCS
	• Look for cause of AMS
	  • Infection
	  • Cardiac symptoms
	  • Stroke
	  • Intoxication/withdrawal symptoms

	• Constipation (common in the elderly) • Hepatic encephalopathy (in cirrhotics) • Uremia • T2RF • Do DRE to look for constipation if safe • Remember to take care of your own well-being as well and get any help you may need
Ix	• CE + ECG • FBC, Renal panel, Liver panel • Screen for infection: CRP, procalcitonin, UFEME • Septic work up if febrile • CXR • CT brain if persistent AMS or neurological deficits (Discuss w MO) • Urine/Serum toxicology if indicated
Mx	• Increase parameter monitoring as needed • Conscious level charting • CIWA/CIWA-B/COWS as indicated • Keep patient NBM with IV drip • Clear bowels • Definitive management will depend on etiology of AMS

ELECTROLYTES

HYPONATREMIA

Definition	• Acute hypoNa: <48h duration (MUST have a documented normal Na value <48h ago. If no documented normal Na <48h, classify as chronic hypoNa by default) • Chronic hypoNa: ≥ 48h duration
Causes	
Hx and exam	1. Severe hyponatremia symptoms • Features of moderately severe hypoNa: Nausea, confusion, dizziness, headache • Features of severe hypoNa: Vomiting, cardiorespiratory distress, drowsiness, seizures, coma (GCS ≤8) 2. Reasons for dehydration • Vomiting / diarrhoea • Poor oral intake • Renal / extrarenal losses 3. Symptoms of fluid overload 4. Symptoms of adrenal insufficiency • Postural giddiness, nausea/vomiting, drowsiness, previous TCM / steroid use 5. Medication history • Thiazide / indapamide • Steroids • TCM • Drugs associated with SIADH (eg: antidepressants, antipsychotics etc) 6. Triggers for SIADH • Pain / nausea • Red flags suggesting malignancy
Ix	• Review previous lab tests to determine if this is acute or chronic hyponatremia • Renal panel (including glucose) • Serum osmolality, urine osmolality, urine sodium • 8am cortisol, thyroid function test • CXR • ** Double click on any biochemistry lab test to open the full result: this may show the comment "serum is lipaemic" if the patient has significant hypertriglyceridemia. Perform a lipid panel if so. **If hyperglycemia is present, calculate corrected Na** **Katz formula:** Corrected Na (mmol/L) = serum Na (mmol/L) + 1.6 x $\frac{\text{glucose (mmol/L)} - 5.5}{5.5}$ **Bartter and Schwartz Criteria for diagnosis of SIADH**

Should have	• Serum osmolality < 275mOsm/kg H_2O • Urine osmolality > 100mOsm/kg H_2O • Urine Na >20 – 30mmol/L while on normal salt and water intake
Should be	• Euvolemic
Must exclude	• Hypocortisolism • Significant hypothyroidism • Diuretic use • Significantly impaired renal function

Mx

- When clerking a new case, always be aware of how much fluids have been given in the ED! Overly liberal fluid therapy without appropriate monitoring can lead to overcorrection and osmotic demyelination – CAUTION!

Monitoring	• Parameters depending on severity of hyponatremia / symptoms • Strict I/O charting (insert IDC if significant hyponatremia) • CLC charting • In the presence of severe hyponatremia (Na <110 or mod/severe symptoms), also consider HD admission, escalate to senior • If presence of mod/severe symptoms (seizures, coma) – escalate to senior
Cause-specific treatment	

Depletional hypoNa	• Hydration with IV 0.9% saline (see section "Fluids used in management of sodium disorders" for how to calculate volume) • Ongoing monitoring of UECr, hourly urine output • Sudden increase in hourly urine output may be a sign that a sharp rise in Na is impending (dehydration initially stimulates ADH production à adequate rehydration causes ADH production to fall à sudden excretion of a dilute urine à sharp rise in serum Na)
Fluid overload	• Diuresis • Fluid restriction
Thiazide diuretics	• Stop diuretics • IV hydration with ongoing monitoring of UECr and urine output
Hypocortisolism	• Glucocorticoids
Hypothyroidism	• Thyroxine replacement
SIADH	• Fluid restriction

Severe hyponatremia	• May require treatment with 3% saline • CONSULT A SENIOR BEFORE PROCEEDING WITH THIS TREATMENT DECISION • 1ml per kg body weight of 3% saline is estimated to raise serum Na by 1mmol/L (infused over about 1 – 2 hours)

Fluids used in management of sodium disorders

Fluid	Na (mmol/L)
D5%	0
0.45% NS	77
0.33% NS/ D5%/ 10mmol KCl (premix)	56
0.9% NS	154
3% NS	513

Depletional hyponatremia: how to calculate volume of replacement fluid

Step 1	Calculate Na deficit Classic formula: **Na deficit = TBW x (desired Na – serum Na)** TBW (total body water): Men: 0.6 x body weight (kg) Women: 0.5 x body weight (kg) Elderly men and women: 0.45 x body weight (kg)
Step 2	Calculate volume of fluid based on amount of Na in the type of IV fluid you plan to give • E.g. if aim to raise Na by 5mmol/L over 24h, in a 50kg woman ○ Na deficit = 0.5 x 50 x 5 = 125mmol ○ Volume of 0.9% saline = 125/154 x 1000ml = 811ml to be given over 24h ○ Round volume up/down for ease of administration
Caution	Still require monitoring of UECr after calculating volume of fluid. The body is not a closed system – Na can rise faster / slower than anticipated, and further adjustments to fluid type/volume may be needed.

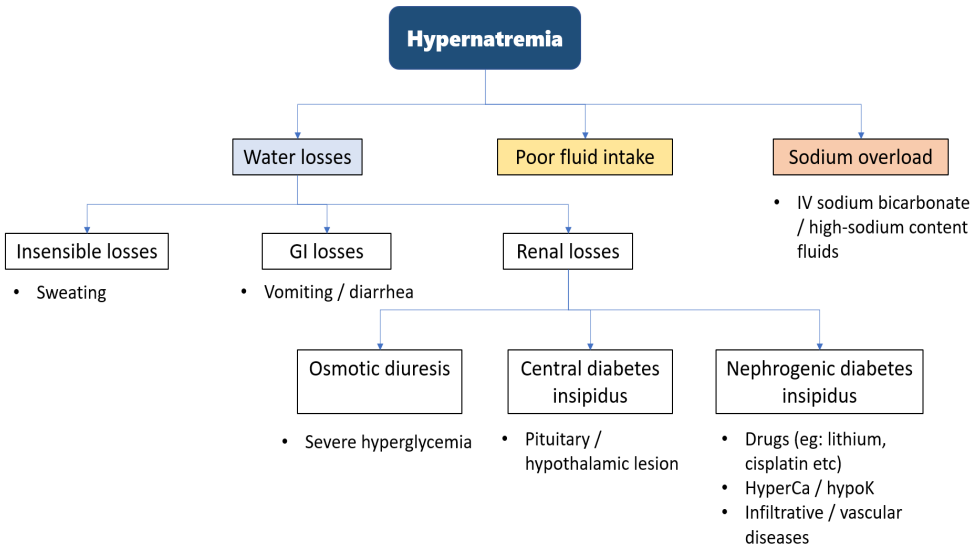
Calculating volume of 3% saline to give in severe hyponatremia

CAUTION: PLEASE CONSULT A SENIOR BEFORE GIVING 3% SALINE TO ANY PATIENT

1ml per kg body weight of 3% saline is estimated to raise serum Na by 1mmol/L

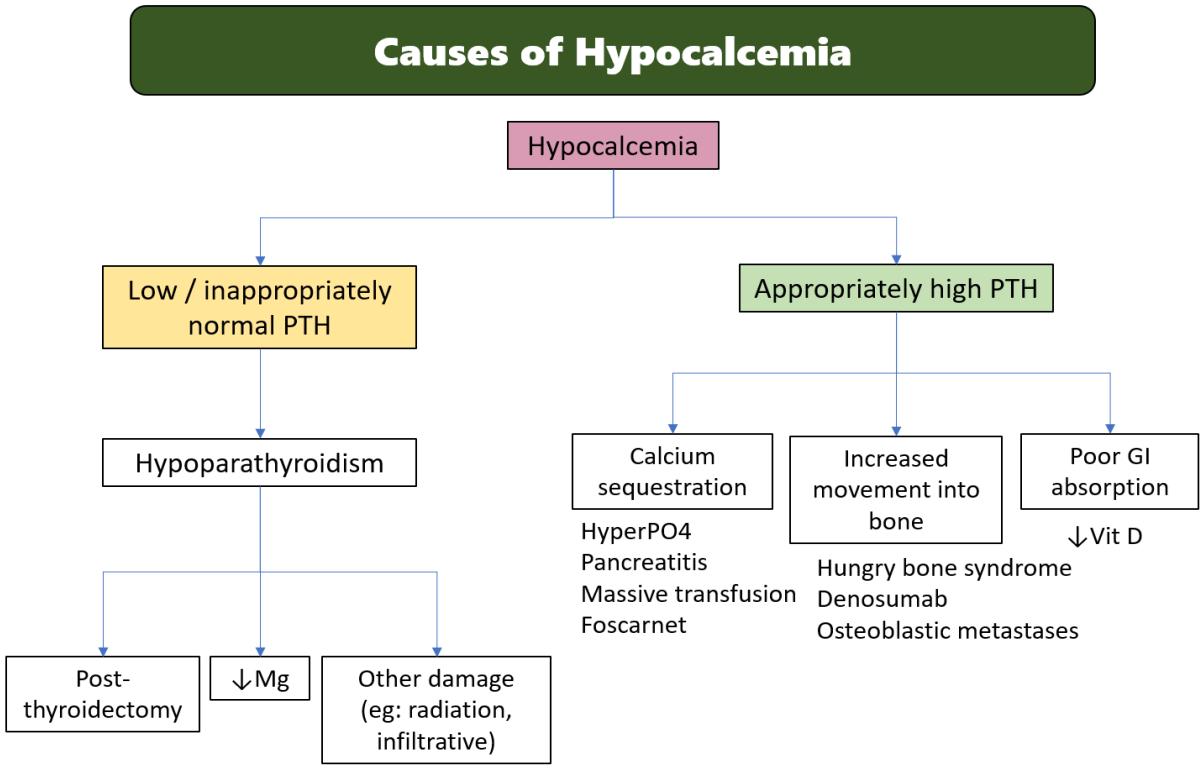
- Eg: If we desire to raise the Na by 2mmol/L in a 50kg patient
  - 2 x 50 = 100ml of 3% saline (to be infused over ~1 hour)

HYPERNATREMIA

Definition	Serum Na > 145mmol/L
Causes	
Hx and exam	Lethargy and weakness, muscle twitching, irritability, thirst, AMS, seizures and coma Causes: • Water losses: excessive sweating, vomiting / diarrhea, polyuria • Poor fluid intake: restricted access to fluids or poor intake • Sodium overload: review of medications given inpatient
Ix	UECr Monitor urine output: send serum osmolality and urine osmolality if polyuric
Mx	Strict I/O charting Aim to decrease Na by maximum of 8 – 10mmol/L over 24H Excessively rapid fall in Na can cause cerebral edema

	• Regular monitoring of UECr (eg: Q4H/Q6H/Q8H or Q24H depending on severity) • Give IV D5% according to water deficit **Water deficit** = TBW x [Serum Na / 140 - 1] **TBW (total body water):** Men: 0.6 x body weight (kg) Women: 0.5 x body weight (kg) Elderly men and women: 0.45 x body weight (kg) *This formula does not take into account ongoing water losses, thus serum electrolytes should be measured frequently to ensure that appropriate fluid replacement is occurring* • Treat underlying cause

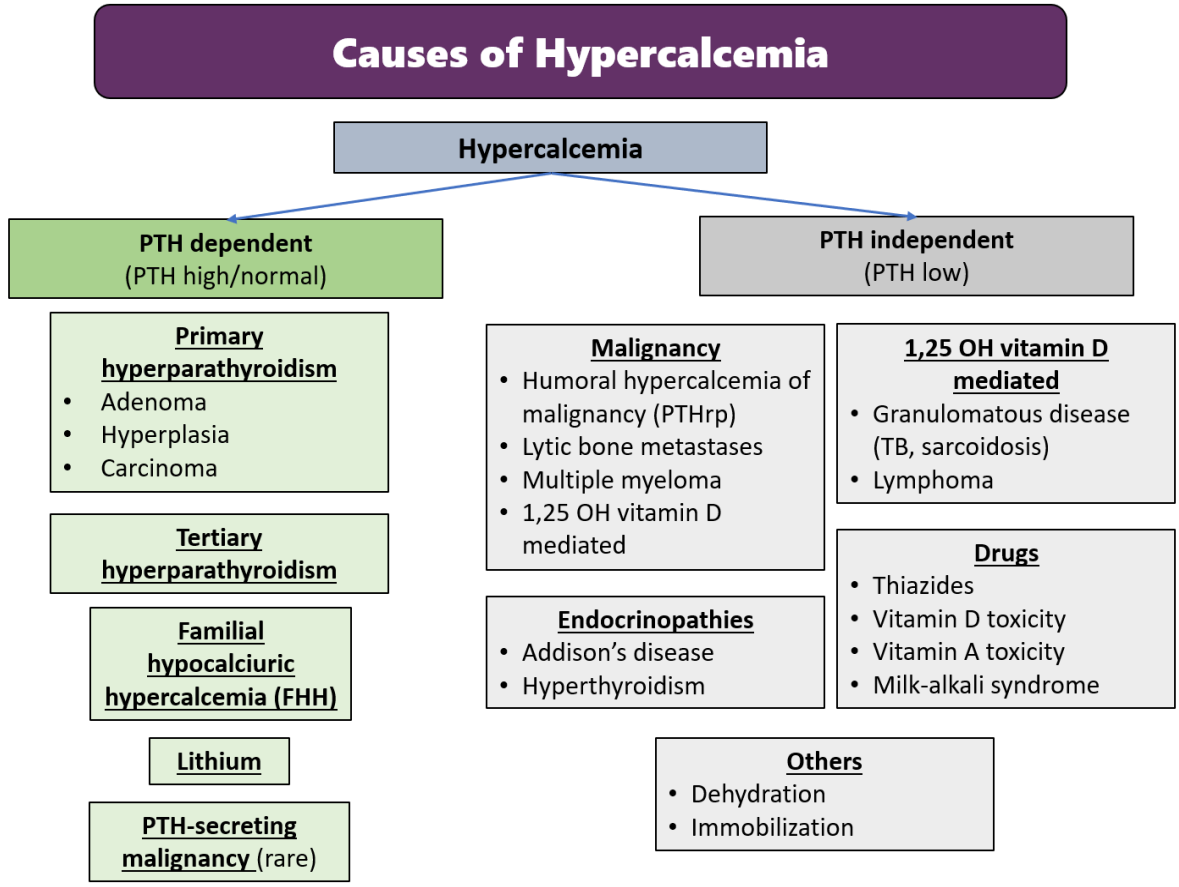
HYPOCALCEMIA

Definition	• Corrected serum Ca < 2.1mmol/L ◦ Corrected calcium= calcium + 0.02 (40-albumin)
Hx and exam	• Perioral numbness, paresthesia of hands and feet, muscle cramps, carpopedal spasms with Trousseau's sign, Chvostek's sign, laryngospasm, seizures • AMS, Fatigue, irritability, anxiety, depression • Bradycardia, hypotension, arrhythmias • History of thyroidectomy / parathyroidectomy • Drug history: recent administration of denosumab / IV zoledronic acid
Causes	
Ix	• Ca/Mg/PO4/Albumin • UECr • iPTH, Vit D • ECG: QTc prolongation and Torsades de pointes

