Exercises in CLINICAL ACCURACY CHECKING

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Following a positive response in November, these clinical accuracy exercises will become a regular feature of HP

In this article, two prescriptions for assessment are given and each one is followed by a discussion. Readers are invited to identify the presenting problems. These prescriptions are actual charts that have passed through the dispensary at Addenbrooke's NHS Trust, although the patients' names have been changed to maintain confidentiality. The check list used by candidates is shown in Figure 1.

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Prescription 1

This prescription (Figures 2 to 4) is for a child, and the important pharmaceutical care issue is the checking of paediatric doses. It is

CLINICAL ACCURACY CHECKING TEST

Task

1. You have **– minutes** to review the following prescription charts and identify the problems. You have **– minutes** to document your answers
Total time allowed:– minutes
2. You are only able to make ONE intervention per prescription
For each of the prescriptions, using the answer sheets provided:

3. Document the ward and clinical specialty
4. List briefly the endorsements you would make to the chart
5. List briefly the patient's major medical problem(s) suggested by the drug therapy
6. List briefly the most important pharmaceutical problems you would try to resolve **if you were checking the chart at ward level** (maximum of **SIX** problems)
7. State the **ONE priority intervention** you would make for **EACH of the charts** given that you are **checking the chart in the dispensary**
8. Briefly state the **action** you would take to resolve the priority intervention
9. State the urgency of the **priority** intervention from one of the following:
Urgent = chart must be amended by a doctor or pharmacist before being dispensed
Less urgent = any other action, such as sending an intervention note to the doctor, highlighting the problem to the ward pharmacist, phoning a nurse or doctor for further information.
10. Materials allowed:

BNF	Martindale's Extra Pharmacopoeia
Paediatric formulary	Hospital formulary
Compendium of data sheets and SPCs	Calculator
Trissel's Handbook of Injectable Drugs	Hospital IV monographs
List of wards — specialty and current ward pharmacist	

Answers (Candidate name:…………………)

Prescription number 1

Review panel:

Ward Clinical speciality

Chart endorsements:

Medical problems:

1.	5.
2.	6.
3.	7.
4.	8.

Pharmaceutical problems:

1.	4.
2.	5.
3.	6.

Priority intervention number 1 2 3 4 5 6
(circle the appropriate box)

Suggested action to resolve the priority intervention:

Urgency: Urgent Less urgent
(circle the appropriate box)

Figure 1: Instructions for candidates: In the test, the candidate is asked to state the ward and clinical specialty in order to focus attention on likely problems. For example, if the patient was on a medical ward specialising in renal disease, the pharmacist must be particularly vigilant about renally excreted drugs. The chart endorsements refer to the the discharge or to take out (TTO) prescription where one exists or otherwise to the inpatient chart. Candidates are given 6 minutes to review each prescription, and 3 minutes to document their answers for each prescription

Prescription Chart

Surname	Hospital No	Weight	DRUG SENSITIVITIES		
Grimes	345678		Doctor must also enter this information on FRONT of case folder. Drugs must not be administered unless this box has been completed		
First Names	Date of Birth / Sex	24.3kg	Date	Drug/Substance	Signature
Anna	23.2.93 / F				
Consultant	Ward	Height			
P	Paediatric				

Regular Prescriptions

Month and date → / Tick times or enter other times →

Drug details	Time		6th	7th	8th
DRUG (APPROVED NAME): Cefotaxime	6				
	8	*			
Dose: 500mg; Route: IV; Start Date: 6.12.99; Stop Date:	12				
	14	*			
Signature: A Doctor; Pharm	18				
Additional Instructions	22	*			
DRUG (APPROVED NAME): Trimethoprim	6				
	8	*			
Dose: 50mg; Route: PO; Start Date: 7.12.99; Stop Date:	12				
	14				
Signature: A Doctor; Pharm	18	*			
Additional Instructions	22				
DRUG (APPROVED NAME): Oxybutinin	6				
	8	*			
Dose: 2.5mg; Route: PO; Start Date: 8.12.99; Stop Date:	12				
	14	*			
Signature: A Doctor; Pharm	18				
Additional Instructions	22	*			

Figure 2: Patient details and regular medication (prescription 1). "AN" are the initials of the nurse who gave the medication

