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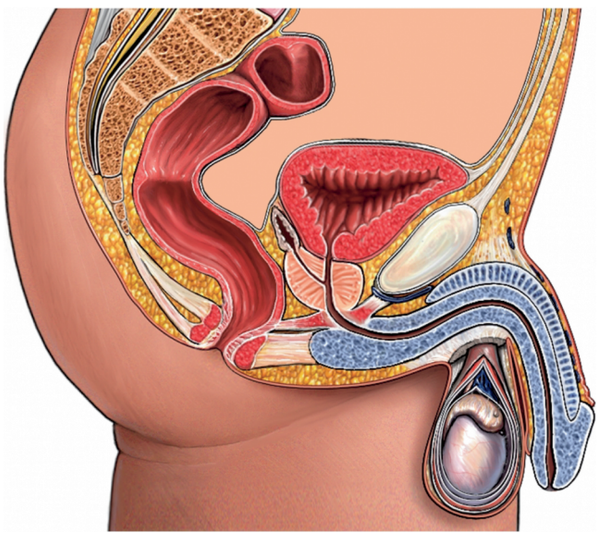

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Editorial

Compact MMC (what you need to know but haven't got the time to read)

Madeleine Beach and Frank Lee

Background

In 1997, the Department of Health launched an initiative to increase the number of medical school places in order to deliver sufficient UK graduates for the National Health Services (NHS). Following the NHS Plan 2000, training was re-structured to provide better guidance for doctors and care for patients. In February 2003, Modernising Medical Careers (MMC) was introduced. It consists of two Foundation years followed by Run-Through Specialty Training (3–7 years). For those who are not in Run-Through Training, a Fixed-Term Specialty Training Appointment is available.

Structure of MMC

The MMC curriculum was approved by the Postgraduate and Medical Education and Training Board (PMETB) which set the criteria and standards for training. Job application is meant to be transparent and structured. Competency is ensured via regular assessment, e.g. 360° feedback. Personal reflection is to take place formally and be recorded in the portfolio.

The Tooke report

Following last year's disastrous application process, Professor Sir John Tooke published an interim report which:

- outlined the principles for postgraduate training,
- reviewed workforce planning and
- stated a consensus on the role of doctors at each stage of their career.

The report recommended:

- improving the link between health care and education sector,
- providing adequate advice on matters important to medicine,
- better co-ordination between PMETB and the General Medical Council,
- reviewing current increase in the number of trainees, accounting for international medical graduates and subsequent planning and
- better management, funding and structuring of postgraduate education.

These recommendations are to be implemented in phases over the next 2–3 years. The issues raised in the report have led to several debates. For example, the British Medical Association (BMA) suggests that budgets for postgraduate training should be protected. It believes sub-standard workforce planning leads to poor career progression. It also advocates an increase in consultant numbers. However, it supports the European Working Time Directive with the belief that training can be optimised within its time limit. This is in contrast to Remedy UK which believes that there should be no limit on working time and that non-medical practitioners, as a cost-cutting measure, are diluting trainees' experience.

In reality, it is important to gain as much experience from each clinical placement as possible in order to compensate for the reduction in training hours. Many Foundation rotations contain un-banded posts, e.g. working 9 am to 5 pm. As a result, clinical exposure is diminished. Trainees should have access to educational supervisors or programme directors from whom they can seek advice. Remedy UK, as well as the Royal College of Surgeons of England, also call for the appointment of a director for medical education.

Recruitment

A Review Group was created to provide recommendations for recruitment of specialty trainees. An MMC (England) Programme Board has also been established to advise ministers of MMC decisions. The most important of which is a deanery-led specialty recruitment programme (locally-led, CV-based) this year due to the lack of a secure IT system. Each deanery has listed on their websites the application, score sheet and timetable for each specialty. Specialties have opted for either run-though grades or uncoupled applications which will lead to competitive applications for ST3. As the chaos from last year's process did not extend to the Foundation applications, these remain national as are General Practice (GP) and certain specialties as listed on the deanery websites.

Conclusion

In theory, MMC will provide quality health care via structured application, training and assessment of doctors in training. In reality, it has to overcome several obstacles. In the junior author's experience, Foundation year assessments are numerous and many seniors have not received adequate training, nor clear and authoritative information about the application process, assessment and 'mentoring' of the trainees. As a result, there has been a steep learning curve for all parties involved since the launch of MMC; not to mention the painful lessons learnt. Together with the old adage: see one, do one, teach one; current trainees have the opportunity to graduate from direct supervision towards a competent and independent practice. One can only hope that once the initial wrinkles are ironed out, the implementation of Professor Tooke's recommendations may bring about improved training and, more importantly, better patient care.

Useful resources

[1] www.bma.org.uk – useful research resources and links to up-to-date news

[2] www.doctors.net.uk – good e-mail service as well as useful training courses and forums

[3] www.foundationprogramme.nhs.uk – provides information about the Foundation Programme, its applications, dates, forums and useful links

[4] www.mmc.nhs.uk – information about the MMC, Foundation and Specialty training and links to deaneries

[5] www.remedyuk.org – news and advice about careers, training and other issues facing doctors-in-training

Editorial

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Case-based discussion

Vaginal discharge

James W. Gray

Abstract

Infection is the most common cause of pathological vaginal discharge. The most common infections are bacterial vaginosis (BV) and candidiasis. Sexually transmitted diseases that may present with vaginal discharge include trichomoniasis, chlamydia and gonorrhoea. Because of the long-term morbidity and public health implications of these infections they should always be considered in women at risk of sexually transmitted diseases. Microscopy and culture of vaginal and endocervical swabs are the mainstay of investigation of vaginal discharge, but for some infections they are increasingly being superseded by nucleic acid amplification techniques. In this article the various infective causes of vaginal discharge, and their treatment, are discussed and recommendations for selection of appropriate microbiological investigations according to the clinical presentation are proposed.

Introduction

Vaginal discharge is a common complaint that may be physiological or pathological. Infection is the major cause of pathological discharge, but other important causes include mechanical or chemical irritation and malignancy. Because infection is the most common cause of abnormal vaginal discharge, a careful history and collection of swabs for microbiological examination are useful first steps in investigating most women with vaginal discharge. Swabs may identify either unequivocal or potential pathogens, or disturbances in the normal vaginal flora that are associated with discharge.

Normal vagina

The normal vaginal microflora consists of a wide range of microbial species that associate in a stable way with the vaginal epithelium. Any change in the environmental conditions provided by the vaginal epithelium as a result of endogenous or exogenous influences can result in changes in the population density or the species composition of the vaginal flora, which can in turn result in discharge. After puberty the presence of oestrogen is associated with the presence of glycogen in the vaginal epithelium, which in turn favours colonization with lactobacilli. These bacteria metabolize glycogen to produce lactic acid, thereby maintaining the normal vaginal pH between 3.8 and 4.4. The vaginal secretions of post-menopausal women are less acidic, meaning that other bacteria such as coliforms are isolated more frequently.

The quality and quantity of vaginal discharge varies between women and also in the same woman over time. A normal physiological discharge is usually clear or white-cream. Pointers to a pathological vaginal discharge include a sudden increase in the amount of discharge, a change in colour to green, yellow-brown or red, or a discharge that is offensive.

Causes of vaginal discharge

Common and/or important causes of vaginal discharge are shown in Table 1. Infections are the most common cause of a pathological vaginal discharge, and can also be the presenting complaint of other vaginal pathologies.

Infections	Non-Infective causes
• Vaginosis • Vaginitis • Cervicitis • Upper genital tract infection	• Chemical irritation • Foreign body • Cervical ectropion • Atrophic changes • Physical trauma • Fistulas • Malignancy

Table 1: Pathological causes of vaginal discharge.

Infective causes of vaginal discharge

Although vaginal discharge is very common, only a small number of types of infection account for the majority of cases. Some of these are sexually transmitted diseases that are rarely seen outside certain risk groups. For women with certain underlying obstetric or gynaecological conditions the range of potential pathogens is much wider, and includes a range of bacteria that in other circumstance would be regarded are normal commensals of the vagina. Differences in the potential pathogens in different women mean that it is important to provide sufficient clinical details with requests to allow the microbiology laboratory to process samples appropriately.

Bacterial vaginosis

BV is characterized by replacement of the normal *Lactobacillus*-predominant flora by predominantly anaerobic bacteria, including *Gardnerella vaginalis*, *Prevotella* species and *Mobiluncus* species.

BV presents with a thin, white/grey, offensive vaginal discharge. The odour is often worse after sexual intercourse, because alkaline seminal fluid results in the release of amines. BV has been associated with many complications. BV is commoner in women with Pelvic inflammatory disease (PID), and is also associated with post-TOP endometritis. In pregnancy, BV is associated with preterm membrane rupture, preterm birth, late miscarriage and postpartum endometritis.

The laboratory diagnosis of BV is largely based on the altered microscopic appearance of a vaginal swab, sometimes combined with other features such as the pH of vaginal secretions. Various scoring systems are used, based on microscopic appearances and other characteristics, e.g. pH of vaginal secretions or a positive sniff test (fishy odour liberated when vaginal secretions are mixed with 10% KOH).

Treatment is with metronidazole 400–500 mg bd for 5–7 days, or 2 g as a single dose. Alternative regimes include oral clindamycin 300 mg bd for 7 days, or intravaginal metronidazole gel or clindamycin cream. All of these regimens give cure rates of 70–80%.

Candidiasis

Candida albicans accounts for 80–90% of cases of vulvovaginal candidiasis. Other species are important, because they are less predictably susceptible to the azole antifungal drugs.

The discharge is characteristically white, curdy and non-offensive. However, it can be thin. Other features include itch, vaginal soreness, dysuria and dyspareunia. On examination there may be erythema, oedema, fissuring and satellite lesions.

The laboratory diagnosis is usually based on a combination of microscopy and culture of vaginal swabs.

A wide range of treatments are available for candidiasis that give comparable outcomes, including topical and oral azoles and topical nystatin preparations.

Trichomoniasis

Trichomoniasis is caused by the flagellated protozoan *Tricomonas vaginalis*, and is almost always sexually transmitted. Up to 70% of women with trichomonas infection will have vaginal discharge. This varies in appearance, with only around 10–30% of women having the classical frothy yellow discharge.

Diagnosis of trichomoniasis is often based on microscopy alone, but culture is more sensitive and can detect an additional 30–50% of cases. Nucleic acid amplification technique (NAAT) tests for *T. vaginalis* will soon become commercially available in the United Kingdom (UK).

Most strains of *T. vaginalis* are highly susceptible to metronidazole, and a cure rate of 95% can be expected with 400–500 mg bd for 5–7 days, or 2 g as a single dose. In some cases treatment failure is because of metronidazole resistance. There is no consensus on how to manage these cases, but usually the first measure is a repeat course of metronidazole at a higher dose.

Chlamydia

Chlamydia is a sexually transmitted disease caused by the obligate intracellular bacterium *Chlamydia trachomatis*. Infections are frequently asymptomatic, although in women who are symptomatic, vaginal discharge is the usual complaint. Without treatment, 10–40% of women develop pelvic inflammatory disease, which can be complicated by infertility, ectopic pregnancy and chronic pelvic pain.

NAAT tests are now almost universally used for diagnosis of chlamydia, superseding the previous unsatisfactory diagnostic techniques.

Recommended treatment for uncomplicated chlamydial infection is with doxycycline 100 mg bd for 7 days or azithromycin 1 g orally as a single dose.

Gonorrhoea

Gonorrhoea is a sexually transmitted disease caused by the bacterium *Neisseria gonorrhoeae*. Like chlamydia, vaginal discharge is the most common symptom of gonorrhoea, but is found in at most 50% of cases. Complications include spread into the upper genital tract (<10% of cases) and disseminated gonococcal infection (<1% of cases).

Culture of an endocervical swab is the mainstay of diagnosis of gonorrhoea. Microscopy can help to make a rapid presumptive diagnosis, but *N. gonorrhoeae* is directly visible in only 30–50% of cases. NAAT tests are becoming increasingly used for diagnosis.

Currently recommended treatment for uncomplicated gonorrhoea is with ceftriaxone 250 mg IM as a single dose, cefixime 400 mg orally as a single dose or spectinomycin 2 g IM as a single dose. Resistance rates to penicillin, tetracycline and ciprofloxacin exceed 10%, and these agents are therefore no longer recommended as first-line treatment.

Other vaginal infections

These infections occur mainly in women with obstetric or gynaecological risk factors. Many infections are endogenous: that is caused by an overgrowth of bacteria that are part of the normal vaginal flora, e.g. coliforms, streptococci, anaerobes. The first challenge in diagnosing these infections is to assess the possible significance of any bacteria isolated from vaginal swabs. This needs to be done in the context of the patients' symptoms, current or recent antibiotic therapy (which may distort the normal vaginal flora without causing illness), and the presence of pus cells in a smear of the swab (suggestive of infection). Antibiotic treatment should be guided by the microbiology culture results.

Microbiological investigation of vaginal discharge

There is no consensus on when, and which, microbiological investigations are indicated. Genital tract swabs are mainstay of microbiological investigation of vaginal discharge. However, different swabs may be required to test for different pathogens: check the requirements of the local microbiology laboratory. Traditionally, vaginal and endocervical swabs were required for optimal detection of all pathogens. This is because *N. gonorrhoeae* and *C. trachomatis* infect the endocervix, whereas other infections are predominantly vaginal. However, with NAAT tests (such as polymerase chain reaction – PCR) these infections can be reliably diagnosed on vaginal swabs. Other advantages of these tests include rapid results, improved sensitivity and the ability to detect of non-viable microorganisms (making specimen transport conditions less stringent).

Although the clinical presentation of different causes of vaginal discharge is not pathognomic, the symptoms of two of the most common infective causes of vaginal discharge, BV and candidiasis are characteristic enough for some to advocate empiric treatment without laboratory investigation where these infections are suspected.

Vaginal discharge may be a symptom of sexually transmitted diseases, although a large proportion of women with these infections are asymptomatic. It is important to identify and treat sexually transmitted diseases are to prevent serious long-term morbidity and to terminate infectivity. The age group that is most at risk of sexually transmitted diseases is the ≤24 years age group, but older women who have had unprotected sex with a new partner within the last 12 months are also at risk. The possibility of sexually transmitted diseases should always be considered when considering investigation of women at risk, even where there appears to be another explanation for their vaginal discharge. Screening for chlamydia is especially important, given that it is much the commonest treatable sexually transmitted disease.

Taking the points discussed above into consideration, recommendations for appropriate microbiological investigations according to the clinical presentation of vaginal discharge are shown in Table 2.

Case-based discussion

Microbiological investigations required	Clinical presentation
None	Presumed candidiasis or BV (see text)
Vaginal swab for examination for BV, candidiasis, trichomoniasis	Where the symptoms are not characteristic of candida or BV or where discharge is recurrent
Vaginal swab for full microbiological culture	Post-natal Before or after termination of pregnancy Before or after gynaecological surgery Children Suspected pelvic inflammatory disease
Vaginal/endocervical swabs for testing for chlamydia	Include for all sexually active women aged ≤24 years; consider for other women at risk
Vaginal/endocervical swabs for testing for chlamydia and gonorrhoea	Include where sexually transmitted diseases considered likely

Table 2: Recommended microbiological investigations according to clinical presentation of vaginal discharge.

Conclusions

Infection is the commonest cause of vaginal discharge. Different pathogens are important in different groups of women, meaning that investigations have to be tailored according to the clinical presentation. Most infections respond well to antibiotic therapy, but a small number of women with recurrent discharge can be difficult to manage.

Case Histories

Case history 1

A 30-year-old married woman presents with recurrent thin, white, offensive vaginal discharge over a two-year period. The odour is worse after sexual intercourse. She has had an IUCD for the past 5 years. Three courses of antibiotics temporarily resolved the problem, but her symptoms have always recurred.

What is the likely diagnosis?

The symptoms are characteristic of BV.

How would you investigate the patient?

Whilst empiric therapy of presumed BV may sometimes be justified, in view of the recurrent nature of the symptoms in this case a vaginal swab is advisable.

What treatment would you give?

BV usually responds to treatment with metrondizole. However, there is no clear guidance on the management of recurrent infections. Periodic metronidazole administration has been proposed; treatment of partners is not beneficial. In this case the IUCD may be acting as a reservoir of infection, and consideration should be given to removing it.

Case history 2

A 23-year-old woman presented with a frothy yellow-green vaginal discharge. She admits to having had unprotected sexual intercourse with two partners in the past 6 months.

What is the likely diagnosis?

The symptoms are very characteristic of trichomoniasis.

How would you investigate the patient?

It is always advisable to collect a vaginal swab to confirm a diagnosis of trichomoniasis. Because of the age of this patient, testing for other sexually transmitted diseases, especially chlamydia, is advisable.

What treatment would you give?

Trichomoniasis is treated with oral metronidazole.

Case history 3

A 60-year-old woman presents with a non-offensive vaginal discharge that began 2 weeks after a gynaecological operation. She has had no other symptoms. Her General Practitioner prescribed co-amoxiclav, which did not improve her symptoms. A post-treatment vaginal swab shows no pus cells and a heavy growth of *Pseudomonas aeruginosa*.

What is the likely diagnosis?

The consideration here is whether the presence of *P. aeruginosa* is significant or not. It may be a non-pathogenic colonizer because co-amoxiclav has eliminated the majority of the normal vaginal flora. Alternatively it is possible that her discharge did not respond to co-amoxiclav because her original problem was a pseudomonas infection. Against this, however, her symptoms appear not to have worsened; the appearance of the discharge is not suggestive of infection; and no pus cells were present.

What treatment would you give?

The best thing to do is not to prescribe more antibiotics, but to ask her to return if the symptoms persist or worsen.

Summary Points

- Infection is the commonest cause of vaginal discharge.
- Different infections are important causes of vaginal discharge in different groups of women.
- BV and candidiasis are the most common vaginal infections.
- It is important to exclude sexually transmitted diseases when investigating women at risk of these infections, i.e. all sexually active women aged ≤24 years, or older women with a recent change of sexual partner.
- A wide range of bacteria can act as opportunistic pathogens, especially in women with obstetric or gynaecological conditions that may have damaged the

vaginal mucosa, thus increasing the susceptibility to infection. The challenge in interpreting culture results in such cases is judging the likely pathogenicity of any microorganisms isolated.

References

[1] Macsween KH, Ridgeway GL. ACP Broadsheet No. 153. The laboratory investigation of vaginal discharge. *J Clin Pathol* 1998;51:564–567.

[2] Smellie WSA, Forth J, Sundar S, *et al*. Best practice in primary care pathology: review 4. *J Clin Pathol* 2006;59:893–902.

[3] British Association for Sexual Health and HIV. http://www.bashh.org/guidelines.asp, accessed on 10th February 2008.

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HIV drugs explained

Tristan J. Barber and Fiona Boag

Introduction

In the last 20 years, HIV has become a manageable, chronic condition in the developed world. This has been a consequence of the development of new antiretroviral agents and the use of combination 'highly active' antiretroviral therapy – HAART. Non-HIV clinicians often find the choice of antiretrovirals bewildering and this is compounded by the fact that new agents and new classes of agent are constantly under investigation, thus guidelines change rapidly. The cornerstone of therapy currently remains two nucleoside reverse transcriptase inhibitors (nukes) combined with either a non-nucleoside reverse transcriptase inhibitor (NNRTI) or ritonavir (RTV)-boosted protease inhibitor (PI/r).

A. The drugs – What do we have?

A.1. Nucleoside/nucleotide reverse transcriptase inhibitors (NRTI/NtRTI)

The nucleosides are analogues of the naturally occurring substrates for DNA synthesis – adenosine, guanine, thymine and cytosine. They work by virtue of the fact that HIV is a retrovirus. It literally hijacks the CD4 T-cell and uses its enzymatic machinery to reproduce. To do this, it utilises a viral enzyme – reverse transcriptase (RT). Reverse transcriptase makes a DNA copy of the HIV RNA genome (the opposite process to eukaryotic translation, where messenger RNA is translated from host double-stranded DNA for transport to the ribosomes and subsequent protein synthesis). The HIV DNA copy is then inserted into the host genome by another viral enzyme – integrase. NRTIs act by competing with endogenous nucleosides at the active site of the RT enzyme.