Mx	• If symptomatic, ECG changes, corrected Ca < 1.9
	  ◦ Escalate to senior
	  ◦ Start IV replacement with cycles of 10ml of 10% IV Ca gluconate
	  ◦ If ECG changes/prolonged QTc, consider cardiac monitoring/HD
	• If corrected Ca > 1.9, patient able to take orally

	○ Calcium carbonate (Calcichew) 1250mg tabs (500mg of elemental Ca per tab) • Replace vitamin D if deficient (<20) or insufficient (<30) • Replace Mg concurrently if low • If underlying etiology is hypoparathyroidism, patient will require activated vitamin D (ie: calcitriol) – consult a senior

HYPERCALCEMIA

Definition	• Corrected serum Ca > 2.46mmol/L Mild hypercalcemia: 2.47 – 2.9mmol/L Moderate hypercalcemia: 3.0 – 3.5mmol/L Severe hypercalcemia: >3.5mmol/L **Arbitrary cutoffs. Assess for severe symptoms (eg: drowsiness or end-organ dysfunction)
Causes	
Hx and exam	• Bones: bone pain, muscle weakness, fractures • Stones: urolithiasis, polyuria, polydipsia (nephrogenic DI) • Abdominal groans: nausea, vomiting, constipation, pancreatitis, peptic ulcer disease • Psychiatric moans: confusion, stupor, depression and headache • Hypertension, shortened QTc, heart block
Ix	• ECG • Short QTc, widened/flattened T wave, complete heart block, Osborn wave • UECr, Ca/Mg/Pi, Alb • iPTH • TFT, Vit D, ALP • If abdominal pain: consider amylase, erect CXR, XR KUB or US kidneys, UFEME
Mx	1. Initial management • Assess mental state, GCS, blood pressure, heart rate and saturation • Abort any seizure using IV diazepam • Intubate if GCS ≤8 • Fluid resuscitation with IV 0.9% saline 500-1000ml over the first hour if hypotensive

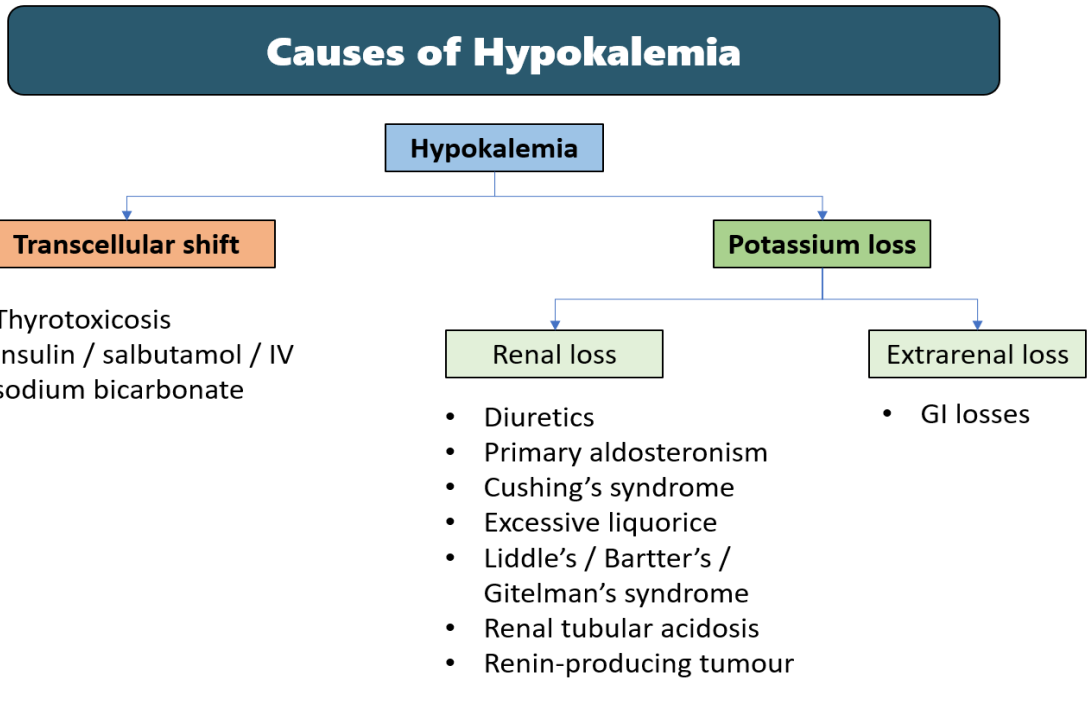
- IDC with hourly urine output monitoring
- Consider telemetry monitoring

2. Fluid administration
   - Fluid resuscitation: IV 0.9% saline 500-1000ml over the first hour
   - Maintenance fluids: IV 0.9% saline 200 – 300ml/hr
   - Aim urine output 100 – 150ml/hour to achieve adequate calciuresis
   - Adjust according to fluid status
   - Caution in elderly or patients with cardiac/renal impairment

3. Agents that lower calcium (CONSULT A SENIOR TO MAKE TREATMENT DECISIONS)

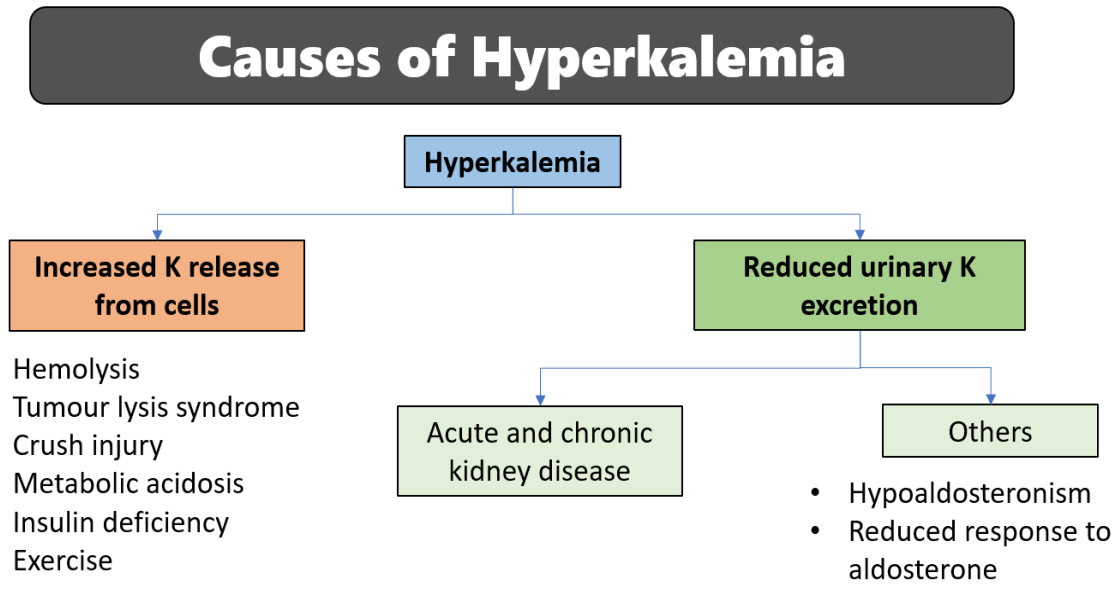
IV bisphosphonates	1. IV zoledronic acid (Zometa) 4mg given over 15min • Prolong infusion time to 30 – 60min if renal impairment present • Caution/dose reduction in renal impairment eGFR <60, contraindicated in eGFR <30 2. IV pamidronate 90mg given over 4h • Caution in renal impairment, dose adjust to 60mg given over 6h • Contraindicated when eGFR <30 • All IV bisphosphonates have delayed onset of action with maximum effect occurring 2 – 3 days after administration • Dose should not be repeated within 7 days from a previous dose • Caution / contraindicated in patients with renal impairment • If patient previously had normal renal function, adequate rehydration may result in improvement in renal function with time, allowing administration of IV bisphosphonates at a later time
SC calcitonin	• SC calcitonin 4U/kg Q12H (round up/down – comes in 100U vials, each costs $26.00) • Can be increased up to 6 – 8U/kg Q6H • Works rapidly (within 4 – 6 hours), lowers Ca by 0.3 – 0.5mmol/L beginning within 4 – 6hours • Efficacy limited: tachyphylaxis after 1st 48hrs

HYPOKALEMIA

Hx and Exam	• Weakness, periodic paralysis, ileus, muscle cramps • Arrhythmia
Causes	

Ix	ECG (flat T waves, prolonged PR interval, widened QRS, prolonged PR, U wave) Serum Mg
Mx	Consider route of replacement: Mild hypoK: 3.0 – 3.4mmol/L: Oral K replacement Moderate hypoK: 2.5 – 2.9mmol/L: IV K replacement Severe hypoK: ≤ 2.4mmol/L: IV K replacement Consider amount of K required • 10mmol of potassium will raise serum K by about 0.1mmol/L Span K (Potassium chloride SR): A 600mg tablet contains 8mmol potassium: 10mmol = ~1 tablet Mist KCl (Potassium chloride mixture): 1ml contains 1.34mmol potassium: 10mmol = ~10 ml KCl (premixed in WFI) 10mmol/100ml infusion to be given over 1h: 1 bag contains 10mmol of potassium: 10mmol = 1 bag Review medication list: • Consider suspending medications that contribute to hypoK if not crucial • Digoxin: risk of digoxin toxicity is higher in hypoK Correct other electrolyte derangements such as hypomagnesemia concurrently Avoid IV K replacement in dialysis patients unless severe

HYPERKALEMIA

Hx and exam	Weakness, palpitations New drugs Increased intake (bananas, durians) Oliguria PMH - recent chemo for cancer
Causes	
Ix	ECG • Tall Tented T waves • Flattened P waves, prolonged PR, widened QRS • AV block, sinus bradycardia, sine wave • VF, asystole Hypocount
Mx	Rule out spurious result (hemolysis, taken from drip arm) Suspend meds that may increase K (eg: ACE-I / ARBs / spironolactone) temporarily Stop K-containing drip K > 5mmol/L: Resonium PO 15g (can be given BD/TDS/QDS), onset 2 – 4h Resonium enema 30g, onset 1 – 2h

K ≥ 6mmol/L or ECG changes	• IV 10U Actrapid (use insulin syringe) in 40ml of D50% • Check capillary blood glucose (CBG) before, 30min after and Q1H for several hours after administration • Ensure IV plug patent before giving • IV calcium gluconate 10ml of a 10% solution slow bolus over 2 – 5 minutes • With continuous ECG monitoring
Refractory hyperK, or severe hyperK >6.5mmol/L, or rapidly rising K levels	• Alert senior! • Consider renal referral for RRT

- Monitoring
  - RP + ECG 2H after correction
  - CBG 30min after insulin and hourly for several hours after

CARDIOVASCULAR

TIPS

Referring at night	At night, the dreaded words for a HO = call CVM on call Important things • Make sure patient is stabilized • Make sure you know the rhythm • Useful to have a photo of the ECG at hand (remember to omit patient info) - will likely need to Whatsapp CVM on call

ACUTE CORONARY SYNDROMES (STEMI, NSTEMI, UA)

History and exam	• Timing of onset of chest pain
	  • Door to balloon time is optimally 90 minutes
	  • Important to catch a STEMI early for immediate PCI
	• Primary symptoms
	  • Chest pain
	  • Usually central chest tightness, may radiate to bilateral shoulders, jaw, arms
	  • Typical cardiac chest pain (atypical = only 2 out of the 3 present)
	  • Substernal chest pain
	  • Worsening with activity
	  • Better with rest/ sublingual GTN
	  • Shortness of breath
	  • Palpitations
	  • Diaphoresis
	  • Nausea/vomiting
	  • Beware the atypical presentation – especially in elderly , females, diabetics and mentally disabled patients
	  • Epigastric dullness/pain
	  • Giddiness
	  • Lethargy
	• PMHx/Risk factors
	  • HTN, HLD, DM, existing CAD/IHD
	• Examine for complications
	  • Murmurs
	  • Septum and free wall rupture
	  • Tamponade
	  • CCF

