Exercises in CLINICAL ACCURACY CHECKING

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These checking exercises attempt to address the pharmaceutical and medical issues that arise in different specialties. The prescriptions in this issue deal with the use of drugs on stroke and gastroenterology wards. Readers are invited to identify the problems and determine solutions for them. The prescriptions are followed by a discussion of the significant issues.

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It must be emphasised that these tests were introduced to assess the performance of checkers in a dispensary situation where time is at a premium. It should also be noted that these prescriptions have passed through the dispensary at Addenbrooke's NHS Trust, although the patients' names have been removed to maintain confidentiality. The check list used by candidates is shown in Figure 1. Figure 2 (p117) relates to prescription 1, and Figure 3 (p118) relates to prescription 2.

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** (NB: Occasionally, more than one intervention may be needed)
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, telephoning a nurse or doctor for further information.

10. Materials allowed:

Martindale's Extra Pharmacopoeia	BNF
Paediatric formulary	Hospital formulary
Compendium of data sheets and SPCs	Calculator
Trissel's handbook of injectable drugs	Hospital IV monographs
Renal drug handbook	
List of wards — specialty and current ward pharmacist	

Answer sheet (Candidate name:…………………)

Prescription number 1

Review panel:

Ward Clinical specialty

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 number)

Suggested action to resolve the priority intervention:

Urgency: Urgent Less urgent
(circle as appropriate)

Figure 1: Instructions for candidates: 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 discharge or to take out (TTO) prescription where one exists or otherwise to the inpatient chart. Please note: candidates are given six minutes to review each prescription, and three minutes to document their answers for each prescription

Prescription Chart					
Surname: S	Hospital No: 123456	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: S	Date of Birth: 12.08.31 Sex: F		Date	Drug/Substance	Signature
			4.9.01	Metals	A Doctor
		Height			
Consultant	Ward: Stroke				

Regular Prescriptions	October														
Month and date / Tick times or enter other times			2	3	4	5	6	7	8	9	10	11			
DRUG (APPROVED NAME): Prednisolone	6														
	8	*	AN	AN	AN	AN	AN	AN	AN	AN	AN	AN			
Dose: 40mg; Route: PEG; Start Date: 19.9.01; Stop Date:	12														
	14														
Signature: A Doctor; Pharm	18														
Additional Instructions	22														
DRUG (APPROVED NAME): Multivitamins	6														
	8	*	AN	AN	AN	AN	AN	AN	AN	AN	AN	AN			
Dose: 1; Route: PEG; Start Date: 19.9.01; Stop Date:	12														
	14														
Signature: A Doctor; Pharm	18														
Additional Instructions	22														
DRUG (APPROVED NAME): Omeprazole	6														
	8	*	AN	AN	AN	AN	AN	AN	AN	AN	AN	AN			
Dose: 40mg; Route: PEG; Start Date: 18.9.01; Stop Date:	12														
	14														
Signature: A Doctor; Pharm	18														
Additional Instructions	22														
DRUG (APPROVED NAME): Mesalazine	6														
	8	*	AN	AN	AN	AN	AN	AN	AN	AN	AN	AN			
Dose: 400mg; Route: PEG; Start Date: 18.9.01; Stop Date:	12														
	14														
Signature: A Doctor; Pharm	18	*	AN	AN	AN	AN	AN	AN	AN	AN	AN				
Additional Instructions	22														
DRUG (APPROVED NAME): Full length TEDS	6														
	8														
Dose: Both; Route: Legs; Start Date: ; Stop Date:	12														
	14														
Signature: A Doctor; Pharm	18														
Additional Instructions	22														
DRUG (APPROVED NAME): Azathioprine	6														
	8	*	AN	AN	AN	AN	AN	AN	AN	AN	AN	AN			
Dose: 150mg; Route: PEG; Start Date: 15.9.01; Stop Date:	12														
	14														
Signature: A Doctor; Pharm	18														
Additional Instructions	22														
DRUG (APPROVED NAME): Elemental E028	6														
	8	*	*	*	*										
Dose: APC; Route: PEG; Start Date: 15.8.01; Stop Date:	12														
	14														
Signature: A Doctor; Pharm	18														
Additional Instructions	22														
DRUG (APPROVED NAME): Fybogel	6														
	8	*										AN			
Dose: 1; Route: PEG; Start Date: 10.10.01; Stop Date:	12														
	14														
Signature: A Doctor; Pharm	18	*									AN				
Additional Instructions	22														

Figure 2: Patient's details and regular drugs (prescription 1). Double-headed arrow indicates discontinuation TEDS = thromboembolic disease stockings; APC = as per chart

Prescription 1

Figure 4 (p120) shows the solution to prescription 1. This prescription for an inflammatory bowel disease (IBD) patient highlights a common pharmaceutical care issue, namely the lack of availability of the oral route.