Stage	Steps in replication	Drug targets
1	Attachment to CD4 receptor	
2	Binding to co-receptor CCR5 or CXCR4	CCR5/CXCR4 receptor inhibitors
3	Fusion	Fusion inhibitors
4	Reverse transcription	Nucleoside and non-nucleoside reverse transcription inhibitors
5	Integration	Integrase inhibitors
6	Transcription	
7	Translation	
8	Cleavage of polypeptides	Protease inhibitors
9	Viral release	

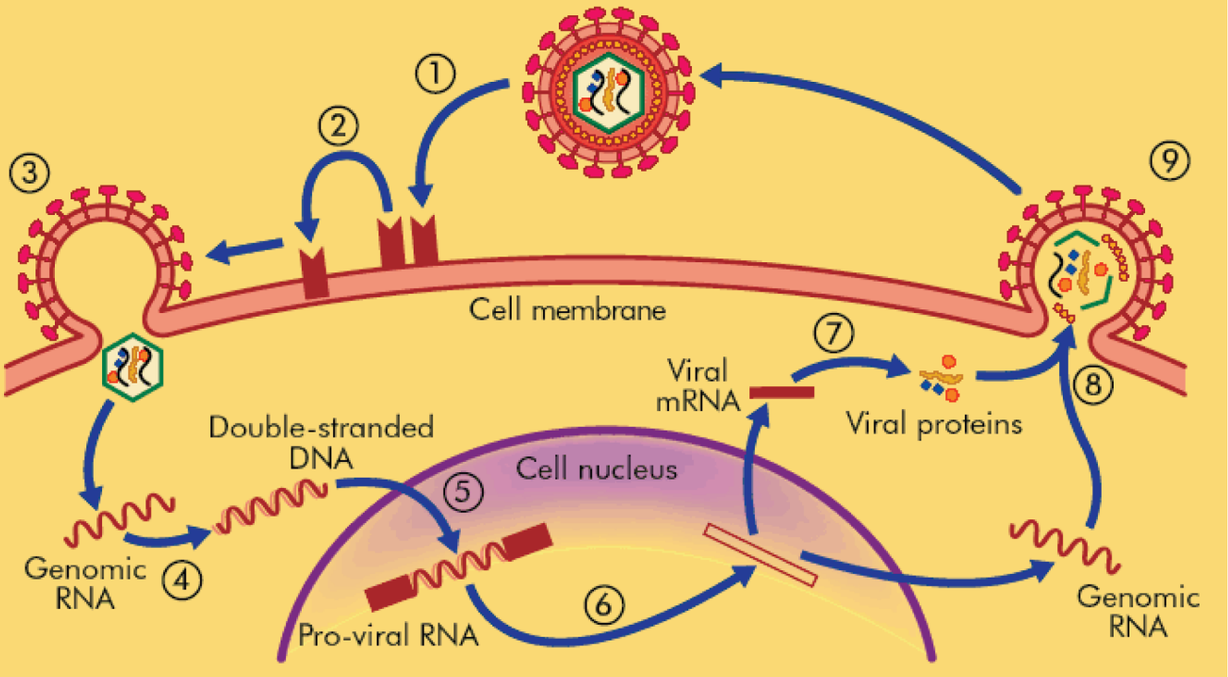

Figure 1: Life cycle of HIV replication and sites of drug action. (Reproduced with kind permission from Davidson's Principles & Practice of Medicine[8].)

Zidovudine	Retrovir®	AZT
Lamivudine	Epivir®	3TC
Emtricitabine	Emtriva®	FTC
Didanosine	Videx®	ddI
Abacavir	Ziagen®	ABC
Tenofovir	Viread®	TDF

Box 1: Commonly used NRTI drugs.

It is worth noting that TDF is a nucleotide rather than a nucleoside – this is because it has undergone one phosphorylation step. For the other drugs, three phosphorylation steps are necessary for intracellular activation, as opposed to only two for TDF.

Stavudine (Zerit®, d4T) is used less often now because of its long-term toxicities (lipoatrophy, particularly) although it may be used in the developing world and is being suggested may be safe at a lower dose than that previously used in Europe and the USA.

Combivir®	AZT/3TC	1 tablet twice daily
Trizivir®	AZT/3TC/ABC	1 tablet twice daily
Kivexa®	ABC/3TC	1 tablet once daily
Truvada®	FTC/TDF	1 tablet once daily

Box 2: Four fixed dose combination (FDC) tablets exist in the NRTI class.

The most common side effect with this class is nausea. Individual drugs have been associated with signature toxicities:

AZT	Anaemia
ddI	Peripheral neuropathy
ABC	Hypersensitivity reaction (HSR)
TDF	Renal impairment (Fanconi-like syndrome)
d4T	Peripheral neuropathy
d4T	Lipoatrophy

It is worth noting that this list of side effects is by no means exhaustive and further information should be sought from the summary of product characteristics by any prescriber.

It is also important to note that the ABC-associated HSR can be fatal on rechallenge. Anyone with a suspected HSR who has received ABC or Kivexa® should not receive an ABC-containing product again. The risk of developing an HSR has been greatly reduced by the development of HLA-B5701 testing. Individuals who are positive for the allele should not receive ABC-containing products, as their chance of developing an HSR is much higher.

There is much developmental activity in this class, looking at developing N(t)RTIs with better side effect profiles and longer half lives, as well as with better 'genetic barriers' to the development of viral resistance, or for use in those who have previously been exposed to the NRTI class and failed with the development of nucleoside-associated resistance mutations.

A.2. Non-nucleoside reverse transcriptase inhibitors (NNRTI)

These agents work by allosteric non-competitive inhibition of RT. They induce a conformational change in the enzyme by binding to it, thus preventing it from functioning normally.

Efavirenz	Sustiva®	EFV
Nevirapine	Viramune®	NVP

Box 3: Commonly used NNRTIs.

The most common side effects seen with these agents are:

- EFV: Rash; Altered dreams; Sleep disturbance; Mental state disturbance
- NVP: Rash (can lead to a severe Stevens–Johnson type syndrome); Hypersensitivity; Liver toxicity

The NNRTI class has been associated with a low-genetic barrier to resistance – this means that virological failure with the development of even just 1 NNRTI-associated mutation may cause therapeutic resistance to the whole NNRTI class. New drugs are being developed in this area, again with the design being towards better side effect profiles or virological activity in those who have NNRTI-associated resistance. The drug closest to license is TMC-125 (Etravirine, ETV).

A.3. Protease inhibitors (PIs)

After the DNA copy of HIV has been integrated into the host genome, when normal translation and transcription of host genes occurs, HIV proteins can be simultaneously produced by the CD4 T-cell. These proteins must then be cleaved and packaged before a mature virion can be formed, which buds from the cell surface and goes on to infect other cells. PIs interfere with the protease enzyme which acts in this processing chain, thus HIV cannot package itself into mature infectious virions.

One member of this class, RTV, is very toxic when given as part of triple therapy. However, this drug is a potent inhibitor of the liver cytochrome P450 system, where PIs are broken down. It was thus found that by using a low dose (usually 100 mg) of RTV (which is fairly well tolerated) it is possible to 'boost' the levels of other PIs, giving better in vivo drug concentrations whilst retaining favourable side effect profiles. The use of low-dose RTV in this way is denoted by '/r'.

Ritonavir	Norvir®	RTV
Lopinavir	Kaletra®	LPV/r*
Sanquinavir	Invirase®	SQV
Fosamprenavir	Telzir®	Fos
Atazanavir	Reyataz®	ATZ
Indinavir	Crixivan®	IDV (used less often)
Tipranavir	Aptivus®	TPV
Darunavir	Prezista®	DRV

Box 4: Drugs currently used PI drugs.
*Kaletra® is the only co-formulated tablet in this class. Each tablet contains 200 mg LPV and 50 mg RTV and the standard dosing is two tablets twice daily. For the other PIs, it is necessary to give RTV separately.

The most common side effects in the PI class have been:

- Drug–drug interactions (via P450 effects)
- Nausea
- Diarrhoea
- Biochemical lipid abnormalities#
- Lipodystrophy (controversial)
- Unconjugated hyperbilirubinaemia – seen with ATZ, not thought to be serious
- Renal stones – seen with IDV and to a lesser extent ATZ

[#]Biochemical lipid abnormalities seen include raised triglycerides (TG), raised low-density lipoprotein (LDL) cholesterol, and lowered high-density lipoprotein (HDL) cholesterol. As we know that high LDL and TG levels may be pro-atherogenic, whilst high HDL levels are cardioprotective, it is felt that continuous use of PIs may lead to an increased cardiovascular risk. As the effects on lipids may be complex, it is worth monitoring the ratio of total cholesterol to HDL rather than just total cholesterol levels in HIV+ patients on therapy. Management of these lipid abnormalities is contentious and an area of ongoing research, but two important points are worth noting. Firstly, HIV itself may be pro-atherogenic. It is felt that this may be mediated by chronic inflammation, and in patients who interrupt their HAART, there have been studies which have observed a doubling of cardiovascular risk and mortality[1]. It is also felt that PIs may be associated with an increased risk of myocardial infarction with one large cohort study attributing a relative risk of 1.16 for every year on continuous treatment with a PI[2].

The boosted PIs have been associated with a higher genetic barrier to resistance, meaning that in virologic failure it may take time to accrue mutations causing resistance to the drug being used or to other agents of the PI class. In some trials with boosted PIs, there have been no significant protease resistance mutations detected in patients failing their therapy. Patients failing in this way may still have developed resistance to other drugs or drug classes in their HAART combination.

A.4. Fusion inhibitors (FI)

These drugs work by preventing HIV entry via the CD4 receptor (CD4-R). The only currently available FI is Enfuvirtide (Fuzeon®; T20). It works by binding to a CD4 cell receptor protein in which it induces a conformational change, thus preventing HIV from entering the cell. It is a very effective and systemically well-tolerated drug[3], but its use is limited by its method of administration (subcutaneous injection twice daily) resulting in injection site reactions which can be painful and unsightly for the patient. It is also expensive.

A.5. New drugs

A.5.i CCR5 inhibitors

The oral entry inhibitors are a new class of drug. The only licensed drug in this class is Maraviroc (Celsentri®; MVC) which was licensed in 2007. These drugs act via the CCR5 co-receptor (CCR5-R). This co-receptor is found next to the CD4-R on CD4 T-cells.

HIV can use one of two co-receptors to gain entry to a CD4 cell. The CD4-R is essential. HIV entry requires the help of either the CCR5-R or the CXCR4 co-receptor. Use of the CCR5-R is more common in early infection. CCR5 also does not seem to be required by humans for normal immune function (CCR5 homozygous deletions occur naturally) whilst CXCR4 seems a more difficult target as it has a role in normal haemopoeisis. Maraviroc® was thus designed to inhibit HIV entry to the cell via the CCR5-R.

As yet, its role in anti-HIV therapy remains to be determined. Although data show that it can be efficacious[4], clinicians are cautious. Firstly, it is necessary to perform a tropism assay before use of the drug (to determine if the HIV strain a subject is infected with is 'R5-tropic' as we know that MVC will not work so well on mixed or X4 tropic virus). The second concern is the possibility of 'uncovering' X4 virus or inducing true 'tropism switching' by the use of CCR5 inhibitors. X4 virus is more commonly seen at last stages of HIV infection, thus its emergence may translate into progression of HIV.

Box 5: Extra learning point – How do CCR5 inhibitors work?

A.5.ii Integrase inhibitors

There are no licensed drugs yet in this class although the first in class, Raltegravir (RAL, MK0518, Isentress®) is expected to be licensed early in 2008.

Raltegravir works by preventing insertion of the DNA template formed by RT from viral RNA genome into the host genome. RAL has been shown to be extremely potent and well tolerated[5] although it may have a low-genetic barrier to development of resistance, perhaps needing only one genetic mutation to confer phenotypic resistance. Because of its mode of action early on in the HIV life cycle, it is felt that RAL may be of use early in HIV treatment paradigms. Indeed, if one were to hypothesise, it may be that by using RAL early after infection, or as pre- or post-exposure prophylaxis for HIV, one could prevent integration of HIV genes into the human genome and perhaps prevent long-term seeding of HIV in sanctuary sites, thus offering better protection against long-term establishment of HIV infection.

Box 6: How do integrasae inhibitors work?

A.5.iii Maturation inhibitors

Scientists continue to develop new agents in existing classes and there is also ongoing development work in new classes. The most notable of these is the maturation inhibitors. One candidate is Bevirimat. This drug interferes with budding and maturation of the new virion from the CD4 cell surface. Although it is someway off license and marketing, it will be interesting to see how development in this class progresses.

B. Prescribing – How do we do it and how do we do it safely?

Whilst an extensive treatment guide for HIV infection is outside the remit of this paper, it is important to discuss some fundamental principles.

Firstly, it remains convention that two drugs are better than one[6], and that three drugs are better than two. At the current time, we start therapy with either two nucleosides (generally an FDC such as Truvada® or Kivexa®) plus an NNRTI (EFV most commonly) or boosted PI (LPV/r, ATZ/r, Fos/r or – less commonly – SQV/r). The choice of NRTI backbone depends on the patient's comorbidities (e.g. renal disease, hepatitis B/C coinfection) and their HLAB5701 status, as discussed. The choice of third agent may also be affected by other conditions (e.g. EFV less suitable if of child bearing age or having previous psychiatric diagnosis), but also on local preference (NNRTI favoured in the UK with reservation of PI/r for later stages of infection).

Recent trials have shown that an EFV-based regime plus two NRTIs is as potent as LPV/r plus two NRTIs[7]. A 'nuke sparing' regime of EFV+LPV/r was shown not to be as efficacious as the other two arms of this study.

Other patient factors are important. If a patient is less likely to be adherent to their therapy, a boosted PI may be safer than an NNRTI in terms of development of resistance. It may also be the case that the patient was infected with a virus that had some baselines resistance (i.e. came from a source already exposed to ART). In this case, the source patients' ART history and/or the genotypic analysis of the virus in the host patient is relevant to selecting which ART to use.

All patients must be monitored clinically and biochemically before and during therapy for the development of toxicities and side effects.

We await research on novel ways to use our existing drugs, and also the best way in which to use new agents. We still do not know what the best drug combination is for first line ART. Some argue that your first combination should be the most powerful and that newer drugs such as DRV/r should be used early in our treatment paradigms to get the best 'first bite' of the treatment cherry. Others adopt a more pragmatic drug conservation approach, arguing that drugs designed for 'salvage' therapy (when patients have failed more established combinations) are best left for later on in treatment when therapeutic options are limited.

There have been some trials looking at PI/r monotherapy, and we continue to strive to find better ways of using drugs so that the experience of ART is more tolerable for our patients over the long term. Given the toxicities seen in the 1980s and early 90s, patients are rightly concerned about the long-term implications of being on ART, especially on drugs from the NNRTI or PI classes.

Conclusions

We can see that there have been dramatic developments in a short period of time in the field of anti-HIV chemotherapy. It is those developments that have enabled us, in some countries, and for some people, to make HIV a manageable long-term illness. However, access to drugs is not universal and even in developed countries long-term compliance with any medication is often fraught with difficulties. Drugs may not be tolerated by all of our patients, and ART provision offers challenges to healthcare providers, both clinically and at an economic and political level in terms of healthcare commissioning and costs. Working in this speciality will test expertise in your foundation skills – communication, accurate prescribing and multidisciplinary team work. Only by working together as multidisciplinary teams of healthcare professionals, and with our patients, patient advocacy groups, politicians and the pharmaceutical industry, can we continue to press for better access to treatment, locally and globally, and the development of better drugs with fewer side effects, for more complete long-term virological control for all.

References

[1] El-Sadr et al and SMART Study Team. CD4+ Count-Guided Interruption of Antiretroviral Treatment. New England Journal of Medicine. 2006; 355:2283–2296.

[2] Friis-Møller et al and DAD Study Group. Class of Antiretroviral Drugs and the Risk of Myocardial Infarction. New England Journal of Medicine. 2007; 356:1723–1735.

[3] Lalezari et al and TORO-1 Study Group. Enfuvirtide, An HIV-1 Fusion Inhibitor, for Drug-Resistant HIV Infection in North and South America. New England Journal of Medicine 2003; 348:2175–2185.

[4] Nelson et al. Efficacy and Safety of Maraviroc plus Optimized Background Therapy in Viremic, ART-Experienced Patients Infected with CCR5-Tropic HIV-1 in Europe, Australia, and North America: 24-Week Results. Conference on Retroviruses and Opportunistic Infections (CROI) 2007, Los Angeles, USA. 104aLB.

[5] Cooper et al. Results of BENCHMRK-1, a Phase III Study Evaluating the Efficacy and Safety of MK-0518, a Novel HIV-1 Integrase Inhibitor, in Patients with Triple-class Resistant Virus. Conference on Retroviruses and Opportunistic Infections (CROI) 2007, Los Angeles, USA. 105aLB.

[6] The Delta Coordinating Committee. Delta: A Randomised Double-Blind Controlled Trial Comparing Combinations of Zidovudine plus Didanosine or Zalcitabine with Zidovudine Alone in HIV-Infected Individuals. The Lancet 1996; 348:283–291.

[7] Riddler et al. A Prospective, Randomized, Phase III Trial of NRTI-, PI-, and NNRTI-Sparing Regimens for Initial Treatment of HIV-1 Infection: ACTG 5142. Program and Abstracts of the 16th International AIDS Conference; August 13–18, 2006; Toronto, Canada. Abstract THLB0204.

[8] "Life cycle of HIV replication and sites of drug action": "Figure 4" – Reproduced with kind permission from Elsevier on behalf of Churchill Livingstone from Davidson's Principles & Practice of Medicine by Haslett et al.

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Case-based discussion

Acute pelvic inflammatory disease

Sandra Sasson and Varsha Mulik

A 19-year-old woman presented to Accident and Emergency with a history of worsening lower abdominal pain of 5 days duration. This was associated with an abnormal vaginal discharge. On examination, she was febrile with a tender abdomen and cervical excitation. High vaginal and endocervical swabs were taken. A pregnancy test was negative. A transvaginal ultrasound scan revealed an adnexal mass. At laparoscopy, access was difficult due to adhesions. Hence laprotomy was performed with drainage of pelvic abscess and adhesiolysis.

Pelvic inflammatory disease (PID) is common. It is increasing in incidence and thus prevalence (increasing incidence does not imply increasing prevalence necessarily). It accounts for 1 in 60 GP consultations by women under the age of 45. One in eight teenagers attending a Family Planning clinic in Nottingham had a sexually transmitted disease (STD)[2]. Delay in receiving appropriate treatment markedly increases the risk of sequelae. One-third of women with untreated chlamydia go on to develop PID[3]. Sequelae include infertility, ectopic pregnancy and chronic pelvic pain. One in five women with an episode of PID will become infertile[3].

Pelvic inflammatory disease results from ascending infection from the endocervix, causing endometritis, salpingitis, parametritis, oophoritis, tubo-ovarian abscess and/or pelvic peritonitis. Causative agents include; chlamydia trachomatis, neisseria gonorrhoeae, mycoplasma genitalium and anaerobes. Up to 50% of men and 70% of women infected with chlamydia are asymptomatic but still contagious[3]. If symptoms do occur, they start 1–3 weeks after infection. They may include vaginal discharge, intermenstrual or post-coital bleeding, dysuria or pelvic pain in women, and urethral discharge or dysuria in men. In this case, the patient complained of abdominal pain, tenderness and vaginal discharge. She was clinically unwell to warrant an admission.

A low threshold for empirical treatment of PID is recommended because of a lack of definitive clinical diagnostic criteria[1]. Clinical features suggestive of PID include: lower abdominal pain and tenderness, deep dyspareunia, abnormal vaginal discharge, cervical excirtation and adnexal tenderness and fever (>38°C)[1]. Clinically unwell cases should be admitted to hospital for treatment. Admission is also warranted if surgical emergency cannot be excluded, in the presence of tubo-ovarian abscess, if PID occurs in pregnancy, if there is lack of response to oral therapy or intolerance to it[1]. Although laparoscopy has been considered the gold standard investigation, 15–30% of suspected cases may have no laparoscopic evidence of acute infection.

Women with suspected PID should be screened for chlamydia and gonorrhoea via endocervical swab and tested using a nucleic acid amplification test (NAAT), for example. Polymerase chain reaction, or strand displacement amplification, testing for gonorrhoea is also achieved via culture (direct inoculation onto a culture plate or transport of the swap to the laboratory within 24 hours).

Taking an additional sample from the urethra increases the diagnostic yield for chlamydia and gonorrhoea. A first-catch urine sample provides an alternative sample for some NAATs[1]. These samples are ideally taken prior to commencement of empirical treatment, as occurred with this patient.

Transvaginal ultrasound scanning may be helpful where there is diagnostic difficulty[1,10]. It was performed in this case due to her significant lower abdominal symptoms.

In mild or moderate PID (in the absence of tubo-ovarian abscess), there is no difference in outcome when patients are treated as outpatients or admitted to hospital[1,4].

Medication	Dosage and route of administration
Ofloxacin+	400 mg bd oral
Metronidazole	400 mg bd oral × 14 days
Ceftriaxone or	250 mg intramuscular
Cefoxitin+	2 g intramuscular
Probenecid then	1 g oral
Doxycycline+	100 mg bd oral
Metronidazole	400 mg bd oral × 14 days

Table 1: Outpatient antibiotic treatment.

Patients should be provided with a detailed explanation of their condition. In the outpatient setting, review at 72 hours and then 4 weeks is recommended[1,5].

In more severe cases, inpatient intravenous antibiotics are required and should be continued until 24 hours after clinical improvement. This was the case for our patient.

Medication	Dosage and route of administration
Cefoxitin+	2 g tds intravenous
Doxycycline then	100 mg bd intravenous/oral
Doxycycline+	100 mg bd oral
Metronidazole	400 mg bd oral × 14 days in total
Clindamycin+	900 mg tds intravenous
Gentamycin then	2 mg/kg loading dose intravenous
	1.5 mg/kg tds intravenous
Clindamycin or	450 mg qds oral × 14 days in total
Doxycycline+	100 mg bd oral
Metronidazole	400 mg bd oral × 14 days in total
Ofloxacin+	400 mg bd intravenous
Metronidazole	500 mg tds intravenous × 14 days

Table 2: Inpatient antibiotic treatment.

Women with HIV and PID should be treated with the same antibiotic regime. Ofloxacin should be avoided in young women when bone development is still occurring, based on data from animal studies[1,6]. Doxycycline can be safely used in children over 12 years of age[1,6].

An intrauterine contraceptive device may be left in situ in women with mild PID, but should be removed in severe disease[1,7-9].

Surgical treatment should be considered in severe cases, or where there is evidence of pelvic abscess. Laparotomy/laparoscopy may help early resolution of the disease by division of adhesions and drainage of pelvic abscesses[11].

We opted for surgical option in this case due to clinical severity and unwellness as well as presence of adnexal mass on ultrasound. One needed to exclude ovarian torsion.

Following surgery and intravenous antibiotics, our patient made a good recovery and was discharged on day 5. She was followed up in the emergency gynaecology clinic after 3 days, and subsequently in the outpatient setting 1 month later. She had completed her full antibiotic course and her symptoms had resolved. She was given advice regarding condom use to guard against future risk of sexually transmitted infections.