Ix	• ECG ASAP
	• Escalate to your MO if any acute ECG changes, KIV call CVM reg for PCI for STEMI
	  • Acute ST changes
	  • New onset left BBB
	  • If high risk for STEMI or high suspicion, can be done every 5-15 minutes to look for dynamic ECG changes
	• Cardiac biomarkers
	  • Historically, CK/CKMB are used to detect acute MI as it rises faster than Troponin T.
	  • However, most labs in SG now are detecting highly sensitive troponin T which start to rise within 1h of infarction
	  ○ Hence, can perform 3 sets of cardiac enzymes faster (e.g. 3 hourly) if the suspicion of ACS is high
	• FBC, UECr, APTT/PT +/- GXM
	• CXR
	• Work up risk factors (not urgent): Fasting lipid panel, fasting glucose, HbA1c
	• 2DE

Mx	• Q1Hrly parameters
	• I/O charting, HC monitoring (aim 6-10)
	• Keep Spo2 >92%
	• Keep NBM
	• Urgent PCI if
	  • STEMI
	  • NSTEMI with low BP, unstable rhythm (VT etc), persistent chest pain despite maximal anti-anginal tx, mechanical complications like acute MR

	• Wellens • Load DAPT (300mg Aspirin, and 180mg Ticagrelor / 600mg Clopidogel) KIV Clexane if high risk NSTEMI • Load only if there is no need for immediate revascularization • Sublingual GTN for angina • Risk factor reduction • Statin • Beta blocker - only if NOT hypotensive and NOT in heart block
Extra reading	Read up 3rd universal definition of AMI

APO

History / exam	• Shortness of breath • At rest or exertion • Effort tolerance • Heart failure symptoms: paroxysmal nocturnal dyspnoea, orthopnea, LL swelling (tends to precede breathlessness) • Associated chest pain/diaphoresis/palpitations • Previous cardiac/ respi/ renal / hepato disease • Intake and output charting • Salt intake • Look for signs of heart failure (deviated apex beat, murmurs, JVP, bibasal creps, LL edema)
Ix	• Cardiac biomarkers, ECG • FBC, UECr • BNP (very sensitive but not specific so don't conclude a patient has overload just on BNP alone; also can be falsely low in obese patient) • CXR • 2DE • ABG if drowsy
Mx	• Q1hrly parameters, Keep Spo2 >92% • Keep NBM • Strict IO charting with IDC • Daily weights • Definitive management depends on type of APO • Warm and wet: IV furosemide (start with 40mg BD) • Cold and wet: Inotropes (alert MO -> will req transfer to HD for inotropes) • Cold and dry: IV fluids and inotropes (alert MO -> will req transfer to HD for inotropes) • Consider NIV (senior decision) • Contra-indications of NIV • Pneumothorax • Drowsiness • Extensive facial hair • pH < 7.2

ARRHYTHMIAS

Hx / exam	• History • Chest pain • Palpitations • Shortness of breath • Symptoms of ongoing infection • Past medical history of atrial fibrillation or arrhythmias • Look for signs of heart failure
Ix	• Cardiac biomarkers, ECG • FBC, UECr, BNP • CXR • Order 2DE, KIV
Mx	• Escalate to senior if hemodynamically unstable or need transfer to HD/ICU for management • Q1hrly parameters • Keep NBM

- Ensure IV access
- Definitive management (including ACLS algorithms)

Pulseless	• Primary ABCD, start CPR, assess rhythm
	• Defibrillate, biphasic 150J
	• IV Adrenaline 1mg (10mls of 1:10,000 - dilute 1ml 1:1000 + 9ml saline)
	  • Every 3-5 mins
	  • Every other CPR cycle
	• Shock again and continue CPR 2min
	• Repeat adrenaline and shock again within 30s, continue CPR 2 min
	• Anti-arrhythmic drugs for VF
	  • IV Amiodarone 300mg bolus
	  • then 150mg every 2 mins
	  • Every CPR cycle
	• If still VF/pulseless VT, continue CPR 2 min, adrenaline, shock
	• Indication of ROSC
	  • Pulse and blood pressure
	  • Spontaneous breathing
	  • Abrupt spontaneous increase in $ETCO_2$

Tachyarrhythmia with pulse	• Unstable
	  • **Alert MO immediately**
	  • Prepare patient for synchronised cardioversion, get crash cart, defib
	  • AF: 50J
	  • SVT/VT: 100J to 150J
	• Stable
	  • Assess Rhythm and trial of drugs

SVT	• Attempt vagal manoeuvres (carotid sinus massage / Valsalva)
	  • Carotid sinus massage **<u>not</u>** for >60y/o, or carotid bruit present
	• 1st line
	  • IV adenosine 6mg push + 20ml saline -> (1- 2min) -> IV adenosine 12mg up to 2 times max with 1 min in between
	• 2nd line
	  • Verapamil 1mg/min (up to max of 20mg)
	  • Diltiazem 2.5mg/min (up to max of 50mg)

AF/Aflutter/MAT	

Stable, but with CCF	• Alert MO
	• First line
	  ○ IV Amiodarone 150-300 over 30min followed by 150mg Q6H
	  • Always send of LFT as well
	  • Remember they can chemically convert and cause stroke
	  • IV have to be given under monitoring in HD/ICU most of the time
	• Second line
	  ○ PO Digoxin 250mcg - 500mcg
	  • Or IV Digoxin 0.5mg, usually requires transfer to HDU

Stable, without CCF	• PO bisoprolol up to 5mg
	• If urgent need for rate control (severe symptomatic, severe RVR)
	  ○ Discuss with MO, KIV CVM on call
	  ○ For IV CCB in HD
	  ○ IV Diltiazem 2.5mg q3min up to 50mg max

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<tr><td></td><td>
IV Verapamil 1mg/min up to 20mg max
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<tr><td>Special case</td><td>
AF with WPW
Broad complexes that are not regular
Avoid ALL agents that selectively block AV node (Adenosine/Amiodarone, Bblockers, CCB, Digoxin) and use IV procainamide 20mg/min
Will need HD
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Consider anti-coagulation (CHAD2VASC)
Look for underlying cause
Sepsis
Thyrotoxicosis
</td></tr>
<tr><td>VT</td><td>
First line
IV amiodarone 150mg over 10 min
Repeat once
Second line
IV lignocaine 50-100mg (1-1.5mg/kg) push -> (5-10min)
Repeat once
Polymorphic VT
Add IV $MgSO_4$ 1-2g over 60-90s
Correct electrolytes
Consider overdrive pacing
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<tr><td>Bradyarrhythmia</td><td>
Unstable
Alert MO ASAP, will need CVM on call referral
Trial of Atropine 0.6mg IV q(3-5min) max 2.4mg
Target HR 60-70
Does not affect infranodal blocks
Unlikely to work in type II second degree blocks / third degree blocks
If still not working, consider inotropes (by now CVM should be on board already)
Dopamine 5-20ug/kg/min IV infusion
The more safe option to give in the ward as safe to give peripherally
Adrenaline 2-10ug/min IV infusion
Will need central line
May require transcutaneous pacing if pharmacological methods fail
Max 1 hour
Stable
1st degree heart block (usually stable unless HR < 30) or Mobitz 1 type 2 heart block
Usually can watch
Type II 2nd degree and 3rd degree heart block
Potentially can turn unstable very quickly
May need inotropes and closer monitoring -> alert MO
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ENDOCRINE

PROCEDURES

Procedures	Synacthen test • Done to assess for hypocortisolism • Draw serum cortisol before injecting IV Tetracosactrin (omin) • Inject 250ug of IV Tetracosactrin • Draw serum cortisol at 30min and 60min (nurses can take these samples, but will need to ensure that it is taken on time)

HYPERGLYCEMIC CRISIS

Note

- When assessing any CTSP for high glucose, it is important to exclude hyperglycemic crisis (DKA/HHS)
- Hyperglycemic crisis guidelines can be assessed on infopedia (search "hyperglycemia")

Diagnostic criteria

DKA	HHS (Hyperosmolar hyperglycemic state)
Glucose > 14 mmol/L AND HCO_3 =< 18 mmol/L AND Serum ketones > 1 or urine ketones > 2+	Glucose > 33 mmol/L AND Effective serum osmolality (2 x uncorrected Na + Glu) > 320 mOsm/kg

Important calculations

Corrected Na	$\frac{\text{Glucose} - 5.5}{5.5} \times 1.6 + \text{serum Na}$
Anion gap	Uncorrected Na – [Cl + HCO_3]
Effective osmolality	2 [Uncorrected Na] + glucose

Hx and exam

- Assess for symptoms that might suggest crisis – abdominal pain, AMS
- If established crisis, look for possible precipitants:
  - Indiscretion of diet / medications
  - Infection
  - Infarction (AMI)
  - Introduction of new meds (Steroids, TCM, anti-psychotics)
  - Infant (check LMP)
- Determine fluid status of patient
  - Dry mucous membranes, tachycardia, reduced skin turgor
  - Postural hypotension, narrow pulse pressure
  - Hypotension, confusion, oliguria, shock

Ix

- FBC, UECr (w/ venous glucose and HCO_3), Ca/Mg/Pi, LFT, CRP
- ABG/VBG
- Serum ketones
- CE + ECG
- HbA1c
- CXR
- KIV septic workup: blood c/s, urine c/s + UFEME

Mx (as per hyperglycemia protocol)

Escalation

- Alert MO STAT → will need to decide on disposition (eg ICU/ICA)
- On-call team to consider consulting Endocrinology urgently if HHS

Monitoring

- Ensure IV access, keep NBM
- Q1Hrly paras + SpO_2 → KIV reduce frequency later if patient shows clinical improvement
- Q1H capillary blood glucose (check venous glucose if CBG reads HI)
  - IMPORTANT: YOU MUST LOOK AT THE CBG TREND FREQUENTLY TO ENSURE IT IS FALLING AT THE RIGHT RATE, AND TO INSTRUCT NURSES TO ADD DEXTROSE INTO DRIP WHEN CBG ≤14mmol/L
- Strict I/O (with IDC) with Q1Hrly charting of urine output
- Q4H UECr/HCO_3/glucose and VBG (important: monitor K, HCO_3, pH. Also monitor corrected Na and effective osmolality if initially deranged)

Meds and fluids

Initial fluid

- Check how much fluid ED has given
- 15 – 20ml/kg body weight (or ~ 1 – 1.5L) in the first hour
- Isotonic fluids to expand intravascular volume

		• More cautious fluid strategy in patients prone to fluid overload (eg: cardiac failure, CKD, very elderly)

	Subsequent fluid replacement	• Volume:
		  • Based on hydration status, hemodynamics, urine output
		  • 100 – 200ml/kg over 24 – 48 hours
		  • More cautious fluid strategy in patients prone to fluid overload (eg: cardiac failure, CKD, very elderly)
		• Composition:
		  • Depends on
		  ○ Corrected Na
		  ○ K
		  ○ Glucose
		  • Important points:
		  ○ Add KCl into drip if serum K is 3.3 - 5.0mmol/L
		  ○ When CBG ≤14mmol/L, add dextrose to maintenance drip to prevent hypoglycaemia while allowing IV insulin infusion to continue until resolution of crisis
		  ○ If K is < 3.3mmol/L, suspend IV insulin for the shortest time possible while replacing potassium urgently
		  ○ How to order drip containing KCl
		  • KCl premixed in 0.9% saline
		  • KCl premixed in D5%
		  • Dextrose 5%/0.9% saline + manual addition of KCl (*REFER IMAGE 1 ALL THE WAY AT THE BOTTOM*)

	IV insulin	• IV Actrapid bolus of 0.1U/kg (if patient is admitted from the A&E with hyperglycemic crisis, this will most likely have been given in the A&E and does not need to be repeated) • Followed by IV Actrapid infusion of 0.1U/kg/h initially, until glucose ≤ 21mmol/L • Once glucose ≤ 21mmol/L use IV insulin sliding scale as per SGH Hyperglycaemic guidelines • Aim fall in CBG/glucose of 3 – 4mmol/L per hour (avoid too-rapid fall to prevent cerebral edema – IV insulin rates can be adjusted to achieve this if the fall is too rapid) • Aim for blood glucose level about 8 – 11mmol/L
	Oral medications	• Suspend oral glucose-lowering medications

	Adjunctive therapies	• Bicarbonate therapy
		  • Not used routinely (significant SE if used inappropriately)
		  • Used to treat SEVERE acidosis in DKA:
		  ○ When pH <6.9, run 100ml of IV sodium bicarbonate + 20mmol KCl in 400ml of D5% over 2 hours
		  ○ Aim for pH >7.0
		  ○ If pH remains <7.0, the above can be repeated every 2 hours until pH >7.0
		• Treat precipitating cause

	Remember to do frequent reviews of the patient / labs and assess for worsening symptoms and hypoglycaemia / hypokalemia, as well as adjust the drip when BGL < 14 to dextrose containing drip	

Important notes	HHS	• Most patients with HHS will require ICA monitoring
		• Escalate to senior; an urgent Endocrinology referral may be required
		• Important not to lower glucose too rapidly: target fall in glucose 3 – 4 mmol/L per hour, similar to DKA
		• Will need more frequent UECr/glucose/HCO_3 monitoring than DKA:
		  • Glucose is often too high to detect by glucometer
		  • Need frequent monitoring to ensure serum osmolality/glucose does not fall too rapidly
		• In HHS <u>WITHOUT</u> OVERLAP DKA:

- If serum ketones <1mmol/L and HCO_3 >18mmol/L, may start <u>IV hydration</u> with 0.9% saline first, and only start <u>IV insulin infusion</u> when fall in glucose starts to plateau or is falling at a slower rate than desired.
- Glucose may fall with IV hydration with 0.9% saline alone (due to restoration of renal perfusion and glucose excretion in the urine)
- 0.9% saline is the fluid of choice, as this is often more hypotonic than patient's serum, and will restore organ perfusion. Switch to more hypotonic fluids when fall in osmolality plateaus or rises.