The patient has a percutaneous endoscopic gastrostomy (PEG) tube sited, which is able to deliver enteral feeds and drugs directly to the stomach. In addition to PEG tubes, some patients also have jejunostomy tubes sited, which can deliver feeds and drugs directly to the jejunum. These tubes are an extension of the PEG tube and still offer the option of delivering drugs directly to the stomach through a separate gastric port. The gastric port is preferred for drug administration as it more closely mimics the route taken if an oral dose is swallowed. As the patient has been prescribed elemental feeds, it is reasonable to assume that she has Crohn's disease. Elemental feeds provide predigested nutrients to the patient, thus enabling the bowel to be rested. They have no function in ulcerative colitis management where only the colon is affected. An elemental diet may be as effective as steroids in Crohn's disease.[1] In Crohn's disease, drug therapy

Prescription Chart					
Surname: H	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: E	Date of Birth: 31.5.39 / Sex: F		Date	Drug/Substance	Signature
			6.8.01	NKDA	A Doctor
Consultant: Consultant	Ward: Gastro	Height			

Regular Prescriptions — August

Month and date / Tick times or enter other times

Drug	Time		8	9	10	11	12	13	14	15					
DRUG (APPROVED NAME)	6														
Enoxaparin	8	*	AN	AN	AN	AN	AN	AN	AN	AN					
Dose / Route / Start Date / Stop Date	12														
40mg / SC / 24.7.01 /	14														
Signature: A Doctor / Pharm	18														
Additional Instructions	22														
DRUG (APPROVED NAME)	6	*		AN	AN										
Hydrocortisone	8														
Dose / Route / Start Date / Stop Date	12	*	AN	AN	AN										
100mg / IV / 24.7.01 /	14														
Signature: A Doctor / Pharm	18	*	AN	AN											
Additional Instructions	22	*	AN	AN											
DRUG (APPROVED NAME)	6														
Azathioprine	8	*	AN												
Dose / Route / Start Date / Stop Date	12														
50mg / PO / 5.8.01 /	14														
Signature: A Doctor / Pharm	18														
Additional Instructions	22														
DRUG (APPROVED NAME)	6														
Predfoam enema	8	*		AN	AN	AN	AN	AN	AN	AN					
Dose / Route / Start Date / Stop Date	12														
1 / PR / 7.8.01 /	14														
Signature: A Doctor / Pharm	18	*	AN	AN	AN	AN	AN	AN	AN						
Additional Instructions	22														
DRUG (APPROVED NAME)	6														
6-Mercaptopurine	8														
Dose / Route / Start Date / Stop Date	12														
50mg / PO / 8.8.01 /	14	*		AN	AN	AN									
Signature: A Doctor / Pharm	18														
Additional Instructions	22														
DRUG (APPROVED NAME)	6														
Infliximab	8	*				X	X								
Dose / Route / Start Date / Stop Date	12														
5mg / IV / 8.8.01 /	14														
Signature: A Doctor / Pharm	18														
Additional Instructions	22														
DRUG (APPROVED NAME)	6														
Prednisolone	8	*			AN	AN	AN	AN	AN	AN					
Dose / Route / Start Date / Stop Date	12														
40mg / PO / 10.8.01 /	14														
Signature: A Doctor / Pharm	18														
Additional Instructions	22														
DRUG (APPROVED NAME)	6														
6-Mercaptopurine	8														
Dose / Route / Start Date / Stop Date	12														
100mg / PO / 12.8.01 /	14	*					AN	AN	AN						
Signature: A Doctor / Pharm	18														
Additional Instructions	22														

Figure 3: Patient's details and regular drugs (prescription 2). Double-headed arrows indicate discontinuation

particularly steroids and immunosuppressants, is the mainstay of treatment, so it is important to ensure that prescribed medicines are delivered in a formulation suitable for the patient.

Prednisolone tablets are available in a soluble form and the chart should be endorsed accordingly. Also, with multivitamins, a liquid preparation is available and the chart should be endorsed with the number of millilitres (ml) or drops. At Addenbrooke's Hospital, Dalivit oral drops are used, and one multivitamin capsule is equivalent to 14 drops of Dalivit (0.6ml).

Omeprazole tablets (Losec MUPS) are dispersible and can be mixed in water as directed on the pack. They should not be crushed first as this affects the microcapsules contained in the formulation and can block the PEG tube.[2] The chart should be endorsed to this effect.