Current sexual partners of women with PID should be screened for gonorrhoea and chlamydia. Referral of the index patient and her partner to a genitourinary medicine clinic is recommended to facilitate contact tracing and infection screening.

All sexually transmitted infections are on the increase in the UK. Early detection and treatment is important to prevent sequelae. Contact tracing can help reduce onward transmission.

References

[1] RCOG. Green-top Guideline No. 32. Management of Acute Pelvic Inflammatory Disease, May 2003.

[2] James NJ, et al. Sex Transm Infect 1999;75:156–61.

[3] Parratt JR, Hay DP. Sexually transmitted infections. Curr Obstet Gynaecol 2003;13(4):224–31.

[4] Ness RB, Soper DE, et al. Effectiveness of inpatient and outpatient treatment strategies for women with pelvic inflammatory disease: results from the Pelvic Inflammatory Disease Evaluation and Clinical Health (PEACH) Randomized Trial. Am J Obstet Gynecol 2002;186:929–37.

[5] Centres for Disease Control and Prevention. Sexually transmitted diseases treatment guidelines 2002. MMWR Morb Mortal Wkly Rep 2002;55:1–84.

[6] British National Formulary, accessed on 10th February 2008.

[7] Grimes DA. Intrauterine device and upper-genital-tract infection. Lancet 2000;356:1013–9.

[8] Soderberg G, Lindgren S. Influence of an intrauterine device on the course of an acute salpingitis. Contraception 1981;24:137–43.

[9] Teisala K. Removal of an intrauterine device and the treatment of acute pelvic inflammatory disease. Ann Med 1989;21:63–5.

[10] Taipale P, Tarjanne H, et al. Transvaginal sonography in suspected pelvic inflammatory disease. Ultrasound Obstet Gynecol 1995;6:430–4.

[11] Reich H, McGlynn F. Laparoscopic treatment of tuboovarian and pelvic abscess. J Reprod Mad 1987;21:63–5.

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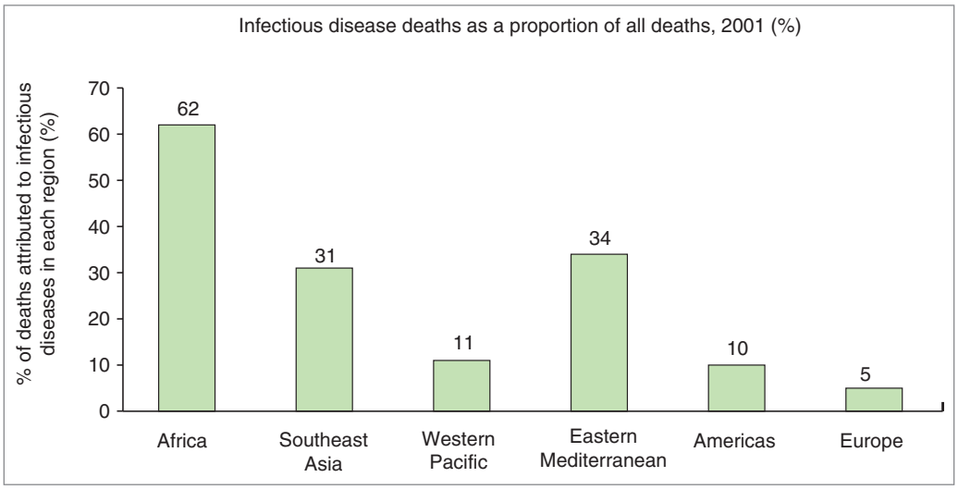
Infectious disease

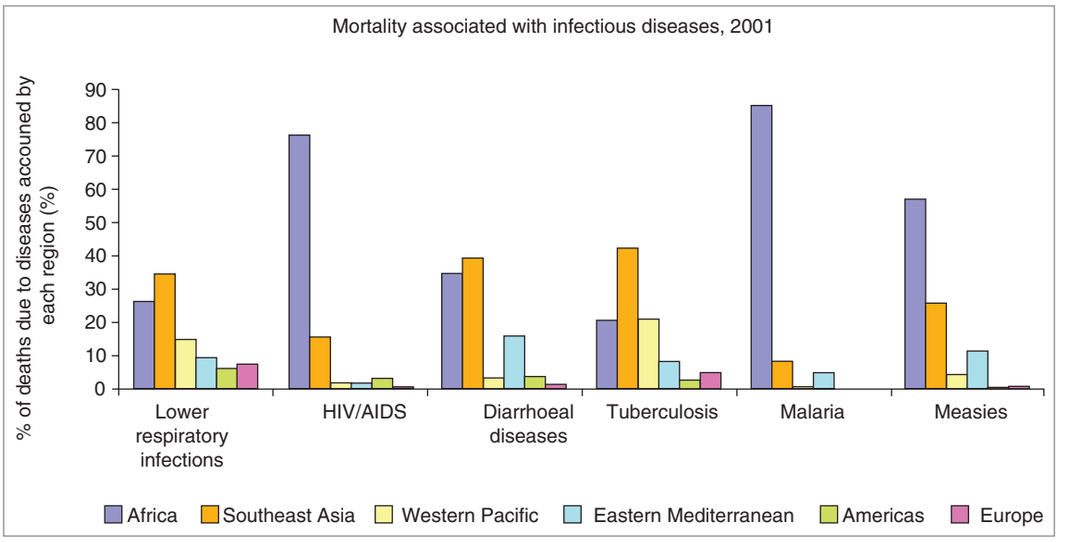
Elzubier Elzubier

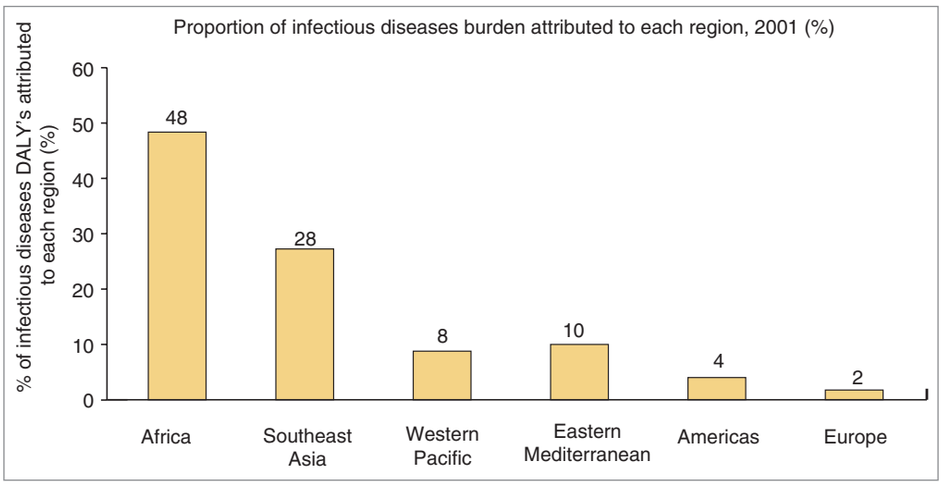
Infectious diseases are caused by pathogenic micro-organisms, such as bacteria, parasites or fungi. The diseases can be spread, directly or indirectly, from one person to another. Zoonotic diseases are infectious diseases of animal that can cause disease when transmitted to humans.

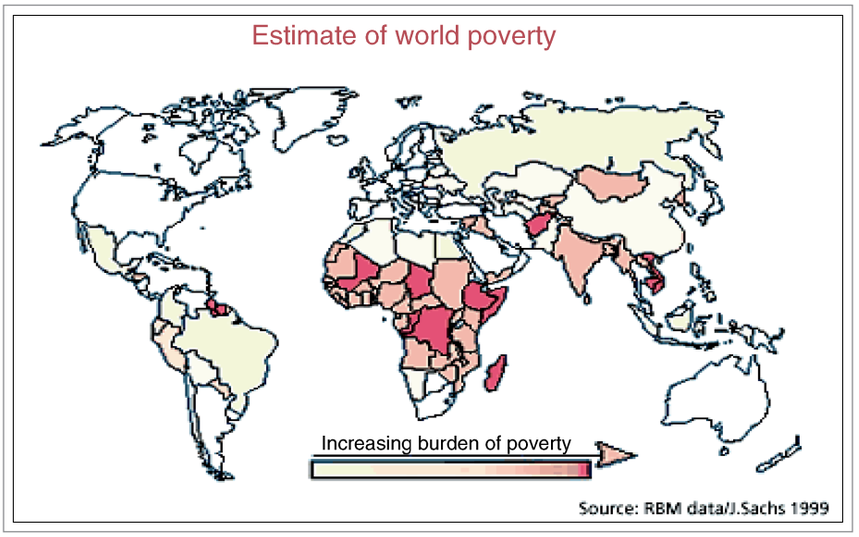
Burden of infectious diseases

The burden of infectious diseases is worldwide, and is strongly associated with poverty and low socioeconomic status. Infectious diseases are the commonest cause of death in the developing world.









Microbiological classification of infectious disease

Bacterial	Gram-negative Gram-positive
Viral	DNA virus RNA virus Enveloped vs. non-enveloped
Fungal	Disseminated Localized
Parasitic	Protozoa Helminths

Classification on the basis of system infected:

- Respiratory system infections
- Gastrointestinal system infection
- Genitourinary system infections
- Central nervous system infection
- Multi-system infection

Respiratory system infection

Respiratory tract infection is classified into upper respiratory tract infection (URTI) and lower respiratory tract infection (LRTI).

URTI

Details of the history aid in differentiating a common cold from conditions that required targeted therapy, such as bacterial pharyngitis and bacterial sinusitis. The table below contrasts symptoms of URTI with symptoms of allergy and influenza:

Symptom	Allergy	URTI	Influenza
Itchy, watery eyes	Common	Rare; conjunctivitis may occur with adenovirus	Soreness behind eyes, sometimes conjunctivitis
Nasal discharge	Common	Common	Common
Nasal congestion	Common	Common	Sometimes
Sneezing	Very common	Very common	Sometimes
Sore throat	Sometimes (postnasal drip)	Very common	Sometimes
Cough	Sometimes	Common, mild to moderate, hacking cough	Common, dry cough, can be severe
Headache	Uncommon	Rare	Common
Fever	Never	Rare in adults, possible in children	Very common, 100–102 °F or higher (in young children), lasting 3–4 days; may have chills
Malaise	Sometimes	Sometimes	Very common
Fatigue, weakness	Sometimes	Sometimes	Very common, can last for weeks, extreme exhaustion early in course
Myalgias	Never	Slight	Very common, often severe
Duration	Weeks	3–14 days	7 days, followed by additional days of cough and fatigue

LRTI

LRTI are often endogenous caused by micro-organisms in the patient's commensal flora. The upper respiratory tract lies above the vocal cords, the lower respiratory tract is situated below the vocal cords. In health, the lower respiratory tract is sterile. Sterility is maintained by the mucociliary escalator. Particles that land in the lungs become entrapped in the mucus that is constantly being swept up out of the lungs by the cilia. When this mechanism breaks down, infection may ensue. There are a large number of micro-organisms that can cause LRTI. Initial diagnosis of LRTI includes a clinical examination and a chest X-ray. The pattern of consolidated or inflamed lung disease revealed in these examinations will yield invaluable clues to the most likely causative organism. Community-acquired typical pneumonia gives lobar consolidation whereas atypical pneumonia gives bilateral infiltrates on X-ray.

Chronic bronchitis

Chronic bronchitis is a multi-factorial disease characterized by overproduction of mucus. In a large number of cases, strains of *Haemophilius influenza* can be isolated.

Pneumonia

Community-acquired pneumonia (typical pneumonia)

This is a pneumonia in which a discreet lobe of the lung is affected; it is almost invariably caused by *Streptococcus pneumoniae*. Over 85 distinct antigenic types have been recognized. The polysaccharide capsule of the organism enhances the pathogenicity of the bacterium. The strains that have lost their capsules are no longer capable of causing infections. Pneumococcal pneumonia is frequently accompanied by a bacteraemia or septicemia. Patients with bacteraemia present with meningeal irritation, deranged liver function and paralytic ileus.

Atypical pneumonia

This is a loose grouping of pneumonia cases that are not caused by classical bacterial pathogens, and it can be community- or hospital-acquired. Such cases typically have dry unproductive coughs and there is little or no evidence of consolidation of the lung tissue clinically, e.g. Legionnaire's disease, *Mycoplasma pneumoniae*, bird fancier disease and viral pneumonia.

Legionnaire's disease

This condition was first recognized amongst members of the Legionnaire's convention in Philadelphia in 1997. Hence, it is called Legionnaire's disease. *Legionella pneumophila* is the causative organism. It is widely distributed in natural waters and can easily be isolated from poorly maintained air-conditioning systems and in shower heads that are not regularly cleaned. From these sources, infected droplets can be aerosolized and dispersed. Legionnaire's disease resembles influenza clinically, particularly in early stages. *Legionella pneumophila* produces beta lactamase and this renders the bacterium resistant to penicillins. The antibiotic of choice is erythromycin.

Mycoplasma pneumonia

The causative organism is *M. pneumoniae*. The onset of the illness is insidious. These bacteria are difficult to stain and cannot be grown easily in artificial culture. Diagnosis depends on serological tests. *Mycoplasma* is treated with erythromycin or tetracycline.

Coxiella burnettie

Coxiella burnettie pneumonia is a less common cause of atypical pneumonia, which is a highly fastidious that can only grow within

other cells. It is thus an obligate intracellular parasite. Diagnosis depends on serological tests and the treatment is tetracycline or chloramphenicol.

Bird fanciers disease

It is an atypical pneumonia that occurs in patients exposed to canaries or parrots. The causative organism is *Chlamydia psittaci* or *C. ornithi*. The conditions are called psittacosis and ornithosis according to the causative organism. The condition is usually severe and can be treated with tetracycline. Diagnosis depends on serological tests.

Viral pneumonia

The best known of virus pneumonia is influenza. Influenza A virus undergoes continual genetic modification so that one person may have several bouts of influenza during their life times. When the new strains emerge, they can cause pandemics.

There is a current concern about the spread of avian influenza. Serologically, it has been described as 'H5N1' indicating its haemagglutinin and neuraminidase structure. It has recently been reported in some of Euorpean countries. Although at present infection of humans with this virus is rare and human-to-human spread is extremely unlikely, the disease in humans currently carries a very high mortality rate.

Respiratory syncytial virus can cause a mild 'flu-like' illness in older children and adults. However, in infants it can cause severe bronchiolitis.

Whooping cough

Whooping cough is an infection caused by *Bordetella pertussis*, a fastidious Gram-negative rod. This bacterium adheres to the epithelial lining of the trachea and bronchi where it releases toxins that interfere with ciliary motility. This subsequently causes over accumulation of mucus. Patients exhibit paroxysmal coughing, with a characteristic 'whoop'. In older children, the condition is relatively mild but in infants under 6 months it may be a life-threatening infection because of relatively small lung capacity. Antibiotics play a little useful role in treating the acute infection.

Pulmonary tuberculosis

'Classical' respiratory tuberculosis is caused by *Mycobacterium tuberculosis* or *Mycobacterium bovis*. So-called 'atypical' mycobacteria, particularly those of the *M. avium intracellulare* complex (MAC) or *M. kansasii*, can also cause a TB-like illness in immuno-compromised patients, especially those with AIDS–reference.

Following primary infection, lesions may become inactive and remain quiescent for many years. In later life, as the host defenses wane, old TB lesions may reactivate to cause a second phase of infectious disease. Diagnosis is made by observing acid alcohol-fast bacilli within the sputum using either Ziehl–Neelsen or auramine rhodamine phenol methods. Sputum samples can be cultivated on Lowenstein–Jensen medium, which takes 6–8 weeks. A skin test for delayed hypersensitivity can be used to determine immunity. This is done using a Mantoux or a Heaf test. Anti-tuberculous drugs are given in combination. The pattern of prescribing will depend upon local resistance patterns. Anti-tuberculous therapy includes isoniazid, rifampicin, pyrazinamide, ethambutol and streptomycin. Because mycobacteria are slow growing, anti-tuberculous therapy has to be prolonged, typically for 6 months to 2 years.

Gastrointestinal infection

Acute gastroentritis

Presentation of acute gastroenteritis is diarrhoea and/or vomiting usually accompanied by a fever of acute onset. Different micro-organisms may have their main effect on the small or large bowel.

Important organisms that may cause gastroenteritis

Viruses	Bacteria	Protozoa
Rotavirus	*Salmonellae*	*Entamoeba histolytica*
Norwalk virus	*Shigellae*	*Giardia lambilia* A1
Adenovirus	*Vibrios*	*Cryptosporidium*
Calicivirus	*Campylobacter*	
Astrovirus	*Escherichia coli*	
Coronavirus	*Yersinia enterocolitica* *Clostridium perfringens* *Bacillus cereus* *Clostridium difficile* *Helicobacter pylori*	

Viral gastroenteritis

Viruses are considered responsible for two-third of cases in childhood. Rotaviruses mainly affect children between 6 months and 2 years old. Usually vomiting and diarrhoea last for 5 days. The condition is highly infectious. Adult viral gastroenteritis is commonly due to calciviruses, e.g. Norwalk virus.

Diagnosis of viral gastroenteritis depends on demonstration of virus in stool or vomitus.

Electron microscopy is used for diagnosis. Detection of viral antigens and antibodies are also used for diagnosis.

Bacterial infantile enteritis

The commonest organism is Enteropathogenic Escherichia (EPEC). It mainly affects children under 2 years of age. Eighteen strains of EPEC have been identified. O157:H7 and O26,O55 and O111 are particular stereotypes causing gastroenteritis.

Travellers' diarrhoea

This is a worldwide disease of brief duration characterized by rapid onset of loose stools with or without nausea, vomiting and abdominal cramps. It usually occurs in travelers from an area of good hygiene to an area of poor hygiene (e.g. temperate to tropics) and can be due to EPEC. Treatment is primarily symptomatic. There is evidence that active treatment with trimethoprim or ciprofloxacin does shorten the period of symptoms.

Cholera

It is an ancient disease of Asia. It occurs in epidemics. The causative organism is *Vibrio cholerae* type 01. It is a waterborne disease. Food

occasionally implicated, e.g. shellfish. It is a disease of poverty and poor sanitation/water supply. The vibrios grow on the epithelial cells of the small bowl mucosa (no invasion) and produce enterotoxins.

The incubation period is classically 1–5 days. Presenting symptoms include abrupt onset of painless diarrhoea (rice, water and stools) and effortless vomiting leading to rapid death from dehydration. Treatment is aimed at replacement of fluids and electrolytes. Tetracycline orally after cessation of vomiting leads to shortening of both the period of diarrhoea and excretion of the vibrios.

Campylobacter enteritis

Campylobacter jejuni and *C. coli* invade the mucosa of the jejunum, ileum and colon. Incubation period is 2–5 days. It is usually associated with a prodrome of fever and malaise. Most cases are mild with brief entities however, more severe cases range from enterocolitis with abdominal pain and profuse diarrhoea to severe bloody diarrhoea mimic an acute abdomen or acute ulcerative colitis. Treatment of mild condition is symptomatic. Erythromycin can be used in early stages.

Helicobacter peptic disease syndrome

Helicobacter pylori is transmitted probably by oral or faecal/oral contact early in life; 80% of people in developing countries and 40% in developed countries are infected. The relationship between *H. pylori* was first discovered in 1982 by Marshall and Warren. *H. pylori* lives in gastric mucus, moves towards gastric epithelial cells using its flagella, and adheres to these cells. It produces urease which neutralizes stomach acid and induces inflammation, damaging the gastric cells. Thereby, it weakens the mechanism which normally protects cells from acid attack leading to a break down in mucosal integrity and ulceration. This is also described as the 'leaking-roof' concept. The treatment is 2-weeks of triple therapy, which is 90% effective in curing ulcers, includes metronidazole or clarithromycin four times daily and tetracycline or amoxicillin four times daily, bismuth subsalicylate four times daily and ranitidine. Two-week dual therapy is 80% effective in curing ulcers, which includes amoxicillin two to four times per day or clarithromycin three times per day and omeprazole.

Bacterial food poison

Food poisoning is common, usually mild, but sometimes deadly illness. Typical symptoms include nausea, vomiting, abdominal cramping and diarrhoea that come on suddenly (within 48 h) of consuming a contaminated food or drink. Depending on the contaminant, fever and chills, bloody stools and dehydration may follow. These symptoms may affect one person or group of people who ate the same thing (this would be called an outbreak).

UK causes

Salmonella 70–80%

Clostridium perfringens 15–20%

Staphylococcus aureus 2–5%

Organism	Incubation period
Salmonella food poisoning	12–36 h
Staphylococcus aureus	2–6 h
Clostridium perfringens	8–20 h
Bacillus cereus	18–16 h
Vibrio parahaemolyticus	12–18 h
Clostridium botulinum	18–36 h

Clostridium difficile

Antibiotic-associated diarrhoea due to overgrowth of toxin-producing *C. difficile* when normal colonization resistance is upset following broad-spectrum antibiotic therapy. Severe cases can develop colitis, which may be fatal. Diagnosis by culture of the organism and detection of toxin A and/or B in the faeces. The treatment: when possible, stop the provoking antibiotics. If severe, give oral metronidazole or oral vancomycin. Beware of spread of spores to other susceptible patients in the hospital.

Urogenital Infection

Cystitis, UTI

Escherichia coli is responsible for 75–90% of uncomplicated cystitis in young women and in more than half of the cases, in older women aged more than 50 years. *Staphylococcus saprophyticus* accounts for 5–15% of UTIs. *Klebsiella, enterococci bacteria, Protius mirabilis* and *Pseudomonas aeriognosa* account for 5–10% of UTI. Rare bacterial causes of UTIs include *Ureaplasma urealyticum* and *Mycoplasma* which are generally harmless organisms.