- In HHS <u>WITH</u> OVERLAP DKA
- If patient meets diagnostic criteria for both HHS and DKA, will need to start IV insulin together with IV hydration

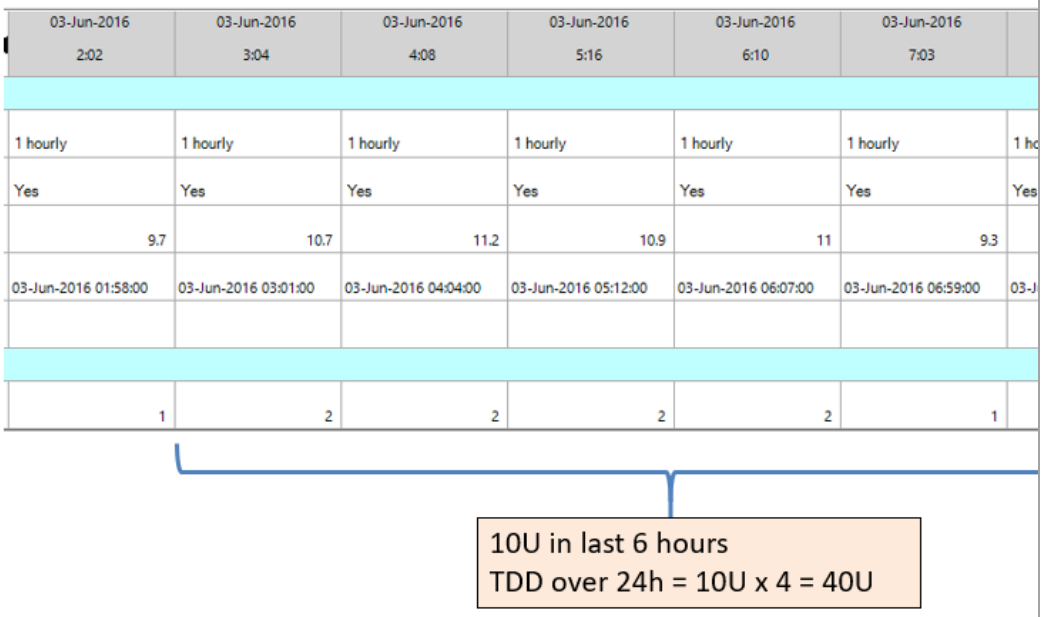
Conversion to SC insulin

- No rush to convert patient to SC insulin on call - may remain on IV insulin with appropriate monitoring
- Should be done only when DKA/ HHS has resolved and patient able to tolerate diet

Resolution criteria:

DKA	HHS
Blood glucose < 11.1 mmol/L + 2 out of 3 of the following: 1. $HCO_3 \geqslant$ 15mmol/L 2. pH > 7.3 3. Anion gap normal ($\leqslant$12)	Serum osmolality <310mOsm/kg + Plasma glucose $\leqslant$ 13.8mmol/L + Mental state has normalized

- Calculate total daily dose of insulin from when blood glucose has stabilized



- Take 80% - this is the SC basal dose of insulatard over 24h
- Give this in 2 doses 12 hours apart (i.e., insulatard BD)
- Add SC Actrapid 4 – 6 units with each meal if patient is eating (SC bolus dose)

- Remember to overlap SC insulin and IV insulin – this is what you tell the nurses when converting from IV to SC insulin:
- Serve SC insulatard + SC Actrapid (IV insulin infusion is still running)
- Serve meal 30 minutes after the above SC insulin has been given
- Stop IV insulin infusion only 1 hour after SC insulin has been served
- After IV insulin is stopped, CBG monitoring can be reduced from Q1H to TDS + 10pm

IMAGE 1:

1

KCl (Premixed in NS) 10mmol/500mL Infusion (Potassium Chloride (Premixed in NaCl 0.9%) 10mmol/500mL Infusion) IV Continuous ___mL over 24h

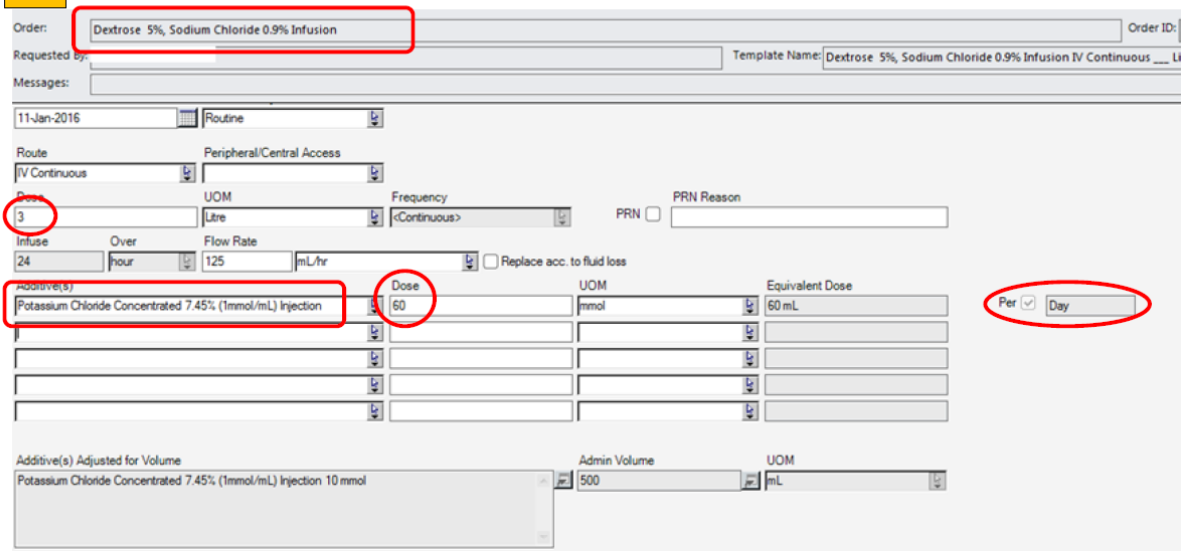
Non-Standard

2

KCl (Premixed in D5) 10mmol/500mL Infusion (Potassium Chloride (Premixed in D5) 10mmol/500mL Infusion) IV Continuous ___mL over 24h

Non-Standard

3



HYPOGLYCEMIA

Definition		• Glucose < 4
Hx and exam		• GCS and ability to tolerate orally • Symptoms of hypoglycaemia (drowsy, tremors, diaphoresis, seizure, coma) • Last meal, last OHGA / insulin dose

Mx	If alert and able to take orally	• For glucose drink 15g and repeat CBG check 15min after
		  ◦ Nurses usually give the 15g of glucose drink and only escalate if patient remains symptomatic or still has glucose < 4mmol/L. Some patients also refuse to drink the glucose drink and you may be called for this.
		  ◦ Note that Milo is not a good option! While it does have sugar, the fat in it delays gastric emptying, slowing absorption of sugars.
		• Follow up treatment:
		  ◦ If next meal >1hr away, give 15g of complex carbohydrates (e.g., crackers, bread)
		  ◦ If next meal <1hr away, serve next meal

	If symptomatic / drowsy	• Order IV D50% 40ml STAT and give slowly
		  ◦ Can ask nurses to kindly prepare for you by the bedside!
		  ◦ Remember to flush with NS before and after. Avoid extravasation of D50% as it can cause phlebitis
		  ◦ Remember to sign off that the dose has been given in the drug administering system as only doctors can administer it in SGH
		• Consider starting an IV D5% maintenance drip if patient is unable to eat (D10% if comatose)
		• Recheck CBG 15min after D50% - to alert Dr if <4mmol/L or >10mmol/L
		• There is no standard frequency of CBG monitoring subsequently, but may opt for QHrly x 4h with subsequent return to TDS + 10pm if stable
		• Monitor mentation
		  ◦ If persistent AMS after achieving normoglycemia, consider other causes e.g. intracranial pathology

	What to do with the oral DM medications/insulin	• Will depend on the cause of hypoglycaemia ◦ Eg reduced oral intake (persistent vs one-off), worsening renal function causing prolonged effect of glucose-lowering medications, wrongly serving oral DM medications/prandial insulins when patient was fasted etc

		• CAUTION:
		  • DO NOT completely stop insulin in T1DM patients, or patients who have recently had DKA/HHS. If basal insulin is omitted, these patients will go into hyperglycemic crisis. It may be more appropriate to reduce insulin doses instead.
		• In other patients
		  • Depending on the cause/severity/persistence of the hypoglycemia, it may be appropriate to either SUSPEND glucose-lowering medications, or REDUCE the culprit doses of medications instead.

THYROID STORM

Note	• Most commonly occurs in patients with underlying Graves' disease • Be prepared that history can be non-specific ranging from AMS to symptoms of heart failure, new onset palpitations or even pyrexia. Suspect thyroid storm in any known case of hyperthyroidism developing fever!

Hx and exam	• Assess for precipitating causes
	  • Non-compliance to medications, sepsis, exposure to iodinated contrast agents, AMI or other acute intercurrent illness
	• Symptoms of hyperthyroidism
	• Assess for organ dysfunction
	  • CNS: Agitation, AMS, seizures, coma
	  • GI: Abdominal pain, diarrhea, vomiting, jaundice
	  • CVS: Heart failure, AF with RVR

Ix	• TFT, LFT, FBC, UECr/HCO_3/glucose, CRP/Procal, CE + ECG, CXR, KIV septic w/u • Use the Burch-Wartofsky score to estimate thyroid storm likelihood (≥45 = highly suggestive) **Burch-Wartofsky Score**

Category	Points
1) Thermoregulatory dysfunction	
Temperature	
37.2 – 37.7 °C	5
37.8 – 38.2 °C	10
38.3 – 38.8 °C	15
38.9 – 39.2 °C	20
39.3 – 39.9 °C	25
≥ 40 °C	30
2) Central nervous system effects	
Absent	0
Mild (agitation)	10
Moderate (delirium, psychosis, extreme lethargy)	20
Severe (seizures, coma)	30
3) Gastrointestinal-hepatic dysfunction	
Absent	0
Moderate (diarrhoea, nausea/vomiting, abdominal pain)	10
Severe (unexplained jaundice)	20
4) Cardiovascular dysfunction	
4a) Tachycardia	
90 – 109 beats/min	5
110 – 119 beats/min	10
120 – 129 beats/min	15
130 – 139 beats/min	20

≥ 140 beats/min	25
4b) Congestive heart failure	
Absent	0
Mild (pedal edema)	5
Moderate (bibasilar rales)	10
Severe (pulmonary edema)	15
4c) Atrial fibrillation	
Absent	0
Present	10
5) Precipitating event	
Absent	0
Present	10

Mx

- Proper monitoring and siting of patient
  - **Escalate immediately**
  - **Will require referral to Endocrine-on-call**
  - Move to MICA/High dependency setting
- ABCs, Hourly parameters, IO charting, CLC monitoring
- Manage any underlying precipitants
- Medications for treatment of thyroid storm:
  - PTU 400mg STAT + 200mg Q6H
  - Lugol's iodine 0.75ml Q8H
    - *To only give this ONE HOUR after PTU has been served, to prevent even more thyroid hormone from being synthesized*
  - IV hydrocortisone 100mg Q8H
  - PO cholestyramine 4g TDS
    - Serve apart from other oral medications to avoid cholestyramine interfering with absorption
  - Rate control
    - +/- PO Propranolol 60-80mg Q4H
      - Not commonly used because of risk of worsening heart failure or even ppt cardiovascular collapse
      - Do **NOT** administer high dose propranolol to patients in decompensated heart failure, or those with suspected/confirmed poor myocardial function
    - Digoxin
      - Alternative rate control agent in decompensated heart failure
- Medications that can be given in thyroid storm patients who are strictly NBM:
  - Rectal PTU 400mg STAT
    - Pharmacist will help to dissolve 8 x 50mg PTU tablets in 90ml sterile water, to administer as enema)
    - Followed by 200mg in 45ml sterile water Q6H if still NBM
  - IV sodium iodide 10% 1g in 500ml of D5% Q12H
    - Caution with large volumes of fluid in patients in fluid overload

MYXEDEMIC COMA

History and examination	• Precipitants: infection, trauma, stroke, AMI, sedatives/opioids, non-compliance to thyroxine
	• Physical examination:
	  • General: hypothermia (or normothermia in ongoing sepsis), look for precipitants
	  • CNS: AMS, drowsiness, coma, seizures
	  • CVS: bradycardia, heart failure
	  • Respi: Hypoventilation
	  • GIT: ileus
	  • Renal: Urinary retention
	  • Capillary blood glucose check: exclude hypoglycemia

Ix	• TFT (including FT3), FBC, UECr/HCO_3/glucose, Ca/Mg/Pi, LFT • ABG especially if confused/drowsy/high HCO_3 (looking for T2RF) • Septic work up as indicated

	• CE + ECG • CXR (pneumonia as precipitant, pericardial effusion) • Serum cortisol (to look for associated hypocortisolism)