Fybogel is not a good product for PEG tube administration. Although it can be dispersed in water, it tends to form a jelly rapidly, which can lead to tube blockage. It would be worth liaising with the nursing staff or dietitian to see why this patient has been prescribed Fybogel. Perhaps the fibre can be incorporated into the enteral feed. If a laxative is required, senna or Movicol can be suggested as alternatives. Lactulose should be avoided because it lowers the bowel pH and may impede mesalazine absorption, which is pH-dependent. The use of antidiarrhoeals and antispasmodics is best avoided in

relapses of IBD because there is a risk of developing toxic megacolon,[1] a potentially fatal complication.

Azathioprine is not available as a liquid. In the past, many hospital pharmacy departments would have prepared a suspension of azathioprine extemporaneously. However, with the increasing emphasis on health and safety, this is becoming less common. Azathioprine does disperse in water sufficiently to enable administration via the PEG tube. To eliminate any risk to nursing staff from inadvertent inhalation of azathioprine dust, the chart should be endorsed "Disperse in water, do not crush" as with the omeprazole.

The greatest administration challenge on the chart is the mesalazine 400mg twice daily. This dose suggests that Asacol is the required product. This is a modified-release brand that is only broken down when the pH rises above 7, causing the molecules to disperse throughout the colon. Pentasa, another modified-release form of mesalazine is broken down in the stomach, releasing the granules throughout the small and large intestine. Unlike other formulations in this group, Pentasa is not affected by changes in gut flora pH or transit time, and for this reason it may be a better choice of drug in Crohn's disease even though the licence currently only covers ulcerative colitis.[3] Since the brands are not interchangeable, the prescriber would need to be contacted and the formulation required confirmed. As neither modified-release preparation should be crushed, a number of options can be explored. First, it is possible that the patient may be able to swallow tablets or capsules. Although they have a PEG tube sited, some tube-fed patients are still able to swallow small quantities including some tablets or capsules. A second option is to change the mesalazine brand to Pentasa (Pentasa tablets disperse in water). Lastly, Pentasa sachets may be used, although it is worth bearing in mind that the dose of the sachets differs from that of the tablets.

Medicines given via a feeding tube should always be in liquid form and diluted with equal parts of warm water if viscous. The tube should always be flushed with a minimum of 10–20mls of water after giving each medicine.

A competent candidate must mention the administration of mesalazine as the priority intervention. The route, brand and potential changes in dose should also be mentioned.

Prescription 2

Figure 5 (p120) shows the solution to prescription 2. This is another prescription for a Crohn's disease patient. The main pharmaceutical care issue is the prescription for infliximab.

Infliximab is a monoclonal antibody which binds to tumour necrosis factor alpha (TNF-alpha), levels of which are increased in Crohn's disease. TNF activity correlates with disease severity in inflammatory conditions such as Crohn's disease and rheumatoid arthritis. Infliximab is used to treat patients with moderate to severe active Crohn's disease, draining enterocutaneous fistulae refractory to conventional treatments, or in patients unable to tolerate conventional therapy. It is also licensed for the treatment of rheumatoid arthritis resistant to treatment with disease-modifying antirheumatic drugs.[4,5] However, the dosage regimens for the different conditions are different and infliximab has to be prescribed along with methotrexate in rheumatoid arthritis.

The patient has been prescribed infliximab 5mg intravenously in the morning on the regular section of the prescription chart. This dose is incorrect: the recommended dose is 5mg per kg body weight for Crohn's disease. This contrasts with the slightly lower dose of 3mg per kg for rheumatoid arthritis.[6] The patient's weight would need to be obtained, and it may be appropriate to round the dose to the nearest vial because the drug is expensive (£451.20 per 100mg vial[7]). This would need to be discussed with the prescriber. The drug (infliximab) should be prescribed on the "once only" section of the prescription chart and cross-referenced to the infusion chart. The prescribing of infliximab on the regular section may cause it to be given daily, leading to possibly fatal consequences. Infliximab should either be given once or repeated after two and six weeks for fistulising Crohn's disease if a beneficial effect is observed. Infliximab can also be readministered within 14 weeks if symptoms recur. The long-term efficacy of repeated administration has not been confirmed. Indeed, repeated administration can be dangerous, since severe delayed hypersensitivity reactions have been reported.[5]

Due to cost considerations and the risk of serious adverse reactions, the use of infliximab is restricted in most hospitals. The formulary status of the drug should be checked and also whether the patient has had it before and when.