Sexually transmitted diseases

Organism	Presenting symptoms
Chlamydia	Cervicitis, vaginitis, conjunctivitis, urethritis, vaginal discharge and urethral discharge.
Neisseria gonorrhoeae	Gonorrhoea, urethritis, yellowish bloody discharge, bleeding between the periods, pelvic inflammatory disease, abdominal pain.
Herpes simplex virus	Genital herpes and oral herpes. Blisters, painful ulcers in mucus membrane.
Human papilloma virus	Genital warts or condylomata acuminata, warts in single or in clusters around the head of the penis, or around vaginal opening spread to rectal area.
Treponema pallidum	Syphilis. Stage 1, up to 12 weeks after the infection red lesions, called chancre, will develop on the penis, or labia or vagina. Sometimes on the mouth and lips. Stage 2, up to 6 months after infection. Rash, high fever, sore throat and generalized aches and pain. Stage 3. If the illness is not treated by the second stage, it will become dormant and return 20 years later. With heart failure, paralysis and dementia.
HIV	AIDS, fever, diarrhoea, loss of weight, night sweats and swollen glands. Opportunistic infection.

Central nervous system infection

Central nervous system infections are extremely serious. Meningitis affects the membranes surrounding the brain and spinal cord. Encephalitis affects the brain itself. Viruses that infect the central nervous system include: herpes viruses, arboviruses, coxsackieviruses, echoviruses and entereoviruses. Infections that affect both the meninges and brain result in meningoencephalitis. Bacterial causes of meningitis include: *meningococci, pnumococci, Hemophilus*

influenzae B, *tuberculosis*, *E. coli* and *group B streptococcal haemolyticus*. Presenting symptoms include fever headache, vomiting, lethargy, skin rash, seizure attack and neurological deficit.

Emerging infectious diseases

Emerging infectious diseases are infections that have recently appeared within a population or those whose incidence or geographical range is rapidly increasing or threatens to increase in the near future.

Emerging infections can be caused by:

- Previously unknown or undetected infectious agent.
- Known agent that has spread to new geographic location or new population.
- Previously known agent whose role in specific diseases has previously gone unrecognized.
- Re-emergence of agents whose incidence of disease had significantly declined in the past, but whose incidence of the disease has re-appeared. This class of diseases is known as re-emerging infectious diseases.

The World Health Organization in its 2007 report warned that infectious diseases are emerging at a rate that has not been seen before - reference. Since the 1970s, about 40 infectious diseases have been discovered, including SARS, avian flu and Ebola. With people traveling much more frequently and far greater distances than in the past, the potential for emerging infectious diseases to spread rapidly and cause global epidemics is a major concern.

References

[1] Mims CA, Playfair JMA, Roitt IM, et al. *Medical Microbiology 1993*, Mosby.

[2] Shanson DC. *Microbiology in Clinical Practice*, 2nd edn., Wright, Bristol, 1989.

[3] Division of Epidemiology and Immunization, Division of Food and Drugs and Division of Diagnostic Laboratories. Foodborne Illness Investigation and Control Reference Manual, Department of Public Health, Massachussetts, September 1997.

[4] Nicolle LE. Infection control in long term care facilities. *Clinical Infectious Disease* 2000, 31:752–756.

[5] Smith JL. Foodborne illness in elderly. *Journal of Food Protection* 1998, 61(9):1229–1239.

[6] Smith PW, Rusnak PG. Infection prevention and control in long term care facilities. *American Journal of Infection Control* 1997, 25:488–512.

[7] Bisol AL, Gerber MA, Gwaltney JM, Kaplan EL, Schwartz RH. Diagnosis and management of group Astreptociccal pharyngitis: A practical guidelines. Infectious Disease Society of America. *Clinical Infectious Disease* 1997, 25(3):574–583.

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Traveller's diarrhoea

Karl Braid and Jeremy Gardner

Introduction

Traveller's diarrhoea is defined as the passage of at least three unformed stools over 24 hrs[1], occurring during or after returning from foreign travel. It is usually infectious in nature (bacterial, viral, protozoan, parasitic), but can occasionally be associated with overindulgence. An estimated 20–50% of traveller's experience diarrhoea when travelling to high-risk areas (Asia, Africa, South America), although the figure is smaller in lower-risk destinations (Europe, North America, Japan)[2]. Faeco-oral remains the most important route of transmission.

Risk factors

The traveller's destination remains the most important risk factor for the development of infectious diarrhoea. Developing parts of the world often have contaminated water systems and food preparation may not be as meticulous as in the West. Raw vegetables, unpeeled fruit, salads and undercooked meat also confer a high risk, as does eating in public restaurants as opposed to meals consumed in private homes[2]. Certain individuals are more prone to developing traveller's diarrhoea, including the very young or old, those suffering from inflammatory bowel disease and diabetes, the immunocompromised[3], and those at risk of achlorhydria (PPI therapy, post-gastrectomy).

Causative organisms

Bacteria are the most important pathogen implicated in travel-associated diarrhoea, accounting for approximately 80% of all cases, of which enterotoxigenic *Escherichia coli* is the most common isolate. Other bacterial and non-bacterial organisms are important, and should be considered in the context of the clinical presentation and destination from which the patient has returned[2]. Important organisms include[2]:

Pathogen	% Isolation	Commonly affected areas
Enterotoxigenic *E. coli*	20–50%	Latin America
Campylobacter spp.	5–30%	Southeast Asia, especially Thailand
Salmonella spp.	5–25%	
Enterohaemorrhagic *E. coli* and *Shigella* spp.	5–15%	Africa, Central America
Vibrio spp.	<5%	Southeast Asia
Viruses (rotavirus, noravirus)	5–25%	
Protozoa (*Giardia lamblia*, *Entamoeba histolytica*)	0–10%	North America, Russia, Eastern Europe

It must be noted that in up to 50% of cases, no causative organism is isolated[2]. The vast majority of *Vibrio* spp. isolates are *V. parahaemolyticus* as cholera is rare nowadays.

Pathophysiology

Several bacteria produce enterotoxins that precipitate secretory diarrhoea. Many of these toxins are bivalent in nature, with one subunit causing structural changes in membranes of enterocytes that facilitates the entry of the second unit. Once inside the cell, the second unit activates adenylate cyclase resulting in uncontrolled production of cyclic AMP, which, via a series of enzymatic cascades, causes numerous chloride channels to open allowing for efflux of ions and water into the intestinal lumen. This is a well-studied process, and is the mechanism of action by which cholera toxin and other enterotoxins[2] cause diarrhoea. There is also some evidence that these toxins mediate a neurohumoral response through interaction with prostaglandins, substance P and vasoactive intestinal peptide to precipitate diarrhoea[4]. Direct injury to the intestinal villi can occur via direct invasion by pathogens and ensuing immune-mediated damage, resulting in decreased intestinal absorption that exacerbates diarrhoea. This latter mechanism is important in the development of viral and protozoan diarrhoea.

Clinical features

Symptoms typically start during the first week of travel, with most patients presenting within the first 2 weeks (allowing for presentation on returning from abroad). Patients often complain of:

- Loose, watery motions
- Nausea and/or vomiting
- Cramping, abdominal pains and bloating
- Fever
- Anorexia

Weight loss can be an uncommon finding, and is usually seen in association with chronic diarrhoea. The presence of blood in the motions (dysentery) suggests infection with enteroinvasive *E. coli*, *Shigella* spp., *Salmonella* spp., *Campylobacter* spp., *Yersinia* spp. and *E. histolytica*, whilst persistent diarrhoea is more indicative of *G. lamblia*, *E. histolytica* and *Cyclospora cayetanensis*.

The history should also include use of prophylactic agents and antibiotics, enquiry into dietary factors and other family members or friends affected.

Joint pain can occur in *Yersinia enterocolitica* and *Campylobacter jejuni* infection, the latter also being a known precipitant of Guillain–Barre syndrome. Bacillary dysentery is also a recognized precipitant of Reiter's syndrome and reactive arthritis. Rarely, some patients can present with haemolytic uraemic syndrome in the setting of diarrhoea caused by shiga-producing *E. coli* or some serotypes of *Shigella dysenteriae*.

Examination is often unhelpful in determining the infective pathogen, but is vital in assessment of the patient's intravascular volume status and in the identification of other causes and risk factors for diarrhoea.

Investigation

Specific investigation is usually not indicated in the majority of patients presenting with acute water diarrhoea, as the disease is typically mild and self-limiting. However, high-risk patients or those presenting with persistent or bloody diarrhoea do warrant further investigation[4].

- **Blood tests** including a full blood count, creatinine, urea and electrolytes, and C-reactive protein are useful in screening for dehydration induced renal failure and

haemolytic uraemic syndrome, causing anaemia, thrombocytopenia and acute renal failure.

- **Stool microscopy and culture** (three samples on three separate days may be required) is the first-line investigation and often allows for direct visualization of parasites by light microscope and staining techniques (*E. histolytica*, *G. lamblia*, *Cryptosporidium parvum*). Subsequent culture can allow for identification of bacterial agents. Faecal antigen tests are available for *E. histolytica* and viral agents, and presence of *Clostridium difficile* toxin can be tested for.
- **Serology** testing is useful in suspected cases of *Yersinia* spp., *E. histolytica*, strongyloidiasis and schistosomiasis.
- **Abdominal radiography** is reserved for the acutely unwell and peritonitic patient to exclude bowel perforation and toxic megacolon.
- **Ultrasonography** is sometimes useful to exclude non-infectious pathology, intestinal TB and detection of complications (amoebic liver abscess, toxic megacolon).
- **Oesophagogastroduodenoscopy** can be important in the investigation of persistent diarrhoea, often revealing villous atrophy in protozoa infection. Duodenal biopsy can reveal the presence of protozoal cysts and larvae in strongyloidiasis, whereas aspiration of intestinal contents can be tested for presence of motile trophozoites typical of *G. lamblia*.
- **Colonoscopy** is important where stool culture and microscopy has proven unhelpful. It can help exclude non-infectious pathologies, although in an acute setting it is often unreliable as ulceration can occur in both inflammatory bowel disease and infectious colitis (*E.histolytica*, intestinal TB). Biopsy allows for detection of *E. histolytica* and ova of *Schistosoma* spp.

Prevention

The most effective method in the prevention of traveller's diarrhoea is to avoid ingestion of infective agents. This can be achieved with clear, succinct travel advice that conveys the importance of only drinking bottled, boiled or carbonated water and eating only cooked meat and vegetables and peeled fruit.

Traditionally, chemoprophylaxis included the use of doxycycline, co-trimoxazole and ciprofloxacin. Such regimens are not recommended in most travellers as many pathogens are resistant to these agents[5,6] and it promotes further resistance, whilst also risking precipitation of side effects. However, high-risk travellers are often provided with suitable antibiotic-based prophylaxis that can be initiated in the event that severe or non-resolving diarrhoea develops.

Although vaccines exist for *V. cholerae* and enterotoxigenic *E. coli*, they are not yet commercially available and, as such, have little role in prophylaxis against traveller's diarrhoea. Similarly, probiotics containing *Lactobacillus* spp. have often been said to help prevent diarrhoea by competing with enteric pathogens for nutrients. However, clinical evidence for this is inconclusive[2,7].

Treatment

Traveller's diarrhoea is usually more disruptive than life threatening, and rarely requires treatment. Patients should be educated on the management of an acute diarrhoeal illness, particularly regarding the importance of adequate hydration. This is usually sufficient unless there is rapid fluid loss as seen in severe diarrhoea and vomiting, or there is more rapid decompensation from hypovolaemia (as seen in infants and the elderly). In these cases, intravenous rehydration in conjunction with oral rehydration solutions (glucose-electrolyte powders) is recommended to prevent derangement of cellular electrolytes.

Loperamide is the most widely used anti-motility agent used in acute infectious diarrhoea. It not only provides symptomatic relief, but also facilitates absorption of fluid and electrolytes from the intestinal lumen[2]. It is not recommended in mild traveller's diarrhoea, but is useful in moderate or severe symptoms. It is contraindicated in dysentery as it may delay the clearance of invasive pathogens, increasing the risk of toxic megacolon. Furthermore, it is not recommended in children due to the risk of accidental narcotic intoxication.

Bismuth salicylate is effective in both the prophylaxis and acute treatment of traveller's diarrhoea, as it displays bactericidal and anti-secretory properties[1,8]. However, the large volumes required for its effectiveness, together with its foul taste and unpleasant side effects (nausea, tinnitus, black tongue) make it an unpopular choice of treatment.

Antimicrobials are typically reserved for high-risk individuals, patients presenting with severe symptoms, and in suspected typhoid fever, dysenteric shigellosis, and amoebiasis. Local guidelines should always be consulted when deciding which agent to initiate. In general, bacterial diarrhoea responds well to doxycycline, azithromycin or quinolones since resistance to co-trimoxazole is well established. It must be noted that some strains of *C. jejuni* originating in Asia are resistant to quinolones, making azithromycin a more appropriate antibiotic. Metronidazole is used in diarrhoeal illnesses caused by *C. difficile*, *E. histolytica* and *G. intestinalis*. Helminthic infections are treated with albendazole or praziquantel, whilst CMV-associated diarrhoea responds to ganciclovir.

Conclusion

Traveller's diarrhoea is a common consequence of foreign travel, but rarely requires extensive investigation or treatment owing to its self-limiting nature. Oral rehydration remains the mainstay of treatment, although the use of antimicrobials is useful in special circumstances and the carriage of antibiotic prophylaxis is recommended in areas where medical services would be difficult to access.

References

[1] Anon L. What to do about traveller's diarrhoea. *Drug Ther Bull* 2002;40:36–38.

[2] Diemert DJ. Prevention and self-treatment of traveler's diarrhea. *Clin Microbiol Rev* 2006;19(3):583–594.

[3] Farthing MJ. Traveller's diarrhoea. *Gut* 1994;35:1–4.

[4] Casburn-Jones AC, Farthing MJG. Management of infectious diarrhoea. *Gut* 2004;53:296–305.

[5] Cabrera R, Ruiz J, Marco F, et al. Mechanism of resistance to several antimicrobial agents in *Salmonella* clinical isolates causing traveler's diarrhea. *Antimicrob Agents Chemother* 2004;48(10):3934–3939.

[6] Vila J, Gascon J, Abdalla S, et al. Antimicrobial resistance of *Shigella* isolates causing traveler's diarrhea. *Antimicrob Agents Chemother* 1994;38(11):2668–2670.

[7] Gismondo MR, Drago L, Lombardi A. Review of probiotics available to modify gastrointestinal flora. *Int J Antimicrob Agents* 1999;12:287–292.

[8] Dupont HL, Ericcson C. Prevention and treatment of traveler's diarrhea. *N Engl J Med* 1993;328:1821–1827.

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Sexually transmitted infections

Sandra Sasson and Varsha Mulik

Sexually transmitted infections (STIs) cause a wide range of illness and lead to significant long-term debility in the United Kingdom (UK). STIs include chlamydia, gonorrhoea, syphilis, genital herpes, anogenital warts and human immunodeficiency virus (HIV). There has been an increase in high-risk behaviour and the UK prevalence of all STIs is on the increase.

Specific STIs

Chlamydia is the most prevalent STI in the UK. In 2001, the highest rates were amongst 16- to 19-year-old females. One-third of women with untreated chlamydia go on to develop pelvic inflammatory disease (PID). One of five women with an episode of PID will become infertile.

Gonorrhoea is the second most common cause of PID. In 2001, incidence was highest in 20- to 24-year-old males in the UK. Men more frequently show signs of infection, typically dysuria and urethral discharge. These symptoms appear 2–10 days after infection. Up to 20% of men and 40% of women with gonorrhoea are also infected with chlamydia.

Incidence of syphilis between 1996 and 2001 raised sixfold in the UK. The predominant mode of acquisition is male homosexual intercourse. In 2001; rates in males were highest in the 25–44 age group (5/100,000). Symptoms are non-specific. The primary infection consists of one or more infectious sores with regional lymphadenopathy. These resolve in 2–6 weeks. Secondary symptoms include a rash on the palms or soles. This develops 6 weeks to 6 months later. Tertiary syphilis occurs 4 or more years after untreated primary infection. Symptoms are very variable and range from skin lesions to dementia. First line treatment is bicillin 800,000 U i.m. for 10–14 days for early infection, and 17–21 days for late infection. In pregnancy if untreated, 70–100% of infants will be infected, and up to one-third stillborn.

Herpes simplex virus infection is the most common ulcerative STI in the UK. The highest incidence rates occur in 20–24 year olds (0.2%). Symptoms include tingling and pain followed by blisters. Dysuria may occur and can lead to acute retention. Treatment involves acyclovir 200 mg five times daily for 5 days.

Consequences of STIs

STIs are associated with PID, infertility, ectopic pregnancy, cervical cancer, neonatal infections and even death, particularly in the case of HIV infection[3]. Early detection is important to prevent severe sequelae. If one STI is found, others should be screened for. Contact tracing and education are vital to reduce STI spread. Screening pregnant women for HIV allows treatment to reduce the risk of vertical transmission.

Primary prevention of PID is dominated by preventing both exposure to and acquisition of chlamydia and gonorrhoea infection. Educational campaigns should aim to raise professional and public awareness of healthy sexual behaviour. Young people can be targeted in schools from as early as 12 years of age.

It is important to identify modifiable risk factors for PID to aid disease prevention. These include young age at sexual debut, a high frequency of sexual intercourse, low usage of contraception and multiple sexual partners[1]. Cigarette smoking may only be indicative of risk-taking behaviour. Non-modifiable risk factors include race, socioeconomic status, age and marital status.

Points in a sexual history

- Patient age, parity and presenting complaint
- Last menstrual period, pregnancy test result
- Regularity of menstrual cycle
- Any abnormal bleeding; intermenstrual/postcoital bleeding/breakthrough bleeding on the oral contraceptive pill
- Previous sexually transmitted infection/PID, treatment and GUM attendance
- Smear history (if >24 years old)
- Contraception use barrier, oral and intrauterine
- Dyspareunia – superficial/deep
- Stability of relationship, number of sexual partners and frequency of intercourse
- Past obstetric/gynaecological history – ectopic, termination of pregnancy
- Social history – any high-risk behaviour; smoking, intravenous drug use and sex worker

Contraception

Contraceptive choices are expanding and new methods are becoming more widely available. More choices remain open to women than to men[4].

Examples of reversible methods are as follows:

Long acting methods that require little input, include injectable progestogens (Depo-provera), subdermal implants (implanon), copper bearing intrauterine devices (IUCDs) and the levornogestrel intrauterine system (IUS). These methods are the most reliable and cost-effective forms of contraception. They not only cut the costs of healthcare provision, but also reduce pregnancy-related mortality and morbidity.

Methods under direct control of the individual

These include combined oral contraceptives (COCs), the contraceptive patch, progestogen only pills (POPs), male and female condoms, diaphragms, cervical caps, periodic abstinence, lactational amenorrhoea and coitus interruptus. The effectiveness of these methods may heavily depend on lifestyle.

Method	Failure rate
Combined oral contraceptive pill	0.1–1
Progestogen only pill	1–3
Depo-provera	0.1–1.2
Implanon	0.2–1
Intrauterine contraceptive device	1–2
Male condom	4–5.5

Table 1: Method failure rates (per 100 women-years).

Good clinical care

Different methods will suit the same individual or couple at different ages and stages of their lives. It is important that as wide a choice as possible is available, and that enough time can be given to helping the patient to choose. It is better to possess the personal, medical and family history, and have baseline test results such as weight and blood pressure available before any detailed discussion takes place. Women often have preferred methods and just require more information on their usage.

Sexual health care is about providing choices rather than treating illness. A modern contraception service should provide easy access to all methods, on the spot pregnancy testing and ease of access to transvaginal ultrasound.

Unwanted pregnancy and termination

The UK has the highest teenage pregnancy rate in Western Europe, twice that of France and Germany, and four times that of Holland. In 2004, conception rate in England was 41.5 per 1000 girls aged 15–17 years. There has been a steady decline. The USA has the highest rate in the world; 43 per 1000[5].

Emergency contraception is available, either as a hormonal method (Levonorgestrel 1.5mg, 3mg if taking enzyme inducing drugs), or an intrauterine contraceptive device (IUCD, copper coil). The hormonal method is effective within 72 hours of coitus, preferably <12 hours. Between 72 and 120 hours, it is unlicensed. The woman is advised if she vomits within 3 hours of taking the medication, she will require a repeat dose with an anti-emetic. Domperidone is the preferred choice. She is further advised that her next period may be irregular, to use barrier contraception to the next period and to see a Doctor if she experiences pain or abnormal bleeding. It is marketed as Levonelle one step, which can be bought over the counter priced £13.83. If under 16 years of age, a prescription is required (Levonelle 1500 £5.11).

The copper coil can be inserted up to 120 hours after coitus or up to 5 days after earliest ovulation. High vaginal and endocervical swabs should be taken to screen for STI, and azithromycin 1g stat should be prescribed as a precaution.

The Abortion Act was introduced in 1967 in Britain. The termination rate in the UK is 9–14 per 1000 women aged 15–45 years. A woman's lifetime chance of termination in the UK is 1 in 40. In 2002, in England and Wales 175,569 terminations were performed. Of these; 42% were performed in an NHS hospital, 36% were in an agency funded by the NHS and 22% were in a private clinic.

The earlier the procedure is performed, the lower the complication rate. Assessment should occur between 5 days and 2 weeks of referral. Women should undergo the procedure within 7 days to 2 weeks of assessment. The minimum standard should be no longer than a 3-week wait from initial referral to procedure.

The majority of cases should be performed as a day case; however, approximately 5% of women require in-patient care. They should be cared for separately. The termination can be performed either as a medical or surgical procedure. Medical is most effective <7 weeks gestation, but is appropriate between 7 and 9 weeks. Surgical is appropriate between 7 and 9 weeks, at >15 weeks dilatation and evacuation is performed. Anti-D is required in rhesus negative women after surgical procedures[6].