Mx	• Proper monitoring and siting of patient
	  • Escalate immediately
	  • Move to MICA/High dependency setting
	  • Move to ICU if require intubation
	• ABCs, Hourly parameters, IO charting, CLC monitoring, CBG monitoring, NBM
	  • May even require airway to be secured if GCS $\leq$ 8
	• Refer Endocrine-on-call
	• Manage any underlying precipitants
	• Specific therapy for myxedema coma:
	  • IV hydrocortisone 100mg stat and Q8H
	  a. *Ensure steroid replacement is started first, due to risk of precipitating an Addisonian crisis upon thyroid hormone replacement*
	  • IV levothyroxine:
	  a. Loading dose: 300-500mcg. If IHD/elderly: 100mcg
	  b. Maintenance dose: 50-100mcg/day (convert to PO levothyroxine when myxedema coma resolved and not in ileus.)
	• Other supportive therapy for respiratory failure, fluid management, electrolyte disturbances, and precipitating causes
	• Cautious external rewarming: sudden vasodilation may cause hypotension if intravascularly depleted

ADRENAL CRISIS

Notes	• Always be wary of patients who have been taking long term steroids who (1) have intercurrent illness/periods of stress (2) have vomiting (3) omit their steroid dose • May present drowsy with limited history, or with non-specific constitutional symptoms, often borderline BP/ hypotensive
Ix	• FBC, UECr/HCO_3/glucose • Other investigations to look for underlying precipitants of adrenal crisis (eg: sepsis, AMI) • If undiagnosed but suspected adrenal insufficiency, send random cortisol • Or 8am cortisol/ACTH **ONLY** IF this does not delay IV hydrocortisone administration) • If already known to be on long-term steroid therapy or known adrenal insufficiency, no need to check serum cortisol/ACTH
Mx	• ABCs, Q1H parameters, I/O charting, CBG monitoring, ensure venous access • IV hydrocortisone 100mg STAT and 50mg Q6H (stress dose) • IV fluids – may need aggressive resuscitation if hypotensive • Treat underlying cause (usually sepsis)

GASTROENTEROLOGY

ELECTIVE PROCEDURES

General rule for elective admits	• Check admission form for instructions • Pre-procedural bloods are important • Ensure anticoagulation and antiplatelets are stopped before procedures (aspirin may be continued in endoscopic procedures – eg OGD / colonoscopy / EUS / ERCP)
TACE	• Ensure recent Childs-Pugh scoring done • Order IV Rocephin / Flagyl to be given en route to angio (Cipro/flagyl if penicillin allergic) • FBC, APTT/PT, RP, LFT, GXM, at least blue plug • Order up IV maxolon as well, patients tend to get nauseated after
RFA	• Order IV Rocephin / Flagyl to be given en route to angio (Cipro/flagyl if penicillin allergic) • FBC, APTT/PT, RP, LFT, GXM, at least pink/green plug
Liver biopsy	• Ensure GXM, APTT/PT, FBC done
Elective paracentesis (LVP = large vol paracentesis)	• No need NBM • No need routine bloods
Scopes	

ERCP	• NBM 12mn + IV drip • GXM
OGD	• NBM 12mn + IV drip
Colono	• Low residue diet from 2 days before • Clear feeds day before scope • NBM 12mn + IV drip • 2L PEG 6pm, 2L PEG 6AM (finish all!) • Ensure stool watery and yellow (like urine)
Flex sigm	• NBM 12mn + fleet enema on morning of procedure

BGIT

History and examination	• Features of hemodynamic instability in vitals (SBP < 90, HR > 100) / ongoing active hematemesis or fresh melena -> update MO ASAP might require urgent OGD • Assess for complications of anemia (most feared is a cardiac event) • Previous scope findings • Examine for signs of anemia • Examine to verify if there truly is melena / coffee grounds / PR bleeding: do a DRE to assess for melena (stale / fresh / spurious iron stools / PR bleed), ask to see the specimen of coffee ground vomitus • Make sure it is from the GI tract and not from somewhere else (hematuria, PV bleed, hemoptysis etc) • UBGIT: Is there underlying liver disease (cirrhotic) that might suggest a variceal bleed?
Ix	• ECG + cardiac enzymes, +/- CXR • FBC, RP, APPT/PT, GXM +/- LFT

Mx	• Ensure ABCs stable, with IV access (2 large bore IV cannulas if massive bleed)
	• Fluid resuscitate if hemodynamically unstable
	• Keep NBM + maintenance drip
	• Parameter charting as indicated (QHrly para + SpO2)
	• Strict I/O charting with stool and vomit charting
	• Look at medications and stop those that might pre-dispose to bleed (e.g., NSAIDs, warfarin etc.)
	  ◦ If patient is on DAPT, please consult MO before stopping
	• **Update MO ASAP**
	• Remember to review the Hb when bloods are out and transfuse as needed, as well as the PT/PTT and correct any coagulopathies (FFP etc)
	  ◦ If patient is already clearly anemic (cold, pale, clammy), no need to wait for Hb, just arrange transfusion as blood takes time to come up from blood bank

UBGIT	• Nurse 45 degrees if actively vomiting to prevent aspiration, might even need intubation to protect airway • Consider NG tube (only if NOT VARICEAL) • Start medications

		• High risk / massive bleed – Nexium 80mg IV bolus + 8mg/h infusion (for total 72H) • Otherwise, IV Nexium 40mg BD might suffice • If suspecting varices, IV somatostatin 250mcg STAT + 250mcg/h infusion (for 5 days) + prophylactic IV Rocephin 2g STAT + OM • Arrange urgent scopes if actively bleeding (escalate to MO, reg on call, bleeder on call)
	LBGIT	• Ensure it is not a frank UBGIT • Remember to do a proctoscope to see if any hemorrhoids / bleeding points can be identified • If hemodynamically unstable / severe bleed, might need to arrange for CT MA KIV angioembolization (having valid UECr will be invaluable) • If stable, might need to arrange for OGD + colonoscopy with PEG the next day

POST PROCEDURE

History and exam	History and Examination
	• Assess for complications of the procedure
	  • Abdominal pain (perforation from scope, pancreatitis from ERCP)
	  • Bleeding
	  • Sore throat
	• Assess for complications of sedation
	  • Nausea, vomiting
	  • Drowsiness

Mx	• Follow the post procedure orders in the report (pOT) • Usually QHrly paras x 4 then Q4Hrly paras thereafter if well • Diet is usually allowed (feeds to DOC as tolerated), but if patient came in for UBGIT with ulcer s/p hemostasis, best to keep on sips of water in case a rebleed happens • If suspicious of complications (eg perforation), escalate to MO and consider erect CXR / CTAP

HEPATIC ENCEPHALOPATHY

History and examination	• Look for other causes of AMS • Assess for precipitating causes of HE • Hemorrhage, Electrolyte abnormalities, Protein intake in excess, Azotemia, Tranquilization (sedatives), Infection (SBP), Constipation (HEPATIC) • Assess severity of HE with West Haven classification • Look for hepatic flap and any abdo pain • Do a DRE to ensure nil GI bleed
Investigations	• To look for precipitating causes as mentioned above – FBC, UECR, PT/PTT, LFT, glucose • Serum ammonia levels; if it is normal, to look for other causes of AMS (might need CT brain) • Consider full septic workup if no clear precipitating source • KIV ascitic tap TRO SBP
Management	• Q4H Paras + Spo2 • I/O charting + stool chart, ensure BO 2-3 times per day • Q4H CLC charting • HC TDS + 10pm • Low protein diet, salt restriction <2g/day for cirrhotics • Start patient on lactulose and aggressively clear bowels – if unable to take lactulose as drowsy, can consider NG insertion • KIV rifaximin • Treat underlying cause

GERIATRICS

TIPS

Elderly care	• Often times, the elderly can be confused on admission due to delirium / dementia and a corroborative history should be taken from caregivers even when on call, if possible • It is important to establish the premorbid status KIV fall precautions, as well as determine the correct diet (thinned fluids etc) as patients can have established dysphagia requiring dietary modifications • Nursing home residents tend to have memos attached to their notes – do flip the file! • Always try to do drug recon when possible

DELIRIUM / BPSD

Hx and exam	• Assess for other causes of AMS (structural, etc)
	• Establish if delirious (CAM – acute with fluctuating course, inattention, disorganized thinking / altered GCS)
	• Look for possible causes of delirium
	  • Medications (anti-cholinergics, anti-histamines, certain pain medications eg tramadol / codeine)
	  • Metabolic (sugars, thyroid, electrolytes)
	  • Infection (look out for infected sacral sores)
	  • Intracranial event
	  • ACS
	  • ARU / constipation (DRE for fecal impaction)
	  • Pain

Ix	• FBC, UECr, Ca/Mg/Pi/Alb, TFT, LFT • B12, folate • ECG - assess QTc as well • KIV CT brain • PVRU • DRE - to look for constipation
Mx	• Sleep chart, behaviour chart • Frequent re-orientation in patient's language • Nurse close to nursing counter • Avoid restraints unless patient at risk to self (last resort) • Drug recon • Address underlying cause (i.e., remove triggers) • If very disruptive / danger of self-harm • KIV antipsychotics – Quetiapine 25mg PRN (try to avoid if possible, most of the time non-pharmacological measures work well and anti-psychotics run the risk of over-sedation, CVA, and QTc prolongation)

FALLS

Hx and exam	• Pre-fall (what were they doing, prodrome), fall (mechanism), post fall (time to recovery, confusion, incontinence, injuries)
	• Identify the cause of the fall
	  • Predisposing factors e.g. OA knee, cognitive impairment, poor safety awareness, Parkinson's
	  • Precipitating factors e.g. Sepsis, OA flare, postural hypotension, stroke
	• Important to differentiate between syncopal and non-syncopal event
	  • Syncopal: Look out for cardiac causes, postural causes (including intravascular depletion ?bleed), as well ddx seizure, hypoglycemia
	  • Non-syncopal: Look out for mechanical factors (joint pain, physical environment) and things to do with the senses (vision, hearing, balance), a neurological exam is paramount (look for stroke, parkinsonism)!
	• It is also a good gauge to know how frequent and how many falls the patient has had
	• Postural BP (look out for absence of reflex tachycardia!)

Ix	• Hypocount • ECG • FBC, UECr, Ca/Mg/Pi, Vit D, TFT • Septic workup if suspecting underlying infection • CT brain if suspecting seizure / stroke / secondary trauma / patient on warfarin • Postural BP BD

Mx	• Priority at night is making sure patient is safe! • CLC charting should be done to monitor for potential head injury complications (eg SDH) • Place patient on falls risk • Suspend anti-hypertensives if suspecting postural cause • Treat underlying cause

HAEONCO

TIPS

Clerking news	Note	• Understanding haem-onco clinic notes can be a work of art… here are some terminology you might see
		  • CR: complete remission
		  • PR: partial remission (eg decrease in size of tumor after treatment)
		  • PD: progression of disease
		• When talking about chemotherapy
		  • C = Cycle
		  • D = Day
		  • E.g. C2D7 = Cycle 2 Day 7
		• Haem-onco patients can get sick FAST, and they might not demonstrate typical SIRS due to immunosuppression. (i.e. Patients may not have fever despite having severe infection)
		• Always remember pain control!
		• Your MO will always be there because he/she is doing full call :D

	Important things to have in your clerking note	• Past medical history
		• Past oncological / hematological history
		  • Diagnosis - location, histology, staging (at presentation + current), site of mets
		  • Primary oncologist on f/u
		  • Treatment
		  • Active Treatment (Chemotherapy/Targeted Therapy) vs Clinical Trial (Find documents saved under CTE) vs Best Supportive Care (generally if the patient is on an active treatment / clinical trial and responding or stable disease, the extent of care with be active management / trial of ICU)
		  • Type of chemo(s), number of cycles done so far
		  • Most recent treatment modality and date
		  • Complications of treatment

Elective chemo / elective procedures	Note	• Check the admission note for specific instructions (double click on the CPOE admission order to see the instructions) . All Clinic Notes in Oncology has now been reverted to online.
	Ix	• FBC, U/E/Cr, LFT + others stated • Remember GXM may be required for some procedures (e.g. lung biopsy)
	Mx	• Usually for primary team to decide regarding chemotherapy session • Trace the bloods taken and act accordingly • Remember to order up old medications, many patients are on prophylactic anti-microbial agents • There are some patients who are electively admitted for chemotherapy the next day and require prehydration, do check with the MOs or the nurses in the ward.