A major safety concern with infliximab is the incidence of post-treatment infections, which have resulted in over 100 deaths since it was marketed. These infections have included a large number of cases of active tuberculosis. Infliximab should not be initiated until the patient has been evaluated for both active and inactive tuberculosis. This evaluation should include a detailed medical history, Tuberculin testing and a chest X-ray. The results of such tests should be held on a patient alert card and carried by the patient. The patient should also be counselled to be aware of the signs and symptoms of tuberculosis.[4]

The other pharmaceutical issue with infliximab is that it must be given via an in-line sterile non-pyrogenic low protein-binding filter (pore size ≤1.2 microns). Since the filter is not included in the pack of infliximab, it is important to check that the ward staff know how to obtain one of these filters. At Addenbrooke's, they are supplied by the central supplies department rather than the pharmacy department. The drug is administered slowly over two hours and the patient should be monitored every 30 minutes during the infusion and for two hours afterwards. The patient should be closely monitored for signs of infusion reaction, and if necessary, the infusion rate should be slowed or the infusion stopped. Emergency treatment should be available and nursing staff should be alert to the possibility of delayed hypersensitivity reactions if the patient is being retreated after a prolonged delay.[8]

The patient is also on both oral and rectal steroids. This is not unusual in Crohn's disease, because symptoms can appear at any point along the gastrointestinal tract. Rectal steroids are only worth using if the patient has mild to moderate distal colonic disease. Although this patient may be developing resistance to steroids, hence the use of infliximab, the steroids would not be stopped suddenly because the patient might relapse further. The dose would be reduced gradually over a few weeks.

Infliximab is safe to use in combination with prednisolone, mercaptopurine and azathioprine, although these drugs have been stopped in this patient. Since azathioprine or mercaptopurine remains the drugs of choice in Crohn's disease, they should be tried for a minimum of six months before considering treatment with infliximab. Doses of 2mg per kg azathioprine or 1.5mg per kg mercaptopurine are suggested.[8]

A competent candidate should be able to point out the error in the dose and frequency of infliximab.

References

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3. Ferring Pharmaceuticals. Pentasa summary of product characteristics. http://emc.vhn.net/eMC/assets/c/html/DisplayDoc.asp?DocumentId=4301
4. Schering Plough. Remicade summary of product characteristics. http://emc.vhn.net/eMC/assets/c/html/DisplayDoc.asp?DocumentId=3236
5. Infliximab overview (drug evaluation). In: Hutchinson TA, Shakan DR, Anderson ML, editors. Drugdex system. Englewood; Micromedex; 2002.
6. British National Formulary Number 42. London: British Medical Association and Royal Pharmaceutical Society of Great Britain; 2001.
7. Monthly Index of Medical Specialities April 2002. London: Haymarket; 2002, p152.
8. Infliximab: a new era in Crohn's management? Prescriber 2000;11:38–47.

Answer sheet (answers are shown in magenta) Candidate name:…………………

Prescription number 1

Ward: Medical Clinical specialty: Stroke

Chart endorsements:
1. Prednisolone — soluble tablets
2. Multivitamins — Dalivit 14 drops (0.6ml) daily
3. Omeprazole — disperse in water, do not crush
4. Mesalazine — take orally (unless changed to Pentasa sachets, see text)
5. Azathioprine — disperse in water, do not crush

Medical problems:
1. Stroke
2. Crohn's disease
3. Diarrhoea or constipation

Pharmaceutical problems:
Administration of drugs via a PEG tube (azathioprine, mesalazine and Fybogel)

Priority intervention Number 1

Suggested action to resolve the priority intervention:
1. Contact prescriber to check required brand of mesalazine, bearing in mind that both Asacol and Pentasa are modified-release preparations and must not be crushed. Consider changing to Pentasa sachets, with appropriate dose recommendation
2. Contact prescriber or nursing staff to confirm the reason for prescribing Fybogel sachets. Advise the prescriber on a suitable alternative

Urgency: Less urgent

Figure 4: Solution to prescription 1

Answer sheet (answers are shown in magenta) Candidate name:…………………

Prescription number 2

Ward: Medical Clinical specialty: Gastroenterology

Chart endorsements:
1. Patient's weight
2. Dose of Predfoam enema (1g)

Medical problems:
Crohn's disease

Pharmaceutical problems:
Incorrect dose and frequency of infliximab. Dose should be 5mg per kg body weight *stat* over two hours, also written on infusion chart

Priority intervention Number 1

Suggested action to resolve the priority intervention:
1. Confirm hospital formulary status of infliximab. Check patient's body weight
2. Check that the risk of prior infection with *Mycobacterium tuberculosis* has been investigated
3. Ensure that the prescriber changes the dose of infliximab (calculated according to body weight) and frequency of administration to a *stat* dose. The drug should be prescribed on a fluid chart so that administration can be recorded

Urgency: Urgent

Figure 5: Solution to prescription 2