Risks of the procedure include: haemorrhage (1 in 1000), infection (1 in 10), uterine perforation (1–4 in 1000), uterine rupture (<1 in 1000), cervical trauma (1 in 100), failed termination (2.3 in 1000 surgical, 1–14 in 1000 medical) and psychological sequelae.

Contraceptive advice or administration should be given prior to discharge to reduce the risk of further unwanted pregnancies. Pre- and post-termination counsellings are extremely important components of a high-quality service.

References

[1] Shaw RW, Soutter WP, Stanton SL. Gynaecology, 2nd edition, 1997.

[2] Washington AE, Aral SO, Wolfer-Hanssen P, Grimes DA, Holmes KK. Assessing risk for pelvic inflammatory disease and its sequelae. JAMA; 1991; 266(18):2581–6.

[3] Parratt JR, Hay DP. Sexually transmitted infections. Current Obstetrics & Gynaecology; 2003;13(4):224–231.

[4] Oakeley P. Choices of contraception. Current Obstetrics & Gynaecology; 2004;14(1):68–71.

[5] RCOG. National Evidence Based Clinical Guideline: The care of women requesting Induced Abortion, 2004.

[6] Allsop JR. Termination of pregnancy. Current Obstetrics & Gynaecology; 2004;14(4):285–290.

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Needlestick injuries in healthcare workers

Earim Chaudry, Shahneila Chaudry, Christopher McDonnell and Samir Dervisevic

A needlestick injury (NSI) occurs when a person sustains a skin puncture wound from a sharp object – most commonly a hypodermic syringe – although sharp equipment such as scalpels or broken glassware may present a similar hazard. This puncture wound can lead to potential exposure to another person's body fluid, resulting in the transmission of infectious disease, most notably bloodborne viruses such as hepatitis B, hepatitis C and human immunodeficiency virus (HIV). A mucosal splash injury can present a similar problem although the risk is smaller[1].

Healthcare workers (HCWs) are at risk of NSI when they use or dispose of needles and other sharp objects. An injury can occur when taking blood from a patient, suturing during surgery or when disposing of waste. Needles can become concealed in linen or garbage and injure other workers who encounter them unexpectedly[1].

Between 1996 and 2004, over 2140 incidences of significant exposure to bloodborne viruses were reported to the HPA[2], including nine HCWs that contracted hepatitis C over the same period. Whilst more than half of these exposures occurred during a procedure, over a third happened after the procedure and during the disposal of clinical waste left by another worker.

An NSI can have a severe and long-lasting emotional impact even when a serious infection is not transmitted. Not knowing the infection status of the patient (donor) can accentuate the stress of the HCW (recipient). A counselling service should be provided to all HCWs who experience an occupational exposure.

Risk of infection after a needlestick injury

Although needlestick injuries (NSIs) may result in local trauma, the principal health risk is the possible acquisition of bloodborne viral disease, in particular hepatitis B virus (HBV), hepatitis C virus (HCV) and human immunodeficiency virus (HIV) infection.

HBV

HBV has prevalence in the UK of about 0.3% (HPA, 2005) and the risk of acquiring HBV infection following an NSI can be >30% when the source is an HBe antigen-positive carrier[3]. Immunisation against HBV is the mainstay of protection; however, immunisation will only protect the worker following an NSI provided they amount a sufficient antibody response to the vaccine (this should prevent chronic carriage but may not prevent against acute infection). Nevertheless, for those who do not develop sufficient protective antibody level (currently considered to be >10 mL IU/mL[4]) early treatment after exposure by active and/or passive immunisation will help prevent HBV infection. Hepatitis B immunoglobulin (HBIG) can be administered to HCWs who are non-responders to HBV immunisation and this has helped to reduce the risk of transmission by 90%[5].

HIV

The prevalence of HIV in the UK is about 0.1%[6] and the average risk of acquiring HIV infection following a percutaneous exposure to HIV-infected blood is approx. 0.3%[3]. If the exposure is mucocutaneous, the risk falls to 0.03%[1]. Since the introduction of post-exposure prophylaxis (PEP), the risk of acquiring HIV infection has been reduced further[7]. To date within the UK, five HCWs are known to have acquired HIV after occupational exposure; the most recent case reported in 1999[8]. Theoretically, the risk of infection is greatest from blood or bodily fluids containing a high virus load, for example, someone during the early seroconversion illness or with AIDS. Conversely, the virus load is likely to be lower in someone who is taking prescribed antiviral drugs.

HCV

HCV has a prevalence of about 0.5%[9] and the risk of acquiring HCV is around 3%[1]. Since HCV infection is more prevalent than HIV, the risk of contracting HCV from an unknown source after an NSI is greater than that of HIV. There is no PEP for HCV currently available.

Action following a sharps incident

When an NSI occurs, the first action to be taken should be to wash the wound under running water (without scrubbing), or rinse the splashed mucosa appropriately. If the injury is by a sharp instrument, it is also important to gently encourage the bleeding but do not suck. If the injury is a mucosal exposure, irrigate the area with copious quantities of cold water. The HCW should immediately inform their senior or line manager of the incident.

The Occupational Health Department should be contacted immediately unless the NSI happens outside of opening hours when the out of hours service or duty virologist should be contacted for advice by the Accident and Emergency Department. If the donor is known to be HIV positive, then the recipient must get a PEP (starter pack) from Occupational Health /A&E ideally within an hour.

If the preliminary assessment considers that there is a significant risk of HIV, PEP should be started immediately. Where the donor status is unknown, the risk assessment should consider the epidemiological likelihood of the source being HIV infected.

A blood sample of the recipient should be taken in all cases ideally within 48 h and the sample should be sent to the virology department for sample storage. If there is any doubt about the recipients immunity to HBV, the sample can be tested.

The donor blood sample should be submitted for bloodborne virus testing and the clinical laboratory informed. The recipient should not take this sample, this is the responsibility of the senior clinician present who should discuss the incident with the donor and gain written consent for a sample to be taken. The need for testing and the type of test to be carried out should be explained to the donor and they should be asked if they would like to know the results of the tests. Any actions taken should be written up in the patients notes. Additionally when sending for testing, care should be taken when filling in forms as many incidents go unnoticed due to inadequately completed forms. If the source of the NSI is an unconscious patient, then a sample should not be taken without their consent[7].

Follow-up procedure

The results from the donor sample should be known the same day and provide an answer whether the donor is HIV, HBV or HCV positive. If the donor has been tested and found to be negative for HIV, HBV and HCV, a risk assessment will be needed in case the donor has recently been infected with a bloodborne virus. However if the donor is found to be positive, the Occupational Health Department should be informed. If this is a new diagnosis, the clinical team looking after the patient will be informed and further confirmatory samples requested. Table 1 outlines the relevant follow-up testing needed.

Donor status		Testing required	Time after sharps injury		
			6 weeks	3 months	6 months
Unknown donor**		HBsAg, anti-HBc, anti-HBs	✓	✓	✓
		Anti-HIV	✓	✓	✓
		Anti-HCV	✓	✓	✓
HBsAg-positive donor		HBsAg, anti-HBc, anti-HBs	✓	✓	✓
HIV-infected donor (irrespective of whether or not PEP offered/taken)		Anti-HIV	✓	✓	✓
		HIV RNA	✓	✓	✓
Anti-HCV positive donor	Confirmed HCV RNA positive	Anti-HCV	✓	✓	✓
		HCV RNA	✓	✓	✓
	Confirmed HCV RNA negative	Anti-HCV	Discuss with clinical virologist		

Table 1: Routine Follow-up Investigations for Recipients of Significant Sharps Injuries*.

* If a donor is infected with more than one bloodborne virus, then the actions indicated for each of the relevant infections should be applied.

** If there is a strong reason to suspect that the donor is infected with a particular bloodborne virus, discuss with clinical virologist.

Management following donor HBV-positive result

The actual management following an acute NSI depends on whether the recipient has been immunised or not. All HCWs should be immunised against HBV. If the recipient is known non-responder to hepatitis B vaccine, then HBIG should be given (in addition to vaccine) within 24h of exposure.

Management following donor HIV-positive result

In an event of the recipient being inoculated with HIV-positive sample, PEP is given. National Guidelines recommend that PEP medication be commenced ideally, within the first hour after HIV exposure and is continued for 28 days[7]. A 5-day starter pack, consisting of one Combivir tablet and two Kaletra tablets, would be available at A&E. The Sexual Health Department will continue the medication and provide medical follow-up. The recipient will need a follow-up after completion of PEP.

It is important to note that the recipient taking PEP should be advised to take adequate precautions to prevent getting pregnant (if female) for 3 months and to use a condom (if male) as this will protect their partner in the unlikely event that the receipt becomes infected following NSI.

Management following donor HCV-positive result

If the donor is HCV-seropositive, the HCW will require appropriate follow-up testing at correct time intervals and should be promptly referred for specialist advice. The HCW will be tested for the presence of HCV RNA. Following discussion with a consultant virologist, HCV RNA testing could also be performed if there was reason to believe that the donor had HCV infection despite seronegativity. It has been shown that HCWs who have recently seroconverted and are started on early treatment, within 6 months of their infection, go on to clear the virus and do not progress to chronic HCV[10].

How can NSI be prevented?

Preventing NSIs is the effective way to protect workers from bloodborne viruses. HCWs need to be trained in correct use, and disposal of needles, and understand the risks associated with needle recapping(It is important that they are aware how dangerous it is to hold a needle in one hand and attempt to cover it with a small cap held in the other hand). A range of recapping devices are currently available that should reduce this risk[11]. Additionally, an effective system for disposing of used needles is crucial to preventing NSIs. It is vital to have adequate disposal containers readily available. This will further help reduce the need for recapping needles and further aid in the prevention of injuries.

Summary

There are still too many preventable NSIs occurring amongst HCWs. Many important changes need to be made to help reduce the number of occupational exposures. These changes are vital to our healthcare service as these injuries take up precious resources they interrupt procedures, create stigma and anxiety, cause infections that can be fatal, and often lead to career restrictions and change, e.g. HCWs leaving surgical practice.

Most of the exposures occur in the ward, operating theatre, intensive care unit and A&E, and are easily preventable by adherence to the correct procedures for the handling of sharps and disposal of clinical waste. Because of the complexity of procedures performed injuries that occur during surgery and in intensive care units, tend to affect doctors disproportionately and unfortunately are more difficult to prevent, but understanding the circumstances surrounding these injuries may help develop equipment and procedures that will help avoid these incidents in the future.

The administration of HBV vaccination or PEP to workers has dramatically reduced the risks of HIV and HBV infection, but unfortunately this is not the case with HCV infections. However, treatment of these viral infections is not always successful and emphasis must remain on the prevention of such injuries by safe working practices and the continued high level awareness of all staff.

References

[1] Eye of the Needle. United Kingdom Surveillance of Significant Occupational Exposures to Bloodborne Viruses in Healthcare Workers, November 2006. Health Protection Agency Centre for Infections, National Public Health Services for Wales, CDSC Northern Ireland and Health Protection Scotland.

[2] Safe use and disposal of sharps. Medical Devices Agency. Safety Notice SN2001(19). 2001.

[3] Guidance for clinical health care workers: Protection against infection with blood borne viruses. Recommendations of the expert advisory committee on AIDS and the advisory group on hepatitis. 1998 UK Health Departments (1998/063), London.

[4] Protection against blood borne infections in the workplace: HIV & hepatitis. 1995 Advisory Committee on Dangerous Pathogens, Department of Health, London.

[5] Immunoglobulin Handbook: Indications and dosage for normal and specific immunoglobulin preparations. Health Protection Agency. January 2006.

[6] Testing times HIV and other Sexually Transmitted Infections in the United Kingdom: 2007, Health Protection Agency.

[7] HIV post-exposure prophylaxis. Guidance from the UK Chief Medical Officer' Expert Advisory Group on AIDS. Department of Health. Revised February 2004.

[8] Henderson DH. Post exposure chemoprophylaxis for occupational exposure to the human immunodeficiency virus. *JAMA* 1999;**281**:931–936.

[9] The Health Protection Annual Report 2007; Hepatitis C in England. Health Protection Agency.

[10] Jaeckel E, Cornberg M, Wedemeyer H, *et al*. Treatment of acute hepatitis C with interferon alfa-2b. *N Engl J Med* 2001;**345**:1452–1457.

[11] The management of health, safety and welfare issues for NHS staff, 2005.

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Survey

Almost one third of junior doctors use inadequate blood volumes in blood cultures

James Allinson and Philip Gothard

Abstract

Introduction: Blood cultures are important in patient management. The major predictor of bacteraemia yield is blood volume. This study aimed to assess whether hospital guidelines were appropriate and whether junior doctors were aware of and followed these guidelines.

Methods: 93 FY2/SHOs were contacted from six district hospital. Forty seven doctors were based in A&E and were contacted by post. Forty six doctors were contacted through hospital switchboards and were working in general medicine, surgery, obstetrics, gynaecology or orthopaedics. The microbiology departments at these hospitals were also contacted regarding their guidelines and training procedures.

Results: 27 (57%) A&E FY2/SHOs responded and 46 FY2/SHOs from other specialties were successfully surveyed. Median average sets of cultures sent per week = 2 (range 0–15). Median reported ideal blood volume = 7.5 mL (1–20 mL). Median reported actual blood volume = 5.0 mL (range 1–10 mL). Percentage of samples <5 mL: ideal 10%, actual 29%. Percentage of samples >5 mL: ideal 90%, actual 71%.

Discussion: There is a linear relationship between positive blood culture yield and volume of blood cultured. Most hospitals advised a minimum specimen volume of 5 mL, the manufacturers advised an optimum of between 8 and 10 mL. Most respondents (90%) knew they should provide at least 5 mL but 29% regularly provide less. This shortfall may reflect difficulties in blood acquisition or prioritization of other blood requiring investigations.

Conclusion: Hospital guidelines are inconsistent and should advise an optimum of 8-10 mL of blood per adult culture bottle. Ninety percent of junior doctors appear aware of current guidelines but almost a third do not follow them. Training should make clear that providing smaller blood volumes, although sometimes inevitable, may hinder accurate diagnosis and necessitate further blood sampling.

Introduction

Blood cultures can be crucial in the management of patients. It is often the junior members of the medical team who are responsible for preparing blood cultures and therein acquiring adequate blood samples to enable detection of bacteraemia. Adult bacteraemia appears to involve very small numbers of bacteria, in many cases less than 1 CFU/mL of blood[1] which may explain why the volume of blood cultured is the major predictor of bacteraemia detection[2]. This survey aimed to assess if hospital guidelines followed this evidence and whether junior doctors were aware of and followed these guidelines.

Methods

Foundation Year 2/Senior House Officers at six different district hospitals were asked three questions:

1. How many sets of blood cultures do you send per week?
2. What is the ideal volume of blood for each culture bottle?
3. What volume of blood do you usually add to each culture bottles?

The survey took place from the 20th of October to the 20th of November 2006. Forty seven A&E FY2/SHOs were contacted by mail (these staff members did not carry bleeps). A further 46 'on-call' FY2/SHOs from the same institutions (working in specialties including medicine, surgery, obstetrics and gynaecology and orthopaedics) were contacted via their hospital switchboards. The paediatric specialty was excluded because lower blood volumes are required in paediatric (especially neonatal) blood culture due to a higher bacterial load. Microbiology departments were contacted by telephone regarding their guidelines and training procedures.

Results

Twenty seven A&E FY2/SHOs responded to the written questionnaire providing a response rate of 57%. A response rate of 100% was achieved via telephone contact with 46 FY2/SHOs from other specialties.

Three hospitals advised 5–10 mL. Two hospitals advised an optimum of 10 mL. The remaining hospitals advised a maximum of 10 mL but admitted their written guidelines did not advise as to a minimum volume required. One department drew attention to culture guidelines at trust induction. The remaining departments were unsure if they undertook formal training besides publishing guidelines.

Discussion

The relationship between positive blood culture yield and the volume of blood cultured is well established[2-3]. Mensa et al.[4] found a linear relationship between bacteraemia detection rate and the blood volume used, each additional millilitre increasing yield by 2.28%. The latter study used BACTEC culture bottles which are widely used by NHS hospitals. They also found that 35% of samples contained less than 5 mL of blood.

Most, but not all hospitals contacted in this survey advised staff to add in excess of 5 mL of blood to each adult culture bottle, a guideline apparently widely known amongst the staff surveyed (see Figure 1 and Table 1) with only 10% believing less than 5 mL was acceptable (two doctors thought the ideal to be 1 mL).

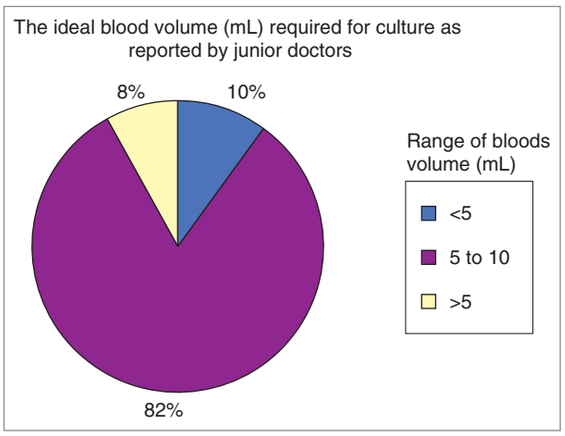

Figure 1: Ideal blood volume for blood culture as reported by 73 junior doctors.

	Number of culture sets sent per week per doctor	Ideal volume reported (mL)	Actual volume used (mL)
Median	2	7.5	5.0
Range	0-15	1-20	1-10

Table 1: Median Number of Cultures Sets Sent per Week, Ideal Volume and Actual Volume Reported by 73 Junior Doctors.

Despite most respondents (90%) knowing they should provide at least 5mL, 29% regularly provide less (see Figure2 and Table 2). Therefore, most of this shortfall is not due to ignorance. Instead, the disparity between ideal and actual volume may reflect difficulties in acquiring sufficient blood or prioritization of other blood requiring investigations. The BACTEC system manufacturers actually state the optimal blood volume to be 8-10mL per bottle. The lower volumes deemed acceptable by the hospitals studied may represent a compromise in response to the pressures discussed.

It is difficult to quantify the importance of blood cultures in the management of patients except to say that inadequate volumes

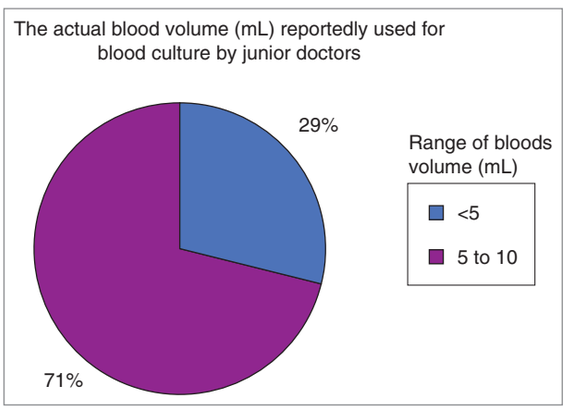

Figure 2: Actual blood volume reported by 73 junior doctors admitted to adding to each blood culture bottle.

		Ideal (%)	Actual (%)
Range of blood volumes (mL)	<5	10	29
	5-10	82	71
	>5	8	0

Table 2: Ideal and Actual Volume of Blood as Reported by 73 Junior Doctors.

lead to poor yields hence missed diagnoses. If blood cultures prove negative from patients with suspected bacteraemia, clinicians should send repeat blood cultures with optimal blood volumes recognizing this may have been a factor in the initial negative result. In addition to damaging patient care, inadequately prepared cultures may waste resources especially as blood culture is a very common investigation, being requested a median average of twice per week per doctors questioned.

Conclusion

Hospital guidelines appear inconsistent and should advise an optimum of 8-10mL of blood per culture bottle. This study suggests that although 90% of junior doctors are aware of current guidelines almost a third do not follow them. During training it should be made clear that collecting smaller blood volumes, although sometimes inevitable, may hinder accurate diagnosis and necessitate further blood sampling.

References

[1] Henry NK, McLimans CA, Wright AJ, Thompson RL, Wilson WR, Washington JA. Microbiological and clinical evaluation of the isolator lysis centrifugation blood culture tube. *J Clin Microbiol*. 1983;17:864-869.

[2] Washington JA. Blood cultures an overview. *Eur. J. Clin. Microbiol. Infect Dis.* 1989;8(9):803-806.

[3] Plorde JJ, Tenover FC, Carlson, LG. Specimen volume versus yield in the BACTEC blood culture system. *J Clin Microbiol*. 1985;22 (2):292-295.

[4] Mensa J, Almela M, Casals C, Martinez JA, Marco F, Tomas R, Vidal F, Soriano E, Jimenez de Anta T. Yield of blood cultures in relation to the cultured blood volume in BACTEC 6A bottles. *Med Clin* (Barcelona). 1997;108:521-523.

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Genitourinary medicine: series 1

Raoya Farah and M.A. Khaled

Introduction

Young people in the UK have high rates of sexually transmitted infections (STIs); pilot screening programmes have found that around 10% of sexually active women aged 16–19 have chlamydia[1]. This is because this age group tends to take more sexual risks.

In the UK, there are now over 260 clinics led by consultants specializing in genitourinary medicine (GUM) covering a wide range of STIs including human immunodeficiency virus (HIV) and other genitourinary conditions. Their main aim is to treat and reduce the incidence of STIs in the community.