DRUG (APPROVED NAME): Ibuprofen								
Dose: 120mg; Max Frequency: 6 hrly; Route: PO; Start Date: 6.12.99	Date	6th	7th	7th	7th	7th	8th
Signature: A Doctor; Stop Date; Pharm	Time	7pm	3am	10am	4pm	10pm	6am
	Dose/Route	120 mg	120 mg	120 mg	120 mg	120 mg	120 mg
Additional Instructions / Max. dose in 24 hours	Given by	AN	AN	AN	AN	AN	AN

DRUG (APPROVED NAME): Calpol					
Dose: 360mg; Max Frequency: 4 hrly; Route: PO; Start Date: 6.12.991	Date	7th	7th	7th	8th
Signature: A Doctor; Stop Date; Pharm	Time	3am	4pm	10am	6am
	Dose/Route	360 mg	360 mg	360 mg	360 mg
Additional Instructions / Max. dose in 24 hours	Given by	AN	AN	AN	AN

Figure 3: Patient's "as required" drugs (prescription 1)

Once Only Prescriptions

Pharm	Date	Drug (approved name)	Dose	Route/other directions	Time to be given	Signature	Given by: Initials	Given by: Time
	8.12.99	Gentamicin	150mg	IV	10am	A Doctor	AD	10am

Figure 4: Patient's "once only" drugs (prescription 1)

used to highlight the method used, which is to check doses for the child's weight rather than age. The publication most commonly referred to at Addenbrooke's hospital is "Medicines for Children".[1]

The second issue examined is the prescribing of antibiotic therapy.

The only endorsement required would be the generic name for Calpol (paracetamol) and the maximum dose recommendation. All

Prescription Chart					
Surname: Froud	Hospital No: 456789	Weight	DRUG SENSITIVITIES		
			Doctor must also enter this information on FRONT of case folder. Drugs must not be administered unless this box has been completed		
First Names: Peter	Date of Birth: 2.9.40 Sex: M	80kg	Date	Drug/Substance	Signature
		Height	17.10.99		
Consultant	Ward: Intensive Care Unit				

Regular Prescriptions														
Month and date → / Tick times or enter other times ↓			17th	18th	19th	20th								
DRUG (APPROVED NAME): Digoxin	6													
	8	*	AN	AN	AN	AN								
Dose: 250mcg; Route: PO; Start Date: 17.10.99; Stop Date:	12													
	14													
Signature: A Doctor; Pharm	18													
Additional Instructions	22													
DRUG (APPROVED NAME): Sucralfate	6													
	8	*	X	X	X	X								
Dose: 1G; Route: PO; Start Date: 17.10.99; Stop Date:	12	*	X	X	X	X								
	14	*	X	X	X	X								
Signature: A Doctor; Pharm	18	*	X	X	X	X								
Additional Instructions	22													
DRUG (APPROVED NAME): Enoxaparin	6													
	8													
Dose: 20mg; Route: SC; Start Date: 17.10.99; Stop Date:	12													
	14													
Signature: A Doctor; Pharm	18	*	AN	AN	AN									
Additional Instructions	22													

Figure 5: Patient details and regular medication (prescription 2). "AN" are the initials of the nurse who gave the medication. NKA=No known allergies

Pharm	Date	Drug (approved name)	Dose	Route/other directions	Time to be given	Signature	Given by Initials	Given by Time
	19.10.99	Amiodarone	300mg	IV in 50ml glucose 5% over 1 hour	10am	A Doctor	AN	10am

Figure 6: Patient's "once only" drugs (prescription 2)

CONTINUOUS INTRAVENOUS INFUSIONS								
Pharm	Date	Drug (approved name)	Dose	Rate	Diluent	Tot Vol	Infusion Rate	Signature
	20.10.99	Amiodarone	900mg	Over 24 hours	Glucose 5%	50ml	50ml over 24 hours	A Doctor
Pharm	Date	Drug (approved name)	Dose	Rate	Diluent	Tot Vol	Infusion Rate	Signature

Figure 7: Patient's "once only" drugs (prescription 2)

wards have an intravenous (IV) drug administration guide and nursing staff are required to follow the instructions given for the drug in question. Instructions for administration would not routinely be added to the chart.

Discussion of this prescription gives the opportunity to reinforce the application of the IV drug administration guide in practice. Candidates might also question whether first dose IV administration of an antibiotic must be by a doctor. This is not the practice at Addenbrooke's hospital but could have been in the candidate's previous place of work.