PROCEDURES

Taking blood from PICC line / Hickman port	• Please ask the nurses in the ward to guide you if you are not confident. • Make sure aseptic technique • Will need at least 3 syringes • Remove dressing • Clean entire line including the needleless connector • Withdraw and discard the first 5mls (no need to discard if the bloods are for cultures. Discard if the blood is for FBC or electrolytes to avoid dilution) • Take the blood needed • Remove the existing needleless connector and replace with a new one (remember to prime the new needleless connector) • Flush with heparin saline ('hep-lock') with positive pressure Re-dress the line

NEUTROPENIC FEVER

<table>
<tr><td>Definition</td><td>

A reading of T >= 38.3 once OR reading of T = 38 sustained over 1H period (however do not use the absolute reading to dictate your actions. Use your clinical judgement as well)
Absolute neutrophil count (ANC*) of < 1.0 x 109/L

Mild: ANC < 1.5 x 109
Moderate: ANC 0.5 to 1.0 x 109
Severe: ANC <0.5 x 109

*: ANC = TW x (%neutrophils)]

</td></tr>
<tr><td>Hx and exam</td><td>

Good to know when last chemo done as worst neutropenia usually occurs 10-14d after chemo
Assess for localizing signs of infection

Common sources: Lung, Urinary tract, Gastrointestinal, Hepatobiliary
Sources commonly missed: Gum infection, mucositis, peridontal abscesses, line infection, SSTI, perianal, oral and palatal thrush

Signs of shock (tachypnea, tachycardia, hypotension, AMS)
Do NOT do per-rectal /per-vaginal examination (look at perianal region externally instead)
These patients may present with hypotension and tachycardia alone. They are unable to mount a febrile response as they are immunocompromised

</td></tr>
<tr><td>Ix (IDSA guidelines)</td><td>

FBC, UECR, LFT, Procal, CRP, KIV lactate
UFEME, urine c/s, CXR, sputum culture
Peripheral blood cultures (1 set)
Line blood cultures (from each lumen) (1 set of 2 bottles)
Fungal blood culture (if prolonged period of neutropenia or prolonged neutropenic fever while on broad-spectrum antibiotics or prior to starting anti-fungal) (1 bottle)

</td></tr>
<tr><td>Mx</td><td>

Medical emergency -> should receive antibiotics within 1 hour of fever onset
IV fluids as per surviving sepsis (ensure urine output >0.5ml/kg/h) – try to avoid IDC
Remember to check for specific instructions from primary team / ID in previous entries – they often have thresholds to escalate antibiotics/management (and abx choice)
Check history of previous infections / cultures to guide abx choices
Neutropenic precautions: Neutropenic diet (no eggs / raw food), KIV isolation with negative pressure
Start antibiotics – important to have pseudomonal coverage

<table>
<tr><th>Hemodynamically stable</th><th>Hemodynamically unstable*</th><th>Penicillin Allergy</th></tr>
<tr><td>Even Days
IV Cefepime + Amikacin
Odd days
IV Tazocin</td><td>IV Meropenem + Vancomycin
IV vancomycin</td><td>IV aztreonam
+/- IV Amikacin
+/- IV Vancomycin</td></tr>
</table>
</td></tr>
</table>

TRANSFUSION REACTION

<table>
<tr><td>Notes</td><td>

Most often, you'll be called for rash, sob, fever
Transfusion complications usually happen within 24H of transfusion

</td></tr>
<tr><td>General mx</td><td>

Ensure vitals stable, monitor urine output
Stop transfusion temporarily
Maintain the IV access with saline drip
Check label of the blood components and check it against patient identifiers
If reaction is severe, transfusion must be discontinued and blood pack returned to SGH blood bank together with GXM
Other than mild allergic or febrile reactions, all transfusion reactions should be raised as RMS
Another GXM should be taken 24H after first specimen
If urgent transfusion of blood or blood components needed, consult haem on call

</td></tr>
</table>

SPECIFIC TRANSFUSION REACTIONS

<table>
<tr><td>Febrile non-haemolytic transfusion reaction</td><td>
<table>
<tr><td>Hx and exam</td><td>

Usually occurs within 4 hours of transfusion
T > 38 or increase in T > 1 degree from pre-transfusion baseline
Chills or rigors (may also only have this without fever)
Look out for suggestion of haemolytic reaction (jaundice, abdominal pain, tea-coloured urine)

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</table>
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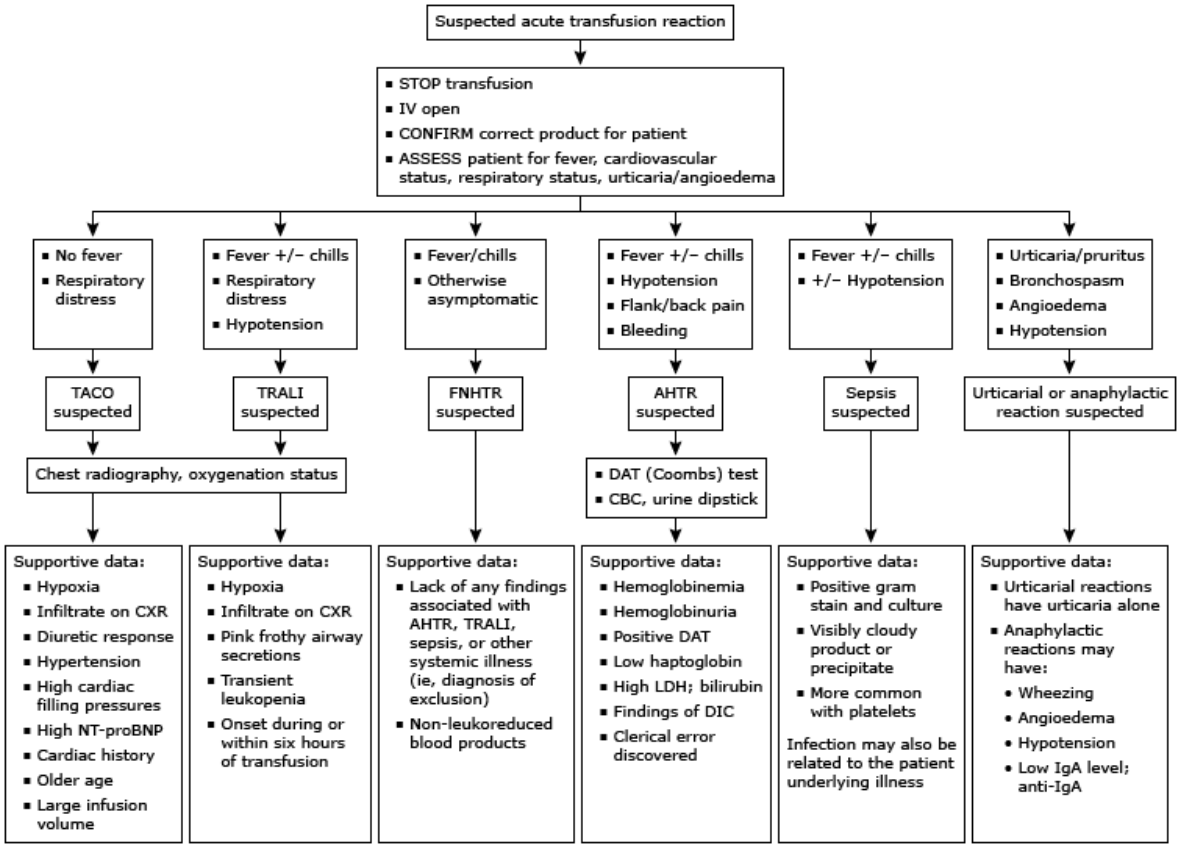
	Ix	• KIV investigate for transfusion associated sepsis
		• KIV further investigations if suspecting hemolysis
		  • Hemolysis bloods: Bilirubin, LDH, haptoglobin, Direct Coombs Test
		  • Other investigations: FBC, UECr, LFT, PTPTT

	Mx	• Non-haemolytic: Paracetamol and observe KIV resume transfusion at slower rate
Mild / moderate allergic reactions	Hx and exam	• Usually occurs within 4 hours of transfusion • Rash (urticaria / flushing) +/- pruritus • Angioedema
	Mx	• IV Diphenhydramine 25-50mg, if severe may require IV hydrocortisone 100mg • Stop transfusion (resume when better) • Monitor for worsening reaction (in which case transfusion must be stopped)
Severe allergic reaction / anaphylaxis	Hx and exam	• Mucocutaneous swelling – tongue, lips, peri-orbital • Respiratory distress, bronchospasm • Hypotension
	Ix	• CXR / ABG if in respiratory distress • Acute transfusion reaction bloods (call blood bank – will inform you about what bloods to take) • Rule out hemolysis (Bilirubin, LDH, haptoglobin, Direct Coombs Test) • PT/PTT • Blood cultures
	Mx	• ABCs • IM epinephrine (0.5ml of 1:1000) • IV hydrocortisone and diphenhydramine • Fluid bolus, KIV inotrope if nil response • Initiate transfusion reaction work-up • Do not re-initiate transfusion without SR / consultant consult • May require pre-medication / washed products subsequently
Hemolytic transfusion reaction	Hx and exam	• Usually occur during the early minutes of transfusion • Suspect when there is chills, fever, hypotension, hemoglobinuria, renal failure, back pain or DIC. (triad: fever, flank pain, brown/red urine) • Check for clerical error! • Medical emergency!
	Ix	• Hemolysis bloods: Bilirubin, LDH, haptoglobin, Direct Coombs Test • Other investigations: FBC, UECr, LFT, DIVC screen (PTPTT, fibrinogen, D-dimer), UFEME (to look for hemoglobinuria) • Recheck GXM • Acute transfusion reaction bloods (call blood bank – will inform you about what bloods to take)
	Mx	• STOP TRANSFUSION IMMEDIATELY • Escalate to MO • IV fluids (normal saline) and watch urine output (might need diuretics to support urine output) – aim 100 to 200mL / hour of urine output (avoid using ringer's lactate as the it contains calcium which may initiate clotting of blood remaining in the IV line, avoid dextrose drip as it may promote hemolysis) • Might need close monitoring in HD/ICU • If suspecting sepsis: Cover with IV antibiotics • Send the entire blood bag with the tubing to the blood bank • Raise RMS
Dyspnoea	• Main transfusion related differentials are TACO and TRALI, amongst other causes for SOB	



HYPERSENSITIVTY TO CHEMO

Aetiology	• Most are Type 1 reactions
	• Common drugs:
	  ◦ Platinium (e.g. cisplatin, carbonplatin, oxaliplatin), taxane (e.g. paclitaxel)
	  ◦ Monoclonal antibody (e.g. rituximab, trastuzumab, cetuximab)

Hx and exam	• Happens immediately, during or within minutes of infusion • Mild: Urticaria, flushing, itching, pruritus, oedema of face, abdo pain, diarrhea, back pain • Severe: bronchospasm, chest pain, tachycardia, hypo- or hypertension with anaphylaxis • Check if patient had such reactions before. If they had, the patients are usually already prescribed pre-medications (e.g. IV hydrocortisone, diphenhydramine)
Ix	• Directed at the underlying symptoms • If febrile, consider septic work-up if there is suspicion of sepsis • If SOB, consider ABG, CXR to work-up for differentials • If hypotensive, consider ECG, Trop T, septic work-up to rule out septic or cardiogenic shock

Mx	• **All hypersensitivity reactions should be attended to by the MO)**
	  ◦ **May even require escalation to Reg**
	• Stop infusion, assess patient
	• If mild
	  ◦ Give IV diphenhydramine 25-50mg and IV hydrocortisone 100mg
	  ◦ Continuing infusion at slower rate once symptoms have resolved should only be decided by the MO/Reg
	• If severe
	  ◦ Secure ABC
	  ◦ Give SC epinephrine as per anaphylaxis
	  ◦ Give diphenhydramine and hydrocortisone as above
	  ◦ Do not re-challenge
	• For NCCS Med Onco patients, raise up a chemo-reaction note on Clin Doc (Type ADR).

SVCO

Hx and exam	• Facial and upper limb swelling, chest pain, SOB, stridor, headache • These worsens with lying down • Look for distension of veins in neck and chest wall

Ix	• CXR (look for mediastinal mass or lung mass) • CT venogram
Mx	• Medical emergency as patient can develop central airway obstruction, laryngeal edema and coma from cerebral edema • Secure airway (do seek airway team help if intubating), breathing, circulation • Set plug in the lower limbs as the upper limbs veins are obstructed • IV dexamethasone 8mg TDS to reduce edema may be considered if there is a prior confirmed histological diagnosis.

BRAIN METS

Definition and Etiology	• Secondary metastasis is the most common History and Physical Examination • Intracranial hypertension (e.g. morning headache, nausea, vomiting and papilloedema) • Seizure, focal deficits
Ix	• Contrasted brain imaging • CT brain • MRI brain
Mx	• Escalate to MO • KIV refer to NES especially if there is obstructive hydrocephalus or raised ICP with impending herniation • CLC charting • IV dexamethasone 4 – 8 mg TDS (pls ensure the patient has histological diagnosis prior to usage of steroids.) • Anti-seizure medications (if patient presents with seizure). Can consider IV Keppra 500mg BD • KIV IV mannitol or 3% saline • RT (SBRT vs WBRT) or surgical intervention (usually for single lesion)

ACUTE CORD COMPRESSION

Hx and exam	• Back pain, acute / gradual LL weakness with areflexia, sensory loss, incontinence, ARU/constipation • Duration of symptoms (esp neurological deficits) – important to note function at presentation (prognostic factor) • Neuro exam to identify level of deficit, DRE for lax anal tone
Ix	• Urgent MRI spine • XR

Mx	• Escalate to MO
	• Refer to spine team (OTO)
	• NBM and PFO
	• Empirical cover with steroids (if primary malignancy has been confirmed by histology and there is no suspicion of lymphoma)
	  ◦ High dose Dexamethasone: e.g. IV Dexamethasone 8mg STAT + 8mg (8am, 12pm, 4pm)
	  ◦ PPI cover with steroid
	• Spinal nursing
	• KIV IDC (check for retention of urine)
	Definitive management likely RT, surgery or both

TUMOUR LYSIS

Definition	• Characterized by the following electrolyte imbalances
	  ◦ Hyperuricemia
	  ◦ Hyperkalemia
	  ◦ Hyperphosphatemia
	  ◦ Hypocalcemia
	• Suspect in patients with chemosensitive tumors who have recently received chemotherapy or those with tumours with rapid turnover (e.g. aggressive lymphoma, leukemia)

History and exam	• Ensure nil complications of electrolyte imbalances
	  ◦ Seizure, cardiac arrhythmias
	  ◦ AKI

	• Muscle cramp, tetany
Ix	• FBC, UECr, CMP/alb • LDH, uric acid

Mx	• Strict I/O
	  • Most important is IV hydration (normal saline)
	  • Aim urine output of 100 – 200ml/h
	  • May require aggressive hydration and diuresis
	  • Allopurinol 300mg OM (adjusted to renal function)
	  • Treat electrolyte derangements (note – treat hypocalcemia only if symptomatic as replacing ca can predispose to stones)
	  • KIV Rasburicase (decision by reg and above)
	  • Contra-indicated in G6PD
	  • KIV Dialysis