The genitourinary medicine patient

It is estimated that one in seven adults over the age of 16 in the UK has attended a GUM clinic at least once[2]. Although patients attending GUM clinics should not be stereotyped, the following group of people are more likely to attend:

- ♂ aged 25–34
- ♀ aged 16–24
- Those who have changed sexual partners recently
- Those having multiple sexual partners
- Those single, separated or divorced

Others attending are under aged who have a high incidence of STIs and report a low use of reliable contraception and survivors of sexual assault.

Risk factors

The following risk factors for STIs have been noted in various epidemiological studies. They are useful in planning local service provision and targeting specific sexual health promotion:

- Age <25 years
- Being single, separated or divorced
- >2 partners in preceding 6 months
- Use of non-barrier contraception
- Residence in inner city
- Symptoms in partner
- History of previous STI
- Ethnicity or migration – prevalence of several infections, notably syphilis, gonorrhoea and HIV, is higher in ethnic minority group and immigrants
- Sexual orientation – e.g. syphilis, gonorrhoea, HIV and hepatitis B virus infections are more prevalent among homosexuals ♂

How to take a sexual history[3]

Taking a sexual history is a sensitive and vital part of the consultation and it should be conducted in a non-judgmental and empathic manner. The setting of the clinic should be comfortable, confidential and physically welcoming environment. Verbal consent should be obtained and the patient reassured regarding confidentiality repeatedly.

Good communication skills are required by all clinicians but more so in GUM clinics and may be important in improving health outcomes. On the initial contact with a patient, there are some particularly important aspects of communication skills that are required and may be particularly important in obtaining an accurate sexual history. These skills include the following components that could be particularly important in obtaining an accurate sexual history:

- Initial greeting of the patient.
- Maintaining eye contact and using appropriate body language.
- Initiating a consultation with open questions followed by exploration of initial concerns and more closed questions as the consultation continues.
- Awareness of the signs of anxiety and distress from the patient.
- Recognising non-verbal cues from the patient.

Components of a sexual history

1. Presenting complaint

It is best to start the sexual history with less intrusive questions regarding presenting concerns and symptoms before asking more sensitive questions regarding sexual behaviour.

2. Symptom review

Ask women presenting to GUM clinics if they had the following symptoms:

- A change in vaginal discharge
- Vulval skin problems
- Lower abdominal pain
- Dysuria
- Dypareunia
- Changes in menstrual cycle or irregular bleeding

Ask men presenting to GUM clinics if they had the following symptoms:

- Urethral discharge
- Dysuria
- Genital skin problems
- Peri-anal/anal symptoms (in gay/bisexual)

3. Sexual history

The more detailed parts of the sexual history outlined below may be elucidated during the initial discussion with the patient.

a. Last sexual intercourse (LSI)

All individuals should be asked: the gender of partner, to identify gay/bisexual men in order to take rectal and pharyngeal samples, undertake hepatitis screening and vaccination and offer HIV testing and counselling; type of sexual intercourse/sites of exposure (oral, vaginal and anal), to identify which sites need to be sampled and in those gay men reporting anal intercourse to offer HIV testing and risk reduction; condom use/barrier contraception during sexual intercourse (and whether the condom was consistently used and remained intact); relationship with partner (long-term partner – record duration of relationship, non-traceable casual partner,

traceable casual partner, etc.), to facilitate partner notification; problems or symptoms of partner, to identify STI diagnosis, or symptoms suggestive of an STI in partners; date of LSI, may inform on timing of tests and other issues, e.g. window period.

b. Previous sexual partner (before partner of LSI last partner change)

All individuals should be asked:

- Gender of partner
- Site of exposure
- Use of barrier contraception
- Relationship to partner (as for LSI – above)
- Problems or symptoms of partner

c. Time period of sexual history

The sexual history should include all partners within the previous 3 months. Taking a 3-month risk history would identify HIV risk behaviour not covered by a negative HIV antibody test.

If no partners are reported during this time, the last time the patient had sexual intercourse should be noted.

If the patient is symptomatic, the sexual history should include all partners during the incubation period of sexually transmitted infections that may be the cause of the symptoms with which the patient presents.

All patients who report no unprotected penetrative vaginal or anal intercourse during this period should be asked the last time that this took place.

All men should be asked if they have had sex with another man in the past, to establish which STIs the patient may be at risk of, and to inform partner notification.

4. Other components of history

a. Previous sexually transmitted infections

- Individuals should be asked about a history of STIs.
- The diagnosis and approximate date of diagnosis should be recorded.
- Patients with a previous history of syphilis should have the date of diagnosis, stage of syphilis, treatment given and clinic of treatment recorded. To allow the interpretation of positive syphilis serology in patients with a previous history of syphilis.

b. Past medical and surgical history

This is to identify conditions which may be associated with or influence the management of STIs.

c. Drug history and history of allergies

Patients should have a history of current medications and history of previous allergies particularly to antibiotics, to identify drugs that cannot be given safely.

d. Contraceptive and reproductive health history

Women should be asked about contraceptive use and last menstrual period and usual cycle, to identify pregnancy or pregnancy risk.

5. Risk assessment

Current or previous history of injecting recreational drugs, sharing of needles, syringes or drug preparation equipment (works).

Whether they have ever had sex abroad, other than with a travelling partner; the nationality or country of birth of their sexual partners.

Whether they have ever had medical treatment abroad (including blood transfusions and operations). Whether they have been tested for HIV previously and the result of test.

All individuals at risk for hepatitis B should be asked for hepatitis B vaccination history. Men and women may be asked whether they have ever exchanged money in return for sex.

6. Closing the sexual history

After the sexual history is completed, the patient should be asked about their other concerns that have not yet been discussed.

7. Clinical examination

Before any examination is embarked upon, a full detailed explanation of the nature of a clinical examination is paramount and why it is necessary and the same is applicable for clinical test sampling and other investigations required.

8. Documentation

Record keeping of a sexual history should be in keeping with the recommended national good standards of practice.

Syphilis

Aetiology, epidemiology and transmission

Syphilis is a sexually transmitted disease, caused by treponema pallidum; it is an obligate human parasite. Currently, there is a high rate of infection in Eastern Europe. In the UK, this infection is prevalent among homosexual males, especially as outbreaks. Accidental infection by inoculation (e.g. health professions), blood-borne needle sharing, blood transfusion and transplacental (from ninth week of pregnancy) are other modes of transmission.

Types and clinical manifestations

Syphilis is classified into acquired and congenital.

Acquired syphilis is subdivided into:

Early syphilis (first 2 years):

Primary syphilis, which occurs 9–90 days after exposure, appears as painless chancre in genitalia, oral, anal margins and rarely fingers, nipple and eyelids. This usually resolves within 3–8 weeks.

Secondary syphilis occurs 6–12 weeks after exposure, presenting with constitutional symptoms: malaise, fever, headache and myalgia. Skin lesions are usually in the form of a maculopapular rash affecting flexor surfaces and involving palms and soles. Secondary syphilis is associated with a persisting primary lesion in 33% and regress over a period of 2 years. Other systems can be involved; lymhadenopathy, splenomegaly, alopecia, periostitis, hepatitis and rarely meningism glomerulonephritis and nephritic syndrome.

Early latent; no signs or symptoms, positive serology, within 2 years of acquisition.

Late syphilis (after 2 years):

Late latent (end result of two-third of those who are not treated); no signs or symptoms, positive serology test, >2 years after acquisition.

Gumma (benign syphilitic granulation tissue) can appear as early as 2 years, but usually occurs after 10–15 years. They are described as punched out ulcers, they are not contagious, and are found in skin, bones, mouth, throat and other organs, e.g. liver, testis, oesophagus, stomach and aortic arch, also reported in bronchi and lungs.

Cardiovascular disease occurs in 10% after 30–40 years. Conduction defects if gumma involves the conductive system in the heart (e.g. Stoke–Adams syndrome). Aortic aneurysm without dissection and aortic regurgitation.

Neurological disease also occurs in 10%, manifesting as meningovascular syphilis after 15–18 years, general paresis 20–25 years and tabes dorsalis after 30 years.

Congenital:

Early congenital disease occurs in the first 2 years of life. Features are failure to thrive, mucosal and skin lesions, hepatosplenomegaly, osteochondritis and others, e.g. meningitis.

Late congenital lesions tend to present from 2 to 3 years on clinical features in 60% of patients.

Diagnosis and management

Dark ground microscopy:

Serum from chancre or aspiration of a regional lymph node or serum from mucous patches ulcers and condylomata are examined by darkfield microscope to look for spirochetes which are very slender with tight spirals moving forwards and backwards.

Serology:

- Cardiolipin tests: venereal diseases research laboratory (VDRL)
- Carbon antigen test/rapid plasma reagin test (RPR)
- Specific tests: treponemal enzyme immunoassay (EIA) to detect IgG, IgG andIgM or IgM. Treponema pallidum haemagglutination assay.

Treponema pallidum particle agglutination assay. Fluorescent treponemal antibody absorption test (FTA-abs).

A false-negative cardiolipin test may occur in secondary or early latent syphilis due to the prozone phenomenon from using undiluted serum. All the specific tests are almost invariably positive in secondary and early latent syphilis.

Serological tests cannot differentiate from other treponemal infections – for example, yaws.

Confirmation or exclusion of neurological, cardiovascular and eye involvement

- Lumbar puncture not necessary in secondary/early latent syphilis unless clinical evidence of neurological involvement.
- CXR in latent syphilis.
- Ophthalmic assessment (slit lamp) may be helpful to differentiate between acquired or congenital syphilis (interstitial keratitis) in cases of latent infection of uncertain duration where congenital syphilis is suspected.

Management

General considerations

A treponemicidal level of antimicrobial should be achieved in the serum, and in the CSF in the case of neurosyphilis. A penicillin level of >0.018 mg/l is considered treponemicidal[4].

Duration of treponemicidal levels of antimicrobial should be at least 7 days to cover a number of division times (30–33 h) of treponemes in early syphilis with a subtreponemicidal interval of not more than 24–30 h.

Specific treatment[3]

Incubating syphilis/epidemiological treatment

First line therapies:

I.m. benzathine penicillin 2.4 MU ×1.

Doxycycline 100 mg b.i.d. × 14 days.

Second line therapy:

Azithromycin 1 g stat.

Early syphilis (primary, secondary and early latent)

I.m. procaine penicillin G 750 mg daily (Jenacillin A 3 mL or Jenacillin O &$$$; 2.5 mL) × 10 days.

I.m. benzathine penicillin 2.4MU single dose, or × 2 (day 1 and 8).

Late latent

I.m. benzathine 2.4 g weekly for three doses.

Oral doxycycline 200 mg b.i.d. for 28 days.

Management of contacts

All patients with syphilis should be seen for partner notification, health education and confirmation of any past treatment history. Patients with primary syphilis, sexual partners within the past 3 months should be notified as the incubation period is up to 90 days. Partner notification may have to extend to 2 years for patients in secondary syphilis with clinical relapse or in early latent syphilis.

Epidemiological treatment for asymptomatic contacts of early syphilis should be considered unless partners are able to attend regularly for exclusion of syphilis.

Serological tests for syphilis including EIA IgM or FTA-abs should be performed at the first visit and repeated at 6 weeks and 3 months.

Follow-up

For early syphilis, minimum clinical and serological (VDRL or RPR) follow-up should be monthly for 3 months, 6 months and 1 year.

Those with concomitant HIV infection or on non-penicillin treatment should be followed up yearly for life.

References

[1] WHO STI Management Guidelines: www.int/reproductive-health/publications/rhr.

[2] Oxford Handbook of Genitourinary Medicine, HIV, and AIDS. Richard Pattman, Michael Snow, Pauline Handy.

[3] UK STI Management Guidelines: www.bashh.org. accessed on 10th February 2008.

[4] Idsøe O, Guthe T, Wilcox RR. Penicillin in the treatment of syphilis. Theexperience of three decades. Bull. WHO 1972;47:1–68.

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Case-based discussion

An interesting case of brucellosis – a case report

Sumeet Tuteja and DAF Lynch

Case History

A 32-year-old man, referred to our hospital (Royal Blackburn Hospital, Blackburn) with the complaints of fever with dry cough. His problems began 3 months back after he returned from pilgrimage from Saudi Arabia. He had low grade fever with evening rise of temperature and night sweats, loss of appetite and some weight loss. There was no history of contact with tuberculosis and no other family member was affected.

Physical examination revealed an ill looking young man with low grade temperature of 37.5, pulse rate 90/min, respiratory rate 14/min, maintaining saturations of 99% at room temperature. There was no lymphadenopathy and his systemic examination was unremarkable.

Results of laboratory tests made on admissions are as follows: Haemoglobin 14.4, WBC count 10.2, lymphocytes 4.3, neutrophils 5.2, ESR 46 and CRP 32. Blood film, coagulation screen, renal and liver functions were normal. His sputum and urine was negative for acid fast bacilli. However, his blood culture report was still awaited. Chest X-ray was unremarkable. CT of thorax showed small mediastinal lymph nodes and CT scan abdomen showed few mesenteric lymph nodes.

Considering tuberculosis as the most likely diagnosis, patient was started on antitubercular medications including rifampicin. Patient started improving. Meanwhile his blood cultures grew unusual gram negative organisms. Therefore, serology was requested. Serology was diagnostic of acute brucellosis with strongly positive IgM antibodies. On further questioning, this time patient gave history of consuming camel milk whilst he was in Saudi Arabia for pilgrimage 3 months back. His anti-TB medication was stopped and he was started on doxycycline and rifampicin for brucellosis. The patient was discharged with a follow-up every 3 months for 2 years.

Discussion

We present this case report to delineate the fact that although rare, brucellosis should be considered as one of the differential diagnosis in cases of pyrexia of unknown origin.

Brucellosis is an important health problem and endemic in many countries, especially in Mediterranean areas, parts of South and Central America, and eastern and western Africa[1]. It is the most common zoonosis in the world; accounting for the annual occurrence of more than 500,000 cases[2].

Brucella species are small gram-negative, aerobic and non-motile intracellular coccobacilli that can be isolated from the genitourinary tracts of many wild and domestic animals[3]. The human pathogens: *Brucella abortus* (*B. abortus*), *B. suis*, *B. canis* and *B. melitensis* can cause systemic infections which may affect any body organ[3]. Brucellosis is transmitted to humans by direct contact with infected animals or ingestion of unpasteurized milk and dairy products[3].

The occupational exposure to veterinarians and laboratory technicians can result in transmission of the disease through contaminated aerosols[3].

Brucellosis is a systemic disease and may involve any organ system. The clinical manifestations of brucellosis are variable and may include fever, rigors, anorexia, weight loss, malaise, backache, bony pains, arthralgias and hepatosplenomegaly[3,4]. Brucellosis can also present as an acute abdomen such as appendicitis, cholecystitis and pancreatitis[5].

Brucellosis may cause a wide range of hematological abnormalities including anemia, leucopenia, thrombocytopenia, pancytopenia, bleeding diathesis and disseminated intravascular coagulation (DIC)[4].

Although a presumptive diagnosis of brucellosis can be made by demonstrating high titers to brucella antigen, the isolation of the organism from body tissues provides the only definitive evidence of the infection[2].

Different antibiotic regimens have been employed in the treatment of brucellosis including the following in various combinations: cotrimoxazole, rifampicin, doxycycline, ciprofloxacin, gentamicin and streptomycin[6]. The mean duration of treatment is usually 6 weeks, but in case of complications like infective endocarditis or spinal involvement, therapy may be prolonged for up to 3 months[6].

References

[1] Young EJ, *Brucella* species. In *Principles and Practice of Infectious Diseases*. 5th edition. Edited by: Mandell GL, Bennett JE, Dolin R. New York: Churchill Livingstone; 2000:2386–2393.

[2] Pappas G, Papadimitriou P, Akritidis N, The new global map of human brucellosis. *Lancet Infect Dis* 2006, 6(2):91–99.

[3] Yagupsky P, Detection of brucellae in blood cultures. *J Clin Microbiol* 1999, 37(11):3437–3442.

[4] Young EJ, Tarry A, Genta RM, Ayden N, Gatuzzo E,Thrombocytopenic purpura associated with brucellosis: Report of 2 cases and literature review. *Clin Infect Dis* 2000, 31(4):904–909.

[5] Pourbagher MA, Pourbagher A, Savas L, Turunc T, Demiroglu YZ, Erol I, Yalcintas D, Clinical pattern and abdominal sonographic findings in 251 cases of brucellosis in southern Turkey. *Am J Roentgenol* 2006, 187(2):W191–W194.

[6] Memish Z, Mah MW, Al Mahmoud S, Al Shaalan M, Kan MY. Brucella bacteremia: Clinical and laboratory observations in 160 patients. *J Infect* 2000, 40(1):59–63.

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Lower Abdominal Pain in Women of Child-bearing Age

Ashis Banerjee, Domike Isiodu and David Mbamalu

A 29-year-old woman attends the emergency department with a 1-day history of cramping lower abdominal pain, associated with nausea. She has no associated urinary or bowel symptoms. On examination, she is anxious and in pain, with a visual analogue score of 6/10. Apart from a heart rate of 100 beats per minute, her vital signs are within normal limits. Her abdomen is soft, with tenderness in the right lower quadrant. On venous blood testing, her white cell count is 12,000/μL. A urine dipstick confirms pyuria (leucocytes 2+), with negative nitrites. The urine pregnancy test is negative. How would you proceed to manage her?

Introduction

Acute abdominal pain, defined as abdominal pain with an onset under a week, is a common presenting complaint in emergency practice. It comprises 5–7% of all emergency department presentations, and represents 50% of all emergency surgical admissions[1]. In around a third of patients a specific diagnosis is never made, leading to the label of non-specific abdominal pain[2]. The diagnostic evaluation of lower abdominal pain in females of child-bearing age (age range of 16–50 years) is particularly challenging, owing to difficulty in clinically differentiating between surgical and gynaecological causes of abdominal pain. The difficulty is enhanced in an emergency department, with a time limit on decision making and initial management of 4 hours from arrival in the department to admission or discharge

History

History taking in a stable patient should commence with characterization of the pain in terms of rapidity of onset, site of origin (and change in localization since), radiation elsewhere, character, progression (getting better/worse or remaining static), severity (as measured by a visual analogue score), constancy or intermittency, exacerbating or relieving factors and previous similar episodes.

Inflammatory pain usually starts gradually as poorly localized pain, eventually localizing to the appropriate organ site, with features suggestive of parietal peritoneal involvement, e.g. pain worse on movement, deep breathing and coughing. Pain from hollow viscus perforation is of sudden onset, is severe and may have been preceded by inflammatory type symptoms. The patient lies still as movement makes things worse.

Obstructive pain is typically spasmodic, of fairly rapid onset and severe. The patient tends to be restless and to roll around in pain. As inflammation or tissue ischaemia develops, the pain will become more constant and localization may be possible. Similar pain can be associated with torsion of or haemorrhage into solid viscera, e.g. ovaries or uterine fibroids.

In young females a gynaecological (vaginal discharge, menstruation), gastrointestinal (nausea, vomiting, diarrhoea, constipation or obstipation), urological (frequency, dysuria and haematuria), sexual, obstetric and contraceptive history are required. It is important to note the date of the last normal menstrual period, the intervals between periods, and the character of flow and duration of the menses. A past medical and surgical history, and current medication should also be documented.

Acute appendicitis remains the commonest cause for an acute surgical abdomen, even in this patient population. The characteristic picture of central abdominal pain localizing to the right lower quadrant, and associated with nausea and low grade fever (38–38.5°C), may not always be seen. This is related to atypical locations of the appendix; e.g. retrocaecal appendicitis and right loin or right upper quadrant pain, and pelvic appendicitis with pelvic pain and irritative symptoms such as frequency of micturition, dysuria and diarrhoea.

Ectopic pregnancy is a major diagnostic consideration and is increasing in incidence in the developed world, being an important cause of maternal mortality especially if missed. Risk factors for ectopic pregnancy should be actively sought (Box 1). A rising incidence of sexually transmitted infections is associated with an increased incidence of pelvic inflammatory disease (PID), and again risk factors for PID should be considered (Box 2). The presentation of ectopic pregnancy can mimic appendicitis in the presence of peritoneal or gut irritation from intraperitoneal blood, leading to diarrhoea in particular.

Cystitis is associated with suprapubic discomfort, painful dysuria, occasionally haematuria, increased frequency of micturition and often a sensation of incomplete voiding. Bacterial cystitis is more likely in the presence of positive nitrites in the urine, and should be confirmed by a mid-stream urine culture.

- History of PID
- Tubal surgery including sterilization and its reversal
- Intrauterine contraceptive device in situ: increased relative risk of ectopic pregnancy relative to intrauterine pregnancy
- Previous ectopic pregnancy
- Use of the progesterone only contraceptive pill
- History of infertility

Box 1 Risk factors for ectopic pregnancy.

- Younger women
- Multiple sexual partners
- Increased frequency of intercourse
- Untreated partner
- Mucopurulent cervicitis
- Prior episode of PID
- Inadequate treatment of PID
- Intrauterine device

Box 2 Risk factors for PID.

A good history remains the most important contributor to diagnosis. Filling out a structured proforma, which acts as an aide memoire, may improve diagnostic accuracy by improving the capture of relevant information.

Examination

Examination should be initiated with an assessment of vital signs (heart rate, blood pressure including postural response, respiratory

rate and capillary refill time). Signs suggestive of sepsis (systemic inflammatory response syndrome) and/or shock should be actively sought at the onset. The overall response of the patient to pain is valuable. The patient may roll around in pain (colicky/obstructive type pain) or lie very still as movement makes things worse (inflammatory type).

Specific signs that should be sought include localized tenderness, guarding, rebound tenderness, the presence of a mass and evaluation of the hernial orifices. Percussion tenderness may be a kinder substitute for eliciting rebound tenderness. Guarding (voluntary and involuntary) and rebound tenderness are important signs of peritoneal inflammation.