Completion of the drug sensitivity box (shown at the top of Figure 2) could be highlighted. If this child were a neonate, the doctors would not be required to complete this section. The chart could prompt discussion about the age after which one would expect the section to be completed.

A check of the doses of all drugs reveals that paracetamol and ibuprofen are prescribed appropriately. However, the doses of trimethoprim and cefotaxime are both rather low for the child's weight. The twice-daily administration of trimethoprim suggests treatment, rather than prophylaxis. The dose should be 100mg twice daily (4mg per kg body weight twice daily). Cefotaxime is widely used at Addenbrooke's hospital on recommendation from the microbiologists. This is a point for discussion with the candidate, since other hospitals often use alternative cephalosporins such as cefuroxime or ceftriaxone. The dose prescribed here (500mg three times a day) is rather low but the change to recommended dosage would depend on the reference text used.

The single dose administration of gentamicin also forms an important point for discussion. The microbiology department has so far not approved the use of once-daily gentamicin regimes, either for adults

or for children. The candidate must be made aware of this since the use of such regimes is widespread at other hospitals. A completely different blood level monitoring process from that used in other dosage regimes is required for once-daily protocols and different methods of administration cannot be mixed. The ward pharmacist could be alerted to make sure the doctor is also aware of this issue.

Before discussing dosage of antibiotics with the prescriber, the candidate should recognise that the overall prescription may be inappropriate. There is considerable overlap of antimicrobial spectrum. Both the IV and oral routes are being used. It is likely that the doctor intended to change from IV cefotaxime to oral trimethoprim, but omitted to cross off the former. Another point which might need to be highlighted is that there is no policy on automatic stop dates for antibiotics at Addenbrooke's hospital.

A competent candidate would be expected to question the whole issue of antibiotic prescribing for this child, and then to make appropriate dosage recommendations in light of the outcome.

Prescription 2

The subject of this prescription (Figures 5 to 7) is a critical care patient, and the main pharmaceutical care issues are IV administration in a critical care area as opposed to a ward area, and clinical significance of drug interactions.

The only endorsement required on the chart is the full version of "mcg", an unofficial abbreviation, as microgram. Instructions for IV administration will be taken from an IV drug administration guide, this time highlighting the guidelines produced especially for critical care areas. The candidate should show that they have checked the diluent, the volume, the dose and the rate of administration of both amiodarone doses. The volume used in this case (50ml) is only suitable for central line administration and is only authorised in a critical care area, where electrocardiogram (ECG) monitoring is available. The candidate might question the initial dose of amiodarone prescribed which seems rather low compared with the British National Formulary (BNF) recommendation.[2] For an 80kg patient, 5mg per kg would give a 400mg initial dose. In practice, a dose of 300mg followed by 900mg is commonly used.

Decisions as to the clinical significance of drug-drug interactions are often difficult. In this prescription, it would be normal to consider a 50 per cent maintenance dose reduction of digoxin when amiodarone is started. Candidates often highlight a potential problem with sucralfate interfering with oral absorption of other medicines. In this patient, however, sucralfate has been omitted for four days. The BNF does not assign clinical significance to the drug interaction between digoxin and sucralfate, but it might be prudent to monitor digoxin blood levels in view of the dual possibility of interactions.

Patients who are critically ill are at risk of developing erosions in the upper gastrointestinal tract. This is commonly referred to as stress ulceration.[3] The risk factors are thought to include shock, sepsis, burns, head injury, multiple trauma, renal or hepatic failure and organ transplantation. The risk of bleeding is small and the omission of sucralfate may not be critical in this patient.

Patients with atrial arrhythmias are usually anticoagulated with heparin and/or warfarin to reduce the risk of thromboembolic events such as stroke.[4] This patient is receiving only a 20mg subcutaneous dose of enoxaparin, previously considered a prophylactic dose. In medical patients, the licensed prophylactic dose has recently been changed to 40mg daily.[2] For atrial arrhythmias, cardiologists often use a treatment dose of tinzaparin, 175units per kg subcutaneously once daily, continuing until the patient is loaded with warfarin and the international normalised ratio (INR) is within reference range. However, this is an unlicensed indication of tinzaparin and one which has not yet been approved by the Addenbrooke's NHS Trust's drug and therapeutics committee. The pharmacist should consider whether treatment doses of anticoagulants should be initiated. If not, the prophylactic dose of enoxaparin should be increased to 40mg subcutaneously once daily.