NEUROLOGY

TIPS

Admin	• Most patients will be in Ward 74. Room 22, beds 1-5 are ICA/HD; beds 6-10 are Acute Stroke Unit. Neuro ICU is shared with NES in ward 52. • NEM reg usually buys dinner and the NEM on call team would usually have dinner together - ensure you contact your MO the night before or at the latest on the morning of the call. • Have ready acronym expansions for full neurological examination before the call • Stroke activations will be seen by the registrar and sometimes are written on a separate note on hard copy or clindoc! Do hunt for it • An post-thrombolysis care protocol exists, which can be found on the intranet. • Remember to use 'NEM CCP Stroke' pathway when clerking stroke cases (otherwise nurses will call you to change); 'NEM CCP Epilepsy' pathway for known epilepsy cases
Important clerking points	• DON'T forget to listen to the neck, heart and lungs

STROKE/TIA

History	• PMHx/Risk factors
	  • AF, prosthetic valves, AMI, HT, hyperlipidaemia, DM
	• Medications
	  • Especially anticoagulants
	• Family Hx:
	  • Epilepsy, migraine, heart disease, stroke
	• Timing of occurrence / when patient was last seen well
	• Primary symptom
	  • Weakness
	  • Numbness: hypoesthesia vs paraesthesia (ants crawling, water trickling down)
	  • Cranial nerve symptoms: diplopia, speech or swallowing difficulties, facial weakness or numbness
	  • Vertigo
	• Site of deficit
	  • Unilateral or bilateral
	  • Upper or lower limbs
	  • Proximal or distal
	  • Lateral or medial
	• Progression of deficit

Exam	• GCS scoring • Upper limb, lower limb and cranial nerve examinations are mandatory • Targeted assessments such as HINTs testing or Dix Hallpike, when appropriate • Eliciting cortical signs, when appropriate

Ix	• CT brain (usually done in ED),
	• Capillary blood glucose
	• FBC, UECr, APTT/PT
	• CXR, ECG
	• MRI brain (Stroke protocol) – diagnosis, clinical history and findings must be entered into the electronic order
	• Risk factor assessment: Fasting lipid panel, fasting glucose (no need for HbA1c)
	• Evaluation of mechanism of stroke
	  • Intracranial disease: MRA, or Transcranial Doppler Ultrasound
	  • Extracranial disease: US carotids

Mx	• NIHSS and CLC charting
	• Dysphagia screen - if patient fails dysphagia screen, keep NBM + IV drip until review by a Speech Therapist
	• Allow permissive hypertension: hold off anti-hypertensives
	  • BP targets: to discuss with the senior
	  ○ If IV tPA: Keep BP <180/110
	  ○ If no IV tPA: BP should not be treated acutely unless >220/120, when treatment indicated, cautious lowering of BP by 15% during first 24hrs
	  ○ If hemorrhagic stroke, usually tight BP control < 140-160 systolic
	• Antiplatelet therapy
	  • If there are concerns re: hemorrhagic complications, please discuss with the seniors before starting antiplatelet therapy
	  • Antiplatelets should be paired with a gastroprotective agent

	• Preferred antiplatelets include:
	  ○ Clopidogrel, PO 300mg OM loading dose then 75mg OM
	  ○ Aspirin, PO 300mg OM loading dose then 100mg OM
	• Referral to the speech therapists, physiotherapists and occupational therapists, only when appropriate

Notes	

Writing issues list	Some consultants are very particular:
	1. Day ___ of Neurological deficit/Clinical syndrome (e.g. right hemiparesis) sec to aetiology (e.g. left MCA infarct)
	• Mechanism: _____ (e.g. small vessel disease, cardio-embolic, ICAD, ESUS)
	• B/G: List risk factors here (e.g. HTN, HLD, ESRF, PVD, smoking)
	
	For example:
	1. Left ataxic hemiparesis secondary to right hemipontine infarct, day 3
	  • Mechanism: small vessel disease
	  • Background: smoker, hypertension

If rTPA given	• Follow IV tPA protocol
	  • No antiplatelet or anticoagulation given
	  • No blood taking or plug setting
	  • No IDC
	  • Repeat CT brain cm
	  • Note: Consider repeat CT ASAP if patient develops acute AMS / drop in GCS or power (might have hemorrhagic conversion) -> escalate to MO

MENINGITIS/ ENCEPHALITIS

History	• Fever, nausea / vomiting, headache, photophobia, neck stiffness • If delirious with focal neurologic signs or seizures, encephalitis should be considered
Exam	• GCS • Brudzinski and Kernig's sign • Neurological deficits • Rash (petechial / purpuric) -> Wear N95 to protect yourself (if not will need contact tracing and PEP) • Fundoscopy for papilledema

Ix	• FBC, UECr, APTT/PT, Procal, CRP
	• Blood cultures x2
	• CXR, CT brain (usually done at A&E)
	• HIV and TB screen when appropriate
	• Lumbar puncture (should not stop you from giving Abx first)
	  • At minimum, should collect 8 bottles of 20 drops each
	  • Note CSF opening pressure and appearance
	  • Send samples for tests listed under "NEM.CNS infection", keep a few bottles spare and send to lab with memo
	  • FEME, protein, glucose, gram stain/culture, and other microbiological assays (discuss with your senior regarding the tests required)
	  • Paired capillary blood glucose

Mx	• NBM + IV drip
	• CLC Q4hrly (or more frequently)
	• Paracetamol
	• Start empiric anti-microbials
	  • IV Ceftriaxone 2g Q12hrly
	  • IV Vancomycin loading dose of 20mg/kg, followed 15mg/kg Q12hrly, to check vancomycin trough pre-4th dose
	  • IV Acyclovir 10mg/kg/dose Q8H
	  • For immunocompromised patients, >50yo, or history of alcoholism
	  • + IV Ampicillin 2g Q4hrly

SEIZURE

History	• Remember to differentiate between seizure and syncope!
	• Will likely mostly be collateral history from nurses – important to note the:
	  • Duration
	  • Seizure semiology

	• Versive head turns • Gaze deviation • Asymmetrical posturing (e.g. figure of 4) • Tonic posturing • Clonic movement • Post ictal condition: combative, aggressive, disoriented or confused • Past medical history (first episode vs known epilepsy) • Precipitating factors e.g. sleep deprivation, non-compliance to AEDs, change in medications, any new medications (drug interactions with AEDs), infection, alcohol withdrawal, metabolic disturbances • It should be noted that urinary or bowel incontinence, or uprolling of eyes are not useful in distinguishing between a seizure or a syncopal event

Exam	• Neurological exam for focal neurological deficit that might localize an underlying structural cause
	• Stigmata of neurocutaneous syndromes
	• Injuries from seizure
	  • Head injuries
	  • Tongue injuries, especially along the lateral aspects
	  • Bony fractures or joint dislocations

Ix	• ECG, capillary blood glucose • FBC, renal panel, Ca, Mg, Phosp, LFT, TFT, CK, lactate • If already on antiepileptics, measure serum levels (e.g. phenytoin, valproic acid, carbamazepine levels) • KIV toxicology screen, septic work up • KIV EEG • KIV CT brain/MRI brain especially for first onset seizure • The choice of protocol of the MRI brain (epilepsy protocol, with or without contrast etc.) should be decided by the senior
Mx	• **Let your MO know!** • ABCs – left lateral position and give supplementary O2 if drowsy, ensure has IV access • Keep NBM if drowsy • CLC charting, fit charting - inform Dr of seizures • IV diazepam 5mg STAT if still actively seizing • Continue AEDs (if already on them) • Treat underlying precipitant (e.g. infection) • KIV thiamine (if there is a concern about thiamine deficiency and hypoglycemia (e.g. alcohol abuse))

STATUS EPILEPTICUS

Priority	**Immediate attention should be given to this patient**
Over the phone	• Ask for vitals (especially SpO2), duration of seizure • Ask nurses to put patient on supplementary O2, turn patient to the left lateral position, prepare intravenous diazepam, set IV plugs, measure capillary blood glucose levels

On arrival	• Upon arrival, reassess the vital parameters
	• Examine the patient and pay attention to the semiology (look at the eyes, expose all limbs)
	• Serve IV diazepam 5mg or IV midazolam 5mg over 5min (in E kit)
	  • If no IV access -> PR diazepam 10-20mg
	  • Works in 1-2min
	  • **Remember to call your MO**
	  • Please note that the duration of effect of midazolam is very short, and the patient should be observed for recurrence of seizures
	• If persistently seizing / recurrent seizures
	  • Administer anti-epileptic drug (AED)
	  • Do discuss with a senior first re: choice of AED
	• Remember to address the underlying cause
	• A summary of management:

Step 1: If seizure >5 minutes Inform your senior	• Serve IV diazepam 5-10mg STAT or IV midazolam 5-10mg over 5min • SGH does not carry IV lorazepam • If no IV access of difficult IV access, give buccal/ IM midazolam 10mg OR rectal diazepam 10mg
Step 2: If no response to step 1 within 10 minutes	• Load AED (choose one) • IV Levetiracetam 1g loading dose over 10 minutes • IV Sodium valproate 30mg/kg infuse over 5mins

			• IV Phenytoin 18mg/kg (range 15-20) max rate 50mg/min • Loading dose should be administered whilst cardiac monitoring is ongoing

PALLIATIVE MEDICINE

TIPS

Regarding PLM	• Starting opioids / adjusting opioids is very scary for a HO, but something important to remember is that there are always people around to help, please don't leave a patient in pain! • There is a PLM consultant on call (not stay in) whom you can call to ask for help if symptoms are difficult to control / you don't know what to do and your MO is held up - Just refer to the on-call roster :) • Always remember that there may be reversible causes – if a PLM patient has abdominal pain, it might well be constipation colic

PAIN

History and Examination	• Try to establish the type of pain if possible
	  • Somatic: sharp, precise location
	  • Neuropathic: burning, tingling, stabbing, numbness
	  • Visceral: difficult to localize / describe

Ix	• Check with patient usual pain regime, any changes, and when last breakthrough was taken • Is the pain a new pain (i.e., of a different nature)? • Always try to find the underlying cause of the pain à Is there a reversible, dangerous or treatable cause? (e.g. constipation, tumour perforation, ascites are all possible causes of abdominal pain)

Mx	• First thing to check is if the patient is already on analgesia -> if so, what kind of analgesia?
	• Serve breakthrough dose of analgesia if not given yet (remember to review and see if it has helped)
	• If thinking of starting / escalating analgesia, go according to WHO pain ladder
	  • WHO pain ladder
	  • 1. Non-opioids
	  • 2. Weak opioids (codeine, panadeine, tramadol)
	  • 3. Strong opioids (morphine, oxycodone, fentanyl)
	  • With adjuvants as necessary
	  • Please check with your MO if initiating opioids

SOB

History and examination	• Establish the cause of the breathlessness
	  • Respiratory (Pleural effusion, collapse / consolidation, PE)
	  • Cardiac (Pericardial effusion, CCF)
	  • Abdominal (Cirrhosis, ascites splinting diaphragm)
	  • Anemia

Ix	• If suspecting a reversible cause
Mx	• ABCs – ensure airway patent, trial of O2 for hypoxic patients • Treat what is reversible – e.g. antibiotics for pneumonia, diuretics for fluid overload • If patient is on opioid for SOB, consider serving breakthrough dose • If element of anxiety exists, consider anxiolytics (IV/SC midazolam 5mg/24H + PRN 2.5mg Q2-4H OR SL lorazepam 0.5mg PRN/BD if able to take orally)

COMMON OPIODS

	Morphine	Fentanyl
Starting dose for oral	For opioid naïve: 2.5 – 5mg Q4H (regular) + 2.5 – 5mg Q1-2H PRN (breakthrough)	NA
Starting dose for IV/SC	For opioid naïve: 0.2 – 0.4mg/h	For opioid naïve: 5-10mcg/h
Breakthrough for IV/SC	If continuous infusion: 2x the hourly dose with PRN up to 1H If rate of continuous infusion is high, then PRN dose can be 1x the hourly E.g. If patient is on 5mcg/h SC fentanyl -> 10mcg Q1H PRN dose.	