Rectal examination may be withheld if abdominal signs of peritoneal inflammation are present and a diagnosis can be made on the basis of abdominal examination. It may, however, be of as much value as a vaginal examination in younger women. Signs that should be looked for include localized tenderness (as in pelvic appendicitis where the abdominal signs are unclear), the presence of mass or abnormalities of accessible pelvic viscera.

Vaginal examination should only be performed by individuals suitably trained, under conditions allowing for privacy and in the presence of a chaperone. If an ectopic pregnancy is suspected, it is prudent to withhold this examination as torrential haemorrhage can be precipitated from handling an adnexal mass leading to rupture of the ectopic gestational sac. Specific signs that can be sought from vaginal examination include adnexal mass or tenderness, uterine size and contour, and cervical motion tenderness.

Investigations (Box 3)

The urine dipstick and urine pregnancy test is a mandatory investigation in this group of patients. A positive urine pregnancy test in the first trimester should be considered as being due to ectopic pregnancy until proven otherwise.

It is customary to perform venous blood testing. The role of blood tests is, however, limited. A raised white cell count with neutrophilia, and a raised acute phase reactant (e.g. C-reactive protein) lack both sensitivity and specificity for the diagnosis of acute inflammatory conditions. Serial increases in the white cell count may be more useful as an indicator of progressive inflammation.

The plain abdominal x-ray is of little value in most situations, other than when bowel obstruction is suspected (abdominal pain, distension, vomiting and obstipation in varying combinations).

The role for cross-sectional imaging in abdominal pain evaluation is, however, increasing. This allows for improved diagnostic accuracy, with consequent better use of resources through reduced admission rates and reduced negative laparotomy rates[3]. Ultrasound in particular is available often as a bedside investigation, and both transabdominal and transvaginal routes are effective. Computerized tomography (CT) scanning is increasingly being used in the diagnosis of the abdomen with equivocal signs.

Laparoscopy is of particular value in situations where the diagnosis is unclear, allowing for one-stop diagnosis and treatment. It has the drawbacks of requiring an experienced surgical operator and an anaesthetic with accompanying trained staff.

- Urine dipstick: blood, leucocytes and nitrites
- Urine pregnancy test for beta-human chorionic gonadotrophin
- Venous blood: full blood count; C-reactive protein; urea and electrolytes (if vomiting); amylase
- High vaginal or introital swabs for chlamydia
- Ultrasound (transabdominal or transvaginal): ectopic gestation; free peritoneal fluid; pelvic mass; appendicitis
- CT scan: appendicitis; pelvic mass
- Laparoscopy

Box 3: Investigations of potential importance.

Specific considerations

Ectopic pregnancy

- Triad of abdominal and/or pelvic pain; amenorrhoea of 4–10 weeks; vaginal bleeding
- Subjective symptoms of pregnancy: vomiting; breast engorgement
- Syncopal episodes
- Referred shoulder tip and/or inter-scapular pain
- Cervical motion tenderness (excitation)

The menstrual history may be unreliable and essentially a urine pregnancy test is indicated in all women in the age group under study in the presence of abdominal pain. Urine testing for the β-subunit of human chorionic gonadotropin has a 97% sensitivity for the diagnosis, which increases to 99% with blood testing[4]. The demonstration of an intrauterine pregnancy with foetal heart activity on transabdominal or transvaginal scanning is felt to exclude the diagnosis of ectopic pregnancy, although ectopic twin pregnancy has been reported.

Pelvic inflammatory disease

Diagnostic criteria for PID (after Hager)[5].

All must be present:

- Lower abdominal pain and tenderness
- Cervical motion tenderness (excitation)
- Adnexal tenderness

At least one must be present:

- Oral temperature >38°C
- White cell count >10,500/cu mm
- Intrapelvic mass on examination or ultrasonography
- White blood cells and bacteria on culdocentesis
- Mucopurulent cervicitis
- Erythrocyte sedimentation rate >15–20 mm/hour

Management

Analgesia must not be withheld where required. The prescription of analgesic agent should be related to the intensity of pain as

recorded on a visual analogue scale and titrated to subsequent response. Analgesia relieves symptoms while not masking signs, and allows for patient confidence and facilitates physical examination.

Intravenous fluid replacement and antibiotics (if there are signs of sepsis) should be provided where necessary.

The appropriate specific management will depend on the identified cause. Appropriate guidance on choice of imaging may require discussion with the radiologist[6].

The most important immediate decision is whether to admit or discharge the patient home. Admission may be under either the surgical or the gynaecological team depending on the most likely clinical diagnosis.Our patient was admitted under the surgical team, because of continued pain. The absence of gynaecological and gastrointestinal symptoms made clinical diagnosis difficult. She had no risk factors for ectopic pregnancy or pelvic inflammatory disease. It was decided eventually to proceed to laparoscopy. An inflamed appendix was found and appendicectomy proceeded to.

The potential options are:

Admission:

- For laparotomy/laparoscopy
- For active observation with serial reassessment, and surgical intervention if required. If in diagnostic doubt, a second opinion is mandatory before the patient leaves the department,

Discharge:

- With outpatient treatment for a patient in whom a diagnosis has been made. E.g. with anti-microbial agent for a urinary tract infection.
- In patients with no obvious cause of their pain and no features of severe illness, e.g. soft abdomen, normal blood results a follow-up review and investigation as out patients at their GP surgery, or at a genitourinary medicine clinic if felt indicated, is important. The long-term sequelae of subclinical pelvic infection are of such importance that they should not be missed.

References

[1] Hospital Episode Statistics. Department of Health, London, 2003–4.

[2] Irvin TT. Abdominal pain: a surgical audit of 1190 emergency admissions. Br J Surg, 1989. 76:1121–1125.

[3] Rhea JT, Halpern EF, Ptak T, Lawrason JN, Sacknoff R, Novelline RA. The status of appendiceal CT in an urban medical center 5 years after its introduction: experience with 753 patients. AJR, 2005. 184:1802–1808.

[4] Symonds EM, Symonds IM. Essential Obstetrics and Gynaecology, 3rd edition, p 41. Churchill Livingstone, Edinburgh, 1998.

[5] Hager WD, Eschenbach DA, Spence MR, Sweet RL. Criteria for diagnosis and grading of salpingitis. Obstet Gynecol, 1983. 61:113–114.

[6] Radiation Protection-118. Referral guidelines for imaging. European Commission, 2000.

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Careers in Microbiology

Karl Braid and Jeremy Gardner

Microbiology has been getting a lot of attention recently, with the current climate of surviving sepsis and media attention on hospital acquired infections. The publication of the surviving sepsis guidelines in 2004 highlights the need for close liaison between intensive care and microbiology specialities[1]. This has resulted in greater recognition of the importance of microbiological input into the management of patients with infection and also in issues of infection control and health protection. This expanded knowledge of the work of the clinical microbiologist has led to greater interest in the speciality as a potential career.

What Is clinical microbiology?

Clinical microbiology is concerned with the microbiological aspects of human infection by pathogens, including bacteria, viruses, fungi and protozoa. It not only focuses on the diagnosis and investigation of numerous infectious diseases, but also on their acute management. Microbiologists work closely with many different hospital and community disciplines to optimize management of patients with infection. This is achieved through telephone-based advice, participation in speciality based ward-rounds and, in the case of community patients, close liaison with the team for communicable disease control.

The work of a microbiologist is not solely concerned with the management of infection, but also with its prevention. Media attention regarding hospital acquired infection and hand hygiene has emphasized the importance of this aspect of microbiology. Microbiologists can be responsible for the treatment and isolation of cases or methicillin resistant *Staphylococcus aureus* (MRSA) or the investigation of diarrhoea in ward inpatients and advising appropriate barrier protection precautions. They also play a vital role in the surveillance of hospital acquired infection. This is achieved by the collection of data on communicable diseases (i.e. MRSA, *Clostridium difficile*, tuberculosis, etc.) and analysis of how and why hospital outbreaks occur[2]. It is obligatory for all trusts to keep records of any cases of *S. aureus* bacteraemias (including methicillin sensitivity studies) and instances of *C. difficile* infection to allow for national incidence and prevalence statistics and inter-trust comparison. This also allows trusts to judge how effective they are at meeting government standards in the prevention of healthcare associated infections[3]. Microbiologists play a central role in auditing their trusts' performance with regard to these issues.

Microbiologists are also involved in the creation and implementation of local trust policies for use in a hospital or community setting. These can include simple flow-chart style guidelines for the investigation and treatment of infectious disease, processes involved in dealing with outbreaks of infection, and institution of safe practice involving minimization of needle-stick injuries and promotion of hand hygiene. Microbiologists often promote this knowledge amongst new staff members by organizing and participating in induction sessions.

Why microbiology?

A career in microbiology can be intensely rewarding, as it is an interesting vocation with many different clinical aspects. It involves interaction with many specialities, meaning the microbiologist is exposed to patients of varying types and ages. Although there is little in the way of direct patient contact, microbiologists remain closely involved in the multidisciplinary management of their infection.

Microbiologists are expected to have a wider and more detailed knowledge of infectious disease, particularly the less common and well known. On-call and out-of-hours responsibilities tend to be less demanding than traditional specialities, especially during the training years. There are often opportunities for research projects and teaching.

Training in microbiology also opens avenues for careers in infectious disease, hospital infection control, and communicable disease control. Knowledge gained from microbiology specialist training is universal, and can be applied to most hospital specialities.

It can, however, be a very busy job particularly in the event of outbreaks of hospital acquired infections. Some individuals may not like the lack of direct patient contact and, in some hospitals, the laboratory is managed on a private basis and can be located off-site. Commuting to and from the laboratory and delegating responsibilities can be difficult.

Training scheme

The minimum requirement for entry into medical microbiology is completion of the two-year foundation training programme (or equivalent), and be eligible for full registration with the General Medical Council at the time of appointment. They should be able to demonstrate basic understanding of the importance of infection on clinical practice, and basic knowledge of laboratory skills is desirable. As with most other specialities, candidates are expected to have gained skills in problem solving, organization, managing others, teamwork and coping under pressure[4].

ST1 is currently the only point of entry to the medical microbiology specialist-training scheme. The training programme itself comprises development of laboratory skills and experience relevant to microbiology, and consolidation of clinical acumen regarding the diagnosis and management of a wide variety of infections. The trainee will be expected to advance skills in the management of a clinical laboratory and related communication competencies. Furthermore, the trainee will be expected to further their knowledge and undertake work in other specialities linked to microbiology, including virology, mycology, parasitology, health protection and epidemiology[5]. There may also be opportunity for training in optional components of public health, infection control and control of communicable disease.

Each programme is divided into four stages, each lasting approximately 12–18 months and culminating in examination before advancing to the next stage[4]:

- **Stage A** – 1–12 months; completion requires a pass in the Royal College of Pathologists Medical Microbiology and Virology Year 1 assessment.
- **Stage B** – 13–36 months; completion requires a minimum of 24 months training and a pass in MRCPath Part 1.
- **Stage C** – 25–48 months; completion requires a minimum of 42 months training and a pass in MRCPath Part 2.
- **Stage D** – 43–60 months; completion requires a minimum of 60 months training, achievement of all skills and competencies outlined in the medical microbiology cirriculum and a completed record of in-training assessment (RITA G).

Completion of the specialist-training scheme will result in issue of a certificate of completion of training in medical microbiology allowing for application to relevant consultant posts.

Getting your foot in the door

Microbiology is highly competitive and popular, not only as a speciality in itself, but also because it represents one of the major routes of attaining posts in infectious disease, hospital infection control and communicable disease control[6]. As such, any attributes or achievements that make candidates stand out are advantageous.

Audit or research of a microbiological nature is useful, especially as this is a requirement of the person specification and specifically enquired about on specialist-trainee application forms[5,7]. This could entail auditing the accuracy of documentation of microbiological advice, rates and reasons for blood culture contamination, or the development of clinical guidelines or pathways on the investigation and management of suspected endocarditis or other infections.

A post-graduate qualification in a relevant subject looks impressive on any application to microbiology specialities, although it is not essential. This may be an MSc in clinical microbiology, a post-graduate diploma in infectious disease or a post-graduate certificate in infection control. The MSc is particularly useful as it incorporates a research project that gives valuable experience in the principles and undertaking of search, a desirable attribute in microbiology applicants. These courses can often be undertaken on a part-time or full-time basis[8] and many schools and universities offer distance learning programmes.

The future

The introduction of molecular diagnostic techniques (i.e. viral and bacterial polymerase chain reactions) and the interest in hospital infection control are likely to provide ample employment opportunities in the future. It provides a grounding for a career in medical virology, a rapidly expanding discipline that is becoming more important in modern times owing to the greater interest in immunocompromised patients and use of solid and bone marrow transplantation. It also provides opportunities for employment in infectious disease and tropical medicine, and hospital infection control which is rapidly gaining attention due to media interest in MRSA and *C. difficile*. These aspects ensure medical microbiology remains an exciting and interesting speciality.

References

[1] Dellinger RP, Carlet JM, Masur H. Surviving sepsis campaign guidelines for management of severe sepsis and septic shock. Crit Care Med 2004;32(3): 858–873.

[2] Dawson S. Hospital infection control. BMJ 2002;325(suppl):121a.

[3] Department of Health. The NHS in England: The operating framework for 2007& sol;2008. London: DoH 2006. www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_063267 (accessed 11 Feb 2008).

[4] National Health Service. NHS careers: medical microbiology and virology. London: DoH. 2007. www.nhscareers.nhs.uk/specialtytraining/medical-microbiology-virology.shtml (accessed 11 Feb 2008).

[5] Modernising medical careers. 2008 person specification – application to enter speciality training at ST1: Medical microbiology/virology. London: DoH. 2008. www.217.154.121.32/DOH/PDF/ST1 MMV-MM person specification final ES 051207.pdf (accessed 11 Feb 2008).

[6] Woodhouse S. Communicable disease control. BMJ 2000;321(suppl):2–3.

[7] Nsutebu E, Minton J. Health protection, infectious diseases, and microbiology. BMJ 2007;334(suppl):52–53.

[8] Malkin J. MSc in clinical microbiology. BMJ 2007;334(suppl):89.

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Answers to issue 2 questions (I)

Testing for Glaucoma Assessment Answers

Rehna Khan and Kamron Khan

A 60-year-old Chinese female attends the emergency department with pain, redness and blurred vision in her right eye. She gives a one day history of coloured haloes around lights, vomiting and frontal headache.

Based on the history which of the following is the most likely diagnosis?

A. Giant cell arteritis
B. Acute angle closure glaucoma
C. Ocular hypertension
D. Pseudoexfoliation glaucoma
E. Bacterial conjunctivitis

The correct answer is B. Acute angle closure glaucoma.

Acute angle closure occurs due to a number of possible mechanisms. It is very important to separate primary acute angle closure from primary open angle glaucoma because the initial therapeutic approach is different. Acute angle closure glaucoma is an emergency and rapid reduction of the intraocular pressure will prevent irreversible nerve fibre layer damage.

Giant cell arteritis is a diagnosis that must not be missed as it can result in rapid and profound loss of sight. It is classically present in patients over the age of 60 with temporal headache, jaw claudication and weight loss. This patient has frontal headache not temporal headache.

Ocular hypertension (OHT) occurs when IOP readings are consistently outside two standard deviations from the normal mean (>21 mmHg), with all other ocular findings within normal limits. A patient with OHT would be asymptomatic. The aetiology and pathomechanism are unknown. A patient with OHT would commonly be referred to the eye clinic by the optician after a routine eye examination.

Pseudoexfoliation glaucoma is a type of secondary open angle glaucoma in which abnormal fibrillo-granualar protein and pigment accumulate on the trabecular meshwork reducing outflow and causing raised pressure leading to optic nerve damage. It is interesting that not all eyes with pseudoexfoliation develop glaucoma. It is common in patients over the age of 60. The signs can only be seen on slit lamp biomicroscopy and as for OHT patients, PXF is often picked up as an incidental finding by the optician.

Bacterial conjunctivitis presents with a red eye but there is no visual loss and the patient is systemically well.

Which of the following investigations is the most helpful for assessing this patient in the emergency department?

A. Conjunctival swab
B. ESR
C. Intraocular pressure measurement
D. Snellen visual acuity
E. Fundoscopy with a direct ophthalmoscope

The correct answer is D.

In the acute setting, in any eye problem the Snellen visual acuity is the most important initial investigation as it allows accurate triaging of the patient. It is analogous to a cardiovascular presenting complaint with a blood pressure recording as a vital part of the assessment. Below is a summary of how to test and record the visual acuity (see Text Box 1).

Checking Visual Acuity in the Emergency Department
Equipment Required
Standard Snellen chart mounted on a wall
Chair for the patient beneath the chart
Opposite the chair, 3 m on a wall ahead, a mirror is required
Occluder with pin hole (available from all eye departments)

A conjunctival swab is not indicated based on the history given. If the patient had presented with a red eye associated with purulent sticky discharge and normal visual acuity then a swab would be useful. An ESR or erythrocyte sedimentation rate is classically high in a patient with giant cell arteritis. The upper limit of normal for ESR has been approximated to age/2 for men and (age + 10)/2 for women. In this case, the history is not suggestive of GCA as the patient does not have temporal tenderness and jaw claudication.

In the acute setting in a patient with suspected acute angle closure, the information gained from looking at the fundus with a direct ophthalmoscope will not help you more than checking the vision. Fundoscopy is an important part of the ocular examination and will give useful diagnostic information in a patient with loss of vision. For example, in a diabetic patient with painless visual loss, fundoscopy may reveal a vitreous haemorrhage and therefore an obscuration of the normal retinal vasculature due to vitreous blood which is easily appreciated even by the most junior doctor by comparing the view in the unaffected eye.

Method to test snellen visual acuity

Explain what you are doing; for example, 'now we shall find out what you can see in the distance'.

1. Instruct the patient: 'Please cover up your left/right eye with the palm of your hand/this occluder'. If using the patient's hand, make sure that the palm is being used as otherwise the patient may be able to peek through their fingers. Some clinicians prefer to hold the occluder over the patient's eye themselves to ensure it is properly occluded.
2. Ask the patient, 'Please read the smallest line that you can see on the chart'.
3. If the patient cannot see the largest letters on the chart, ask them to move closer to the letter until two or three lines can be seen. The distance at which this occurs should be noted (e.g. 3 m, 1 m). This is a more accurate assessment than determining the position that the patient can 'count fingers'. If the patient cannot see the letters even at the closest test distance, use the following test sequence. Stop at the level at which the patient can accurately respond.
    a. Hand movements (HM): The patient can see a hand moving from a certain distance.
    b. Light projection (Lproj.): The patient can report which direction light is coming from when you hold a penlight about 50 cm away. Ask the patient to point to the light and note the areas of the field in which the patient has light perception.
    c. Light perception (LP): The patient can see the light but not where it is coming from. If they cannot see light, the vision is recorded as no light perception or NLP.

Answers to issue 2 questions (I)

4. Once the patient has reached what they believe is the smallest letters they can see, they should be pushed to determine whether they can see anymore. Use prompts such as 'Can you see any letters on the next line' or 'Have a guess. It doesn't matter if you get any wrong'.

   Some patients are more cautious than others and only indicate those letters that they can see easily and clearly. Unless you push patients to guess, you could obtain different VA results depending on how cautious your patient is. Ideally, you should stop pushing patients to read more if they make four or more mistakes on a line of five letters.
5. The pinhole visual acuity is now checked. This is the letters that are read by looking through the pinhole. This indicated the best corrected visual acuity.
6. Record vision unaided (note if it is with glasses or without and best corrected pinhole acuity) in the right eye (OD) and the left eye (OS).
7. Repeat measurements for the other eye and binocularly.

Which of the following is the most probable intraocular pressure reading and vision in this patient?

A. 5–8 mmHg and VA 6/5 OD and OS
B. 10–21 mmHg and VA 6/6 +1 OD and OS
C. 21–25 mmHg and VA 6/6 OD and 6/60 OS
D. 26–30 mmHg and VA 3/60 OD and OS
E. 31–60 mmHg and VA 6/24 OD and 6/6 OS

The correct answer is E.

Many emergency departments will have the equipment required to check an intraocular pressure; however, it does take practice. In this case a raised intraocular pressure (normal is 10–21 mmHg) usually greater than 30 mmHg in the acute angle closure cases will help to confirm the diagnosis. The most frequently used instrument is the Goldmann applanation tonometer (see Figure 1), mounted at the slit lamp.

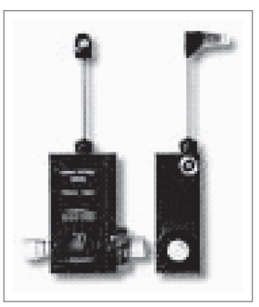


Figure 1: Goldmann applanation tonometer.

The method involves illumination of the biprism tonometer head with a blue light obtained using a cobalt filter and applanation of the cornea after applying topical anaesthesia and fluorescein in the tear film. The scaled knob on the side of the instrument is then turned until the hemicircle of fluorescent tear meniscus visualized through each prism just overlap (see Figure 2).

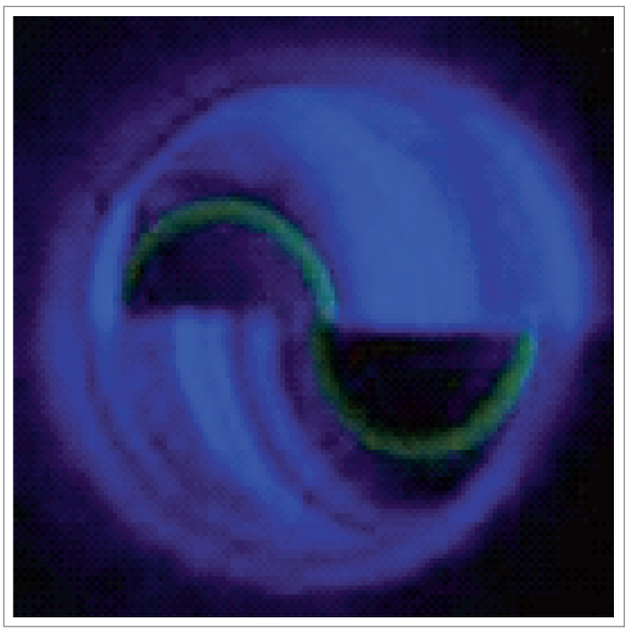


Figure 2: Goldmann applanation tonometer mires visualized through.