A competent candidate must highlight the potential drug interaction between digoxin and amiodarone and suggest a course of action appropriate to the decision as to whether amiodarone is to continue as maintenance therapy. Anticoagulant therapy should also be questioned.

N.B. Solutions to these exercises are shown in Figures 8 and 9 on page 54.

References

1. Medicines for children. London: Royal College of Paediatrics and Child Health; 1999.
2. British National Formulary Number 40. London: British Medical Association and Royal Pharmaceutical Society of Great Britain; 2000.
3. Critical care therapeutics. Rachel Elliott, editor. London: The Pharmaceutical Press; 1999.
4. Lip GYH, Kamath S. Atrial fibrillation (1) the condition. Pharm J 2000;264:622-6.

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Answer sheet (answers are shown in magenta)
Candidate name:....................
Prescription number 1
Ward: Clinical specialty: Paediatrics

Chart endorsements: Calpol — paracetamol. Maximum four doses in 24 hours

Medical problems:
1. Infection, probably urinary tract infection
2. Neurogenic bladder or nocturnal enuresis

Pharmaceutical problems:
1. Check all doses for child's weight — 24.3kg:
   Ibuprofen, 20mg per kg per day. 480mg per day is the maximum dose
   Paracetamol, 10 to 15mg per kg per dose four times a day. 360mg four times a day is the maximum dose
   Cefotaxime, 100 to 150mg per kg per day (see BNF[2]) or 50mg per kg twice daily (see "Medicines for children"[1]). Dose prescribed is low
   Trimethoprim treatment dose, 4mg per kg per dose twice daily. Dose should be 100mg twice daily
   Gentamicin, 2mg per kg every eight hours (see BNF[2]) but single daily dose regimen 6mg per kg, or 150mg (see "Medicines for children"[1])
2. Query antibiotic therapy:
   Why is the child having three antibiotics with overlapping spectrums?
   Why are some IV and others oral?
3. Allergy box not completed

Priority intervention number Number 1 and/or 2
Candidates selecting Number 1 as the priority must have mentioned Number 2 and vice versa

Suggested action to resolve the priority intervention:
Contact doctor to check on antibiotic therapy. If trimethoprim is to continue, ensure it is for treatment, not prophylaxis
If cefotaxime is to continue, advise a dose of 1200 to 1800mg twice daily depending on severity of infection
Single daily dose regimen for gentamicin is not approved by Addenbrooke's hospital's microbiologists for adults or children
Ward pharmacist to follow up on the protocol being used

Urgency: Less urgent

Figure 8: Solution to prescription 1

Answer sheet (answers are shown in magenta)
Candidate name:....................
Prescription number 2
Ward: ICU Clinical specialty: Critical care

Chart endorsements: Digoxin — endorse "microgram" in full

Medical problems:
1. Arrhythmia, probably involving atria
2. Prophylaxis against stress ulceration
3. Prophylaxis against DVT/PE

Pharmaceutical problems:
1. Allergy box not completed
2. Amiodarone/digoxin drug interaction
3. Digoxin — narrow therapeutic margin. Check renal function, apex pulse, possibly blood level at steady state
4. Amiodarone — check route of administration (central line), diluent, rate of administration (ICU protocol), ECG monitoring.
   Check amiodarone dose — BNF recommends 5mg per kg IV over 20 to 120 minutes.
   Should initial IV dose be 400mg?
5. Review anticoagulant therapy. Check if patient should be fully anticoagulated. Question 20mg enoxaparin dose
6. Sucralfate/digoxin drug interaction — possibly impaired digoxin absorption (doubtful clinical significance). Check why sucralfate is not being administered?

Priority intervention number Number 2, but candidate must also mention Number 5

Suggested action to resolve the priority intervention:
Check with doctor if the amiodarone is a one-off dose or if it is to continue
If it is to continue, the dose of digoxin should be reduced to 125microgram daily
Determine the purpose of anticoagulation (treatment or prophylaxis) and advise on appropriate therapy change
Either increase enoxaparin dose to 40mg or "warfarinise" the patient

Urgency: Less urgent

Figure 9: Solution to prescription 2