Titration	Review PRN doses over the preceding 24H and add total PRN doses taken to the baseline dose (if more than 3 PRN doses taken) OR increase by 30-50% E.g. If patient is on 5mcg/h SC fentanyl and received total of 6 breakthrough doses of 10mcg each (60mcg in total) -> total fentanyl over 24H = 5*24 + 60 = 180 -> new baseline dose of 7.5mcg/h	
Rapid titration	Morphine: 1-2mg boluses Assume effective dose lasts 4H (morphine) Take what was required to get pain relief and multiply to cover for 24H E.g. Total 3mg morphine required to get pain relief (can last 4 hours) à 3mg*6 à 18mg over 24hours à 0.75mg/h	Fentanyl 10-20mcg boluses Assume effective dose lasts 2H Take what was required to get pain relief and multiply to cover for 24H E.g. If a total of 30mcg was required to get significant pain relief à 30mcg*12 à 360mcg over 24hours à 15mcg/hour

OTHER TIPS

- When titrating a patient with an existing fentanyl patch, do not remove the patch. Add on a fentanyl infusion and adjust the breakthrough accordingly
    - Generally: 2 x [fentanyl patch + fentanyl infusion]
- When the continuous infusion dose is very high
    - Eg. Fentanyl dose 100mcg/h) -> breakthrough can be 1x of the infusion dose

RENAL

TIPS

Clerking new patients	Important things to find out for ESRF patients
	• On HD or PD or not on RRT
	  ○ If HD (e.g. HD 1/3/5 via L BC AVF at NKF Bukit Batok)
	  • Which days
	  • Vascular access
	  • Dialysis centre
	  • When was the last full dialysis
	  • Hep B/ Hep C/ HIV status
	  • Vascular access issues
	  • Any present lines and when they were placed (eg Perm cath)
	  ○ If PD
	  • APD or CAPD
	  • Ask for their PD book
	• Dry weight
	• Trace dialysis prescription (PD/HD)

Important points	◦ If taking blood from perm cath remember to heparin lock if not on TEGO • Usually on the perm cath tips (red / blue) there is a number indicating the number of mls needed to lock ◦ If perm cath is bleeding, clean and drape and press with sterile gauze

AKI

History	◦ Pre-renal
	  • Dehydration, intravascular depletion
	◦ Renal
	  • ATN (drug list)
	  • GN
	  • Acute vascular thrombosis
	◦ Post renal
	  • Bladder outlet obstruction
	  • Upper tract obstruction

Exam	◦ Fluid status
	  • Dry mucous membranes, tachycardia, reduced skin turgor (5%BW fluid deficit)
	  • Postural hypotension, narrow pulse pressure (10% BW fluid deficit)
	  • Hypotension, confusion, oliguria, shock (15% BW fluid deficit)
	◦ Look out for complications - uremia, overload, arrhythmia

Ix	◦ UECR -> is there an urgent indication for dialysis ◦ FBC, Ca/Mg/Pi ◦ UFEME ◦ US KUB, CXR, ECG ◦ Other tests done at your discretion re: underlying cause • E.g. Urine phase contrast, renal vein/arteries doppler, autoimmune w/u
Mx	◦ Strict IO ◦ Discontinue all relevant drugs (ACE-I, ARBs, NSAIDs, aminoglycosides) ◦ If depleted -> give crystalloids (remember to base selection on serum Na) ◦ Make sure you don't drive patient into overload ◦ Correct electrolytes ◦ If volume unresponsive AKI w/ persistent oliguria, consider RRT

MISSED DIALYSIS

Notes	• Usually due to blocked access (perm cath blocked / poor flow, thrombosed AVF) • Sometimes due to possible infection of line / AVF
History	• Look for the memo from dialysis centre regarding what happened • When was the last full dialysis • Any infective symptoms • Any cardiac symptoms

Exam	• Look out for the status of the AVF (thrill, bruit) • Look out for complications - uremia, overload, arrhythmia • Look out for overlying cellulitis, pus etc.

Ix	• UECr is the **most** important to determine urgency to dialyze esp if missed HD / incomplete HD
	  ◦ Any urgent indication for dialysis?
	  ◦ Acidosis (usually <15, we try to dialyze ASAP)
	  ◦ Electrolyte imbalance (usually >6, we try to dialyze ASAP)
	  ◦ Intoxication
	  ◦ Overload (APO)
	  ◦ Uremia (encephalopathy, pericarditis)
	• **Please do let your MO know about missed dialysis cases**
	  ◦ (REN reg on call will review the bloods and decide re: need for Vasc cath insertion and urgent dialysis)
	• Important to prep for op if foresee-ing procedure (eg line insertion)
	  ◦ PT/PTT, FBC, GXM
	• CXR for FO
	• ECG for hyperkalemic changes
	• Blood c/s and swab c/s if suspicion of infection present

Mx	**Blocked AVF issue**
	• Order AVF scan (order as US upper limb (VSU, NOT NHC) and specify AVF site)
	• Angioplasty / thrombolysis cm
	
	Blocked perm cath
	• Usually Renal MO to attempt urokinase KIV perm cath exchange
	
	Infected access
	• Send blood c/s (2 sets if line: one from peripheral, one from perm cath)
	• Do not pull the line first -> alert your MO
	• Cover w/ abx – will need gram + and gram – coverage
	  ◦ If MRSA, IV Vancomycin
	• If decision is made to pull out line - check if need to send tip for cultures
	
	Bleeding access
	• Ensure that patient is haemodynamically stable
	• Attempt hemostasis mechanically in sterile fashion using gauze
	• If perm cath
	  ◦ Can attempt hemostasis with adrenalize soaked gauze if mechanical compression fails
	  ◦ Alert MO KIV attempt re-stitching if perm cath
	• If bleeding AVF
	  ◦ Call MO ASAP
	  ◦ Will likely need urgent Vascular surgery referral overnight
	• Trend Hb and get a GXM if profuse bleeding

INTRADIALYTIC HYPOTENSION

Notes	Approach is the same as an approach to a hypotensive patient
History / Exam	• Rule out sepsis, cardiac event, and anaphylaxis (esp if new meds given) • Good to note what time in dialysis this occurred • If early, unlikely to be due to over-UF
Ix	• CE + ECG • FBC • UECr (if dialysis not completed) • Septic work up if suspecting sepsis
Mx	• Alert REN MO on call • Stop UF KIV convert to SLED KIV stop dialysis and return all blood • If needed, give given fluid bolus of 250ml

PD ISSUES

Peritonitis	History	A lot can present non-specifically and don't necessarily have florid abdo pain N/v, diarrhea, fever, lethargy Suspect if PD effluent is cloudy Check for symptoms of fluid overload (trend towards decreased UF due to peritonitis) Check for cause - non sterile technique etc.)

	Exam	Check if fluid overloaded Check if grossly peritonitic
	Ix	FBC, UECr, CRP, PT/PTT PD fluid cell count, differential count, gram stain, aerobic cultures Blood cultures if febrile Might require CT AP if suspicious for other causes of peritonitis eg perf
	Mx	Alert REN MO on call -> will need to call PD nurse to assess dialysate and drain dwell Start abx (please avoid starting until investigations are sent, there is a PD nurse on call 24H) • PD peritonitis antibiogram is on CITRIX • Usually IP Amikacin and IP Vancomycin • Will need PO Nystatin for fungal prophylaxis too
Exit site / tunnel infx	History	• Pus / bloody drainage from exit site • Tenderness over tract
	Exam	• Erythema over TK catheter site • Tenderness • Pus discharging after pressure on cuff • Peritonitic
	Ix	• US tunnel track • Aerobic c/s of catheter site • FBC, UECr, CRP, PT/PTT • Blood c/s if febrile
	Mx	• Again, alert REN MO -> will call PD nurse • Empirical antibiotics • PO Cefuroxime and topical Gentamicin cream

RESPI

COPD

History and examination	• Increased SOB, cough, frequency, volume and purulence of sputum
	• Chest tightness, SOB, wheeze
	• Duration and tempo
	• Precipitating factors
	  • Non-compliance to inhalers
	  • Sick contacts, recent travel
	  • Infective symptoms of fever / chills / rigors
	  ○ Usually cause is viral (2/3 of cases) vs. bacterial (2/3 of cases)
	• Smoking history
	• Vaccinations history: influenza, pneumococcal
	• Rule out other causes of SOB
	  • CCF (ED should have done NT-proBNP), APO, PTX, PE, pneumonia, asthma
	• Severity of COPD
	  • How many exacerbations usually
	  • How many admissions this year, any ICU / HD
	  • mMRC grading
	  • LTOT therapy
	• Ask about inhalers

Exam	• Respiratory effort (speaking in sentences etc.) • Assess air entry • Look hard for signs of pneumothorax • Look for right heart failure (elevated JVP, peripheral oedema etc.)
Ix	• FBC, UECr, CRP/Procal • CEx2 + ECG • CXR (Usually done at ED) • Previous sputum cultures • ABG • Respiratory sputum gram stain and culture, KIV respiratory viral swab

Mx	• Keep NBM
	• Keep SpO2>88%, wean supplementary oxygen as tolerated
	• Remember ABC
	  • <u>Antibiotics</u>
	  • If infective exacerbation
	  • Start Augmentin and Azithromycin (check QTc) KIV Tamiflu
	  • <u>Bronchodilators</u>
	  • Regular Q4hrly Nebs (you can order Q1 to Q8hrly):
	  • Salbutamol: ipratropium: normal saline in the ratio of 1:1:2 (to prevent anticholinergic effects from ipratropium especially in the elderly)
	  • REVIEW PATIENT REGULARLY KIV decrease freq of nebs (e.g. Q4hrly -> Q6hrly)
	  • Remember to order up patient's old inhalers!
	  • <u>Corticosteroids</u>
	  • If severe: hydrocortisone 100mg Q8H
	  • Otherwise: Prednisolone 30mg x 5/7
	• Consider COPD nurse review cm
	• Smoking cessation counselling

ASTHMA

History and examination	• Chest tightness, SOB, wheeze, cough - worse at night 2-3am
	• Precipitating factors
	  • Non-compliance to inhalers
	  • Sick contacts, recent travel
	  • Infective symptoms
	  • Animal exposure
	  • Cold air
	  • Drugs (aspirin, NSAIDs, ACE-I, beta-blockers)
	  • Cigarette smoke
	• Rule out other causes of SOB

	• CCF (ED should have done NT-proBNP), APO, PTX, PE, pneumonia, COPD
	• Comorbids
	  • GERD
	  • OSA
	  • Eczema, AR
	• Severity of asthma
	  • How many exacerbations usually
	  • How many admissions this year, any ICU / HD
	• Ask about inhalers
	• Important to know when was the patient last nebulised

Exam	• Respiratory effort (use of assessor muscles, cyanosis, speaking in short phrases, inability to lie flat) • Assess air entry
Ix	• FBC, UECr, CRP/Procal • CEx2 + ECG • CXR (Usually done at ED) • KIV ABG • KIV respiratory sputum gram stain and culture • KIV respiratory viral swab

Mx	• Keep NBM
	• Keep SpO2>92%, wean supplementary oxygen as tolerated
	• Bronchodilators
	  • Regular Q4hrly Nebs (you can order Q1 to Q8hrly):
	  • Salbutamol: ipratropium: normal saline in the ratio of 1:2:1
	  • REVIEW PATIENT REGULARLY KIV decrease freq of nebs (e.g. Q4hrly -> Q6hrly)
	  • Remember to order up patient's old inhalers!
	• Corticosteroids
	  • If severe: hydrocortisone 100mg Q8H
	  • Otherwise: Prednisolone 50mg x 5/7
	• KIV Magnesium sulphate
	• KIV antibiotics
	  • If infective exacerbation
	  • Start Augmentin and Azithromycin (check QTc) KIV Tamiflu
	• Consider asthma nurse review cm
	
	To consider MICU admission (call your MO **immediately**) for KIV ventilatory support if:
	• Drowsiness, confused, AMS
	• Persistent hypoxia
	• Normal or raised pCO2 on ABG (indicates that the patient is tiring out)
	• No response to treatment

PNEUMONIA

History	• Fever/rigors/new-onset cough/change in sputum colour/pleuritic chest pain/dyspnoea, pre-treatment (will affect type of Abx given), sick contacts, recent travel, vaccinations (influenza, pneumococcal) • Complications: e.g. haemoptysis, LOW/LOA • Smoking Hx • Meropenem + Azithromycin for severe pneumonia. Also consider adding on Tamiflu if influenza A is suspected
Exam	• Any consolidation: ↓ Chest excursion, dull percussion note, Bronchial breath sounds (hollow, tubular, low pitched), Crepitations • Signs of severity: Acute altered mental state, RR≥30, SBP<90, Temp <35 or ≥40, HR ≥125
Ix	• FBC, RP, CXR (Usually done at ED) • Sputum gram stain and culture, KIV respiratory viral swab

Mx	• Keep SpO2 >92%
	• Follow abx guidelines:
	  • Community acquired pneumonia
	  ○ Augmentin/Ceftriaxone +

	○ Azithromycin for 3/7 (Doxycycline for 5/7 if QTC prolonged)

HEMOPTYSIS

Priority	See IMMEDIATELY, especially if massive hemoptysis (50ml in a single episode OR >150ml per day)
On phone	• Current saturations and INO2 requirements any desaturation? Vitals stable? • Is patient in respiratory distress? • Reason for admission? Any Concurrent illnesses or comorbidities? • EOC status • Ask for CXR • Ask nurses to set large bore cannulas in bilateral antecubital fossa • Consider fluid resuscitation (Plasmalyte or Hartmann's or NS 500ml over 30mins STAT)

On arrival	• Distinguish between haematemesis vs. pseudo-haemoptysis vs. haemoptysis
	• Establish cause:
	  • CCF/mitral stenosis: SOBOE, orthopnoea, PND
	  • Infectious cause: fever chills, rigors, night sweats, previously untreated TB, pneumonia
	  • Malignancy: anorexia, malaise, weight, underlying lung CA
	  • Previous DVT, PE, COPD, bleeding disorder
	  • Smoking, exposure to asbestos/silica, travel
	• Look for any signs of respiratory distress and for signs suggestive of underlying lung malignancy / CTD

Ix	• FBC, UECr, APTT/PT, LFT, GXM +/- ABG if massive • Portable CXR STAT • Sputum gram stain and culture • AFB smear and culture x2 + TB GeneExpert if suspecting infection • Blood cultures if suspecting infection • KIV CT Thorax cm • KIV CTPA if high risk of PE
Mx	• Paras Q1hrly, Keep NBM • Keep SBP>90, MAP>60, keep SpO2 >92% • "Haemoptysis charting - inform Dr if haemoptysis >50ml per episode or >150ml per shift" • **Inform MO immediately if patient is in respiratory distress, having active haemoptysis, having stridor or wheezing or has silent chest** • May require intubation to protect airways • Fluid resuscitate if needed • Lie patient on affected side • Hold off anti-coagulation / antiplatelet if patient is on (be judicious) • Manage underlying cause • If massive hemotypsis, may require urgent referral to IR for BAE

CHEST DRAIN

Pneumothorax	• Do not clamp chest tubes or it may cause tension pneumothorax! • Check for air bubbling - means still has air leak (pneumothorax yet to resolve)
Pleural effusion	• Allow 500 - 1000ml per shift • Usually aim < 1 - 1.5L because of the risk of re-expansion pulmonary edema • Make sure the level falls and rise with respiration -> if not tube may be mispositioned / blocked