Other methods to check the intraocular pressure include air-puff tonometry (used in most optician practices) and the Tono-Pen (see Figure 3).

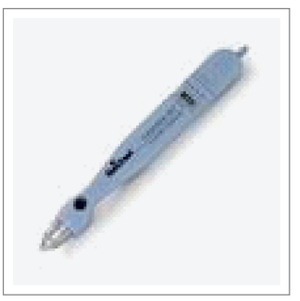


Figure 3: Tono-Pen. vet.reicherttonopen.com

The Tono-Pen has software that automatically selects the acceptable measurements and rejects the inappropriate ones. It is a useful method as it requires little practice and training but is not as accurate as Goldmann applanation tonometry.

You decide to examine the patient further using the slit lamp in the department. Which of the following figures (Figures 4–7) represent the likely findings in this patient?

Answers to issue 2 questions (I)

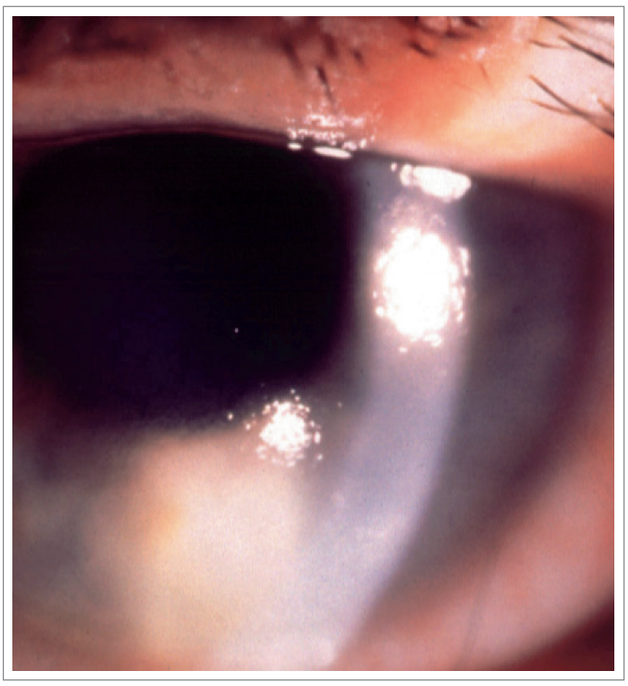


Figure 4: Epithelial corneal oedema. Narrow angles in AACG.

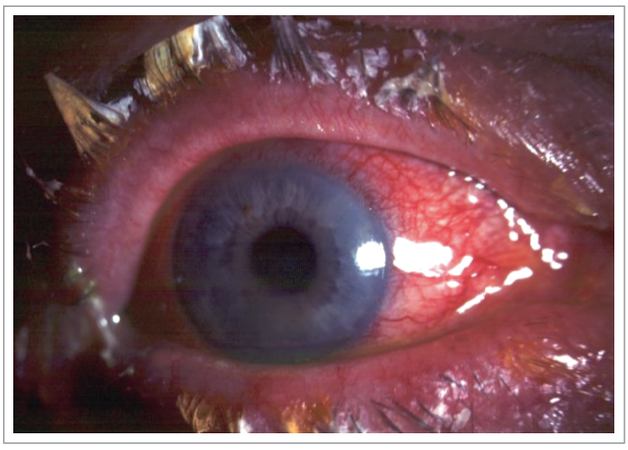


Figure 5: Crusted eyelids and conjunctival injection Conjunctivitis.

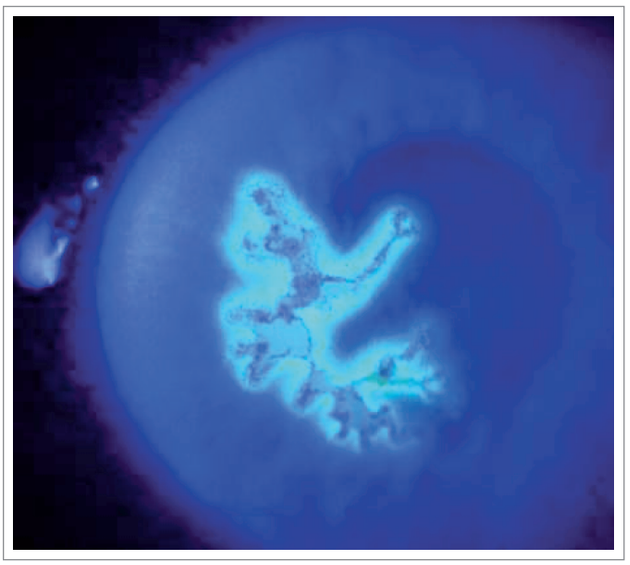


Figure 6: Corneal dendritic ulcer stained with fluroscein and viewed under cobalt blue light Herpes simplex keratitis.

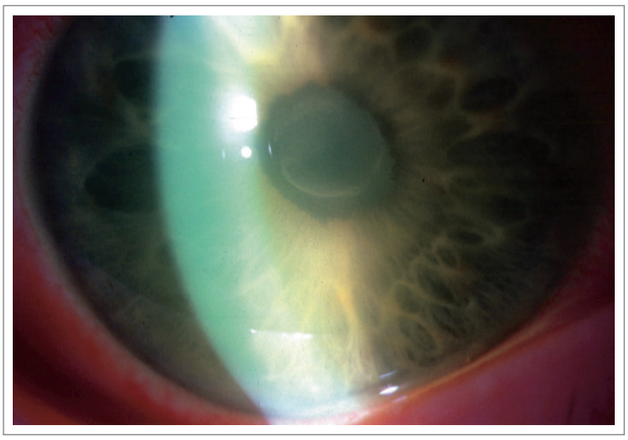


Figure 7: Anterior Uveitis Cells anad flare in anterior chamber Irregular pupil Photophobic patient.

What is the emergency management of this condition?

A. Topical chloramphenicol twice per day to the affected eye
B. i.v or oral acetazolomide alone
C. Topical B blockers, steroids, pilocarpine 2% and α2 agonist (apraclonidine/brimonidine) and i.v acetazolomide
D. All of C and keep patient supine, analgesia and anit-emetics
E. Topical acyclovir five times per day to the affected eye

The correct answer is D.

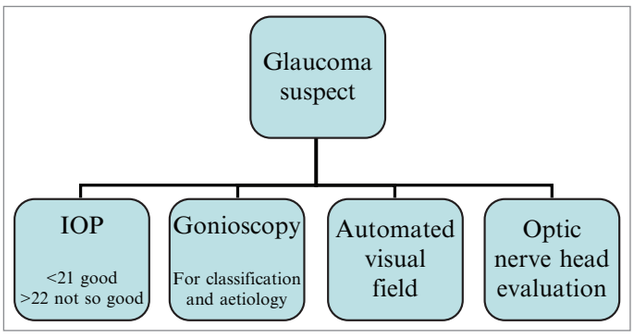
While on a late shift in the emergency department, a patient comes in with a referral letter from his optician (a GOS18). It states that the patient has high IOP of 25 in the right eye and 27 in the left and suspicious optic nerve heads.

Does this patient need to be referred to ophthalmology urgently or routinely?

A routine referral is correct. In the absence of a painful red eye with blurred vision in a systemically well patient, angle closure is unlikely.

The patient will require assessment to identify the cause of the raised pressure and the consequences of it.

Answers to issue 2 questions (I)



The identification of cup disc ratio, contour and colour can be done by use of an indirect fundus lens (78 D or 90 D) at the slit lamp or a direct fundus lens but most junior doctors in their foundation year will be familiar with the direct ophthalmoscope. The pupil should be dilated whenever possible. It is essential to select a spot size with a diameter smaller than the diameter of the disc. This is to avoid light spreading from the para-papillary retina altering the colour appearance of the rim.

Optic Nerve Head Evaluation in Glaucoma

- Colour (pink or pale)
- Contour (defined or blurred)
- Cup (vertical size and cup disc ratio)
- Disc haemorrhage (present or absent)
- Para-papillary atrophy (present or absent)

Based on the criteria above, look at the following figures (Figures 8–11) and select the one that is suspicious for glaucoma.

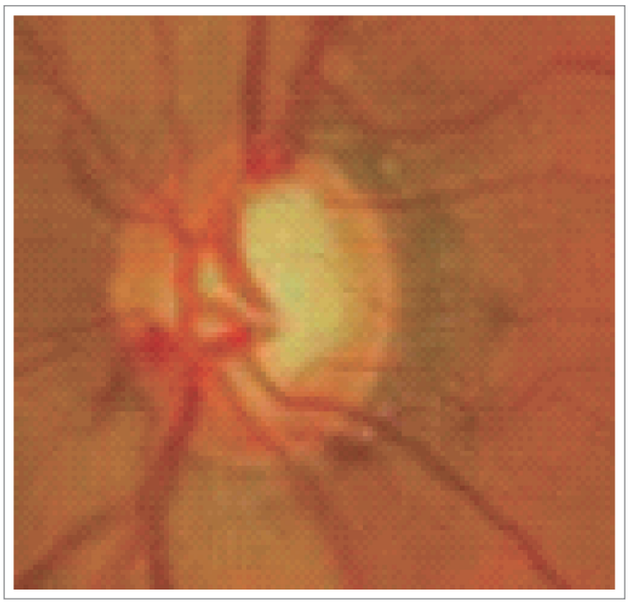


Figure 8: Glaucomatous optic neuropathy.

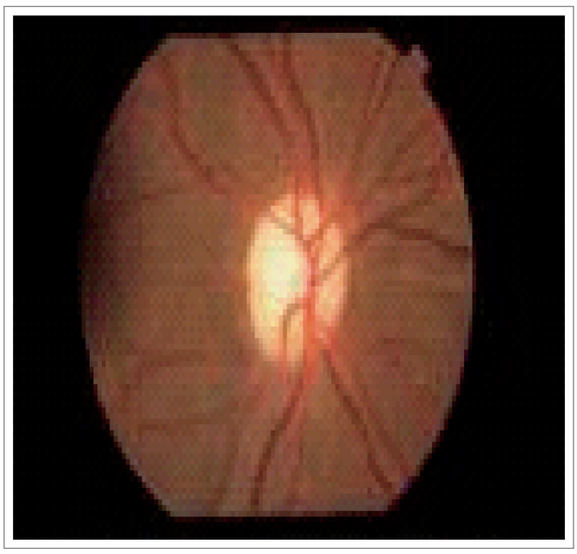


Figure 9: Normal optic nerve.

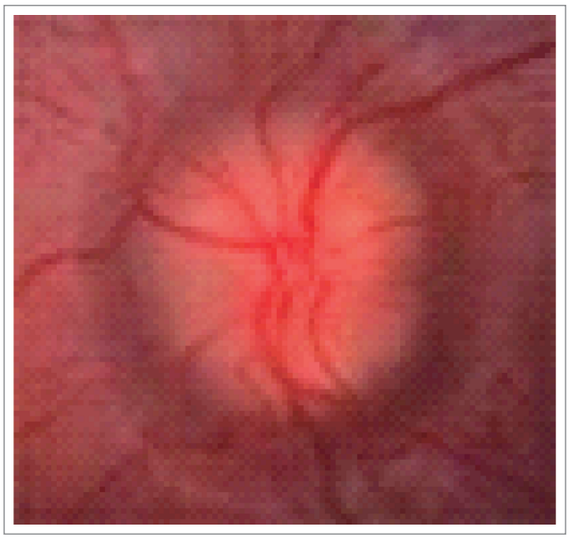


Figure 10: Swollen Optic nerve head.

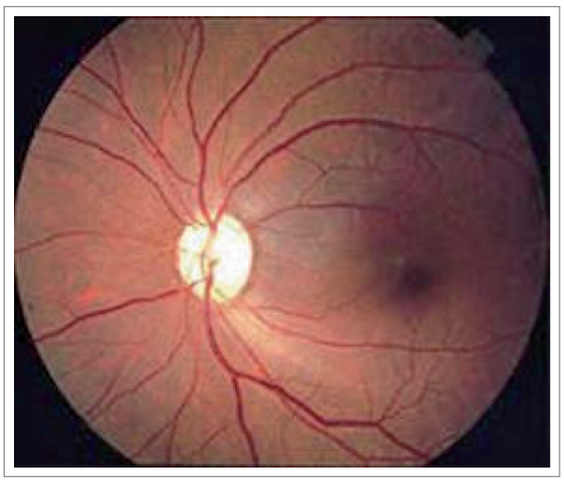


Figure 11: Traumatic optic atrophy.

Answers to issue 2 questions (I)

Look at the following automated visual fields (see Figures 12–15):

Match the field to the most likely pathology:

A. Bitemporal hemianopia
B. Left homonymous hemianopia
C. Glaucomatous field defect

The correct answers are

A. Bitemporal hemianopia is shown in Figure 15. This suggests a lesion in the optic chiasm. CT scan of the head and orbits is indicated.
B. Left homonymous hemianopia is shown in Figure 14
C. Glaucomatous field defect is shown in Figure 13: Note that the defect does not respect the midline. This is a bilateral arcuate scotoma. The optic nerve head is likely to show inferior optic nerve rim notches.

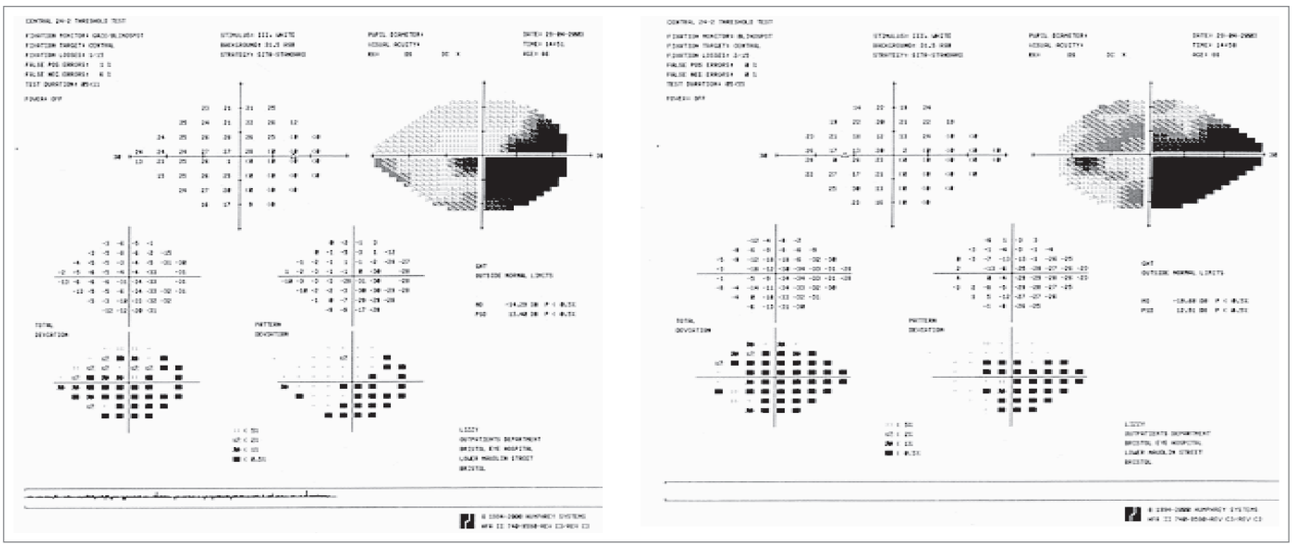


Figure 12.

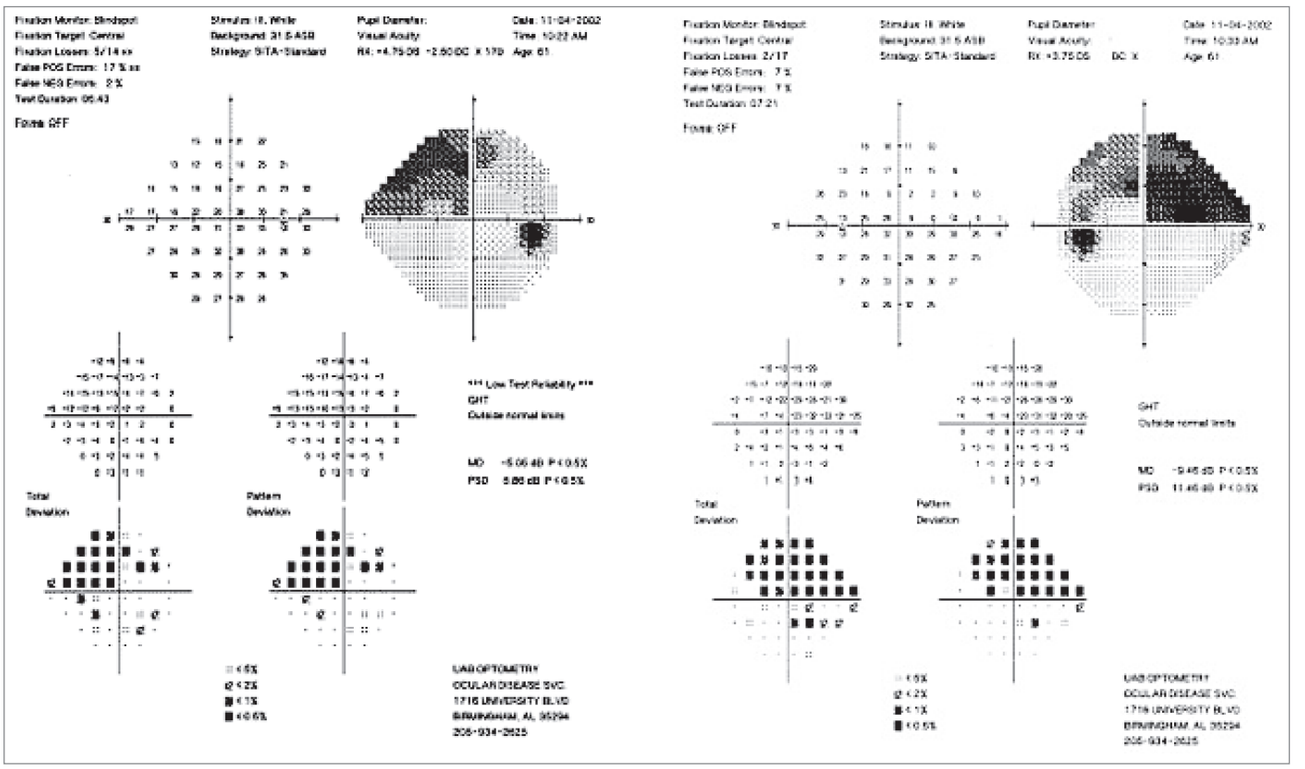


Figure 13.

Answers to issue 2 questions (I)

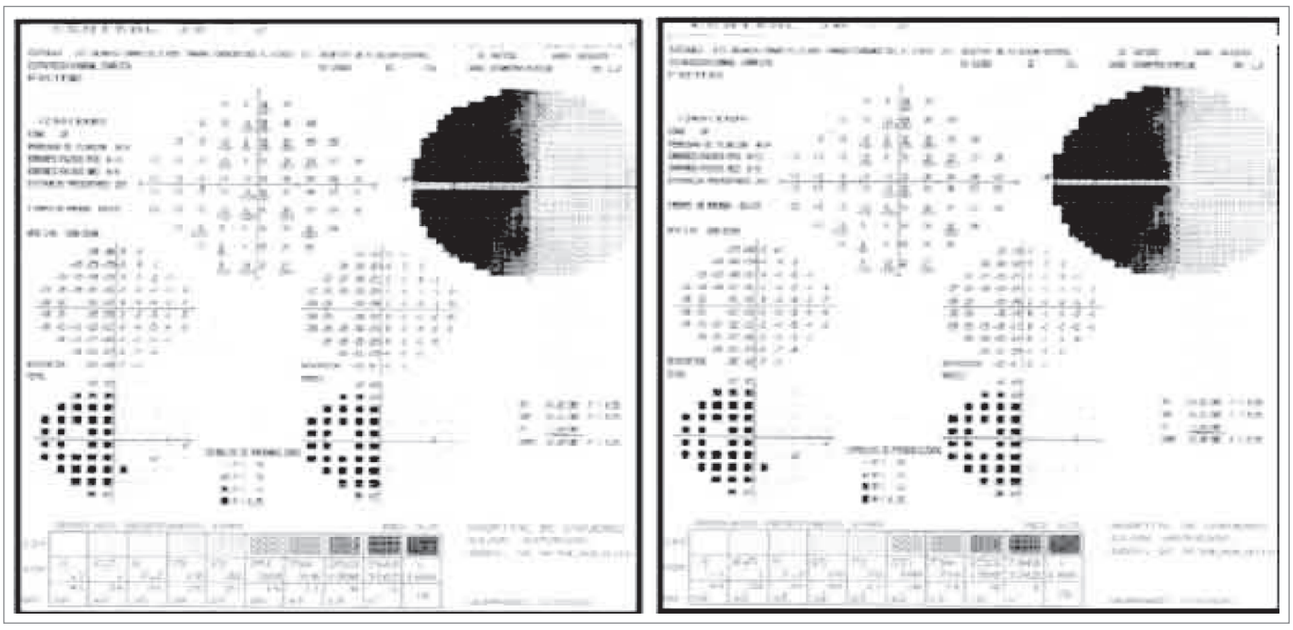


Figure 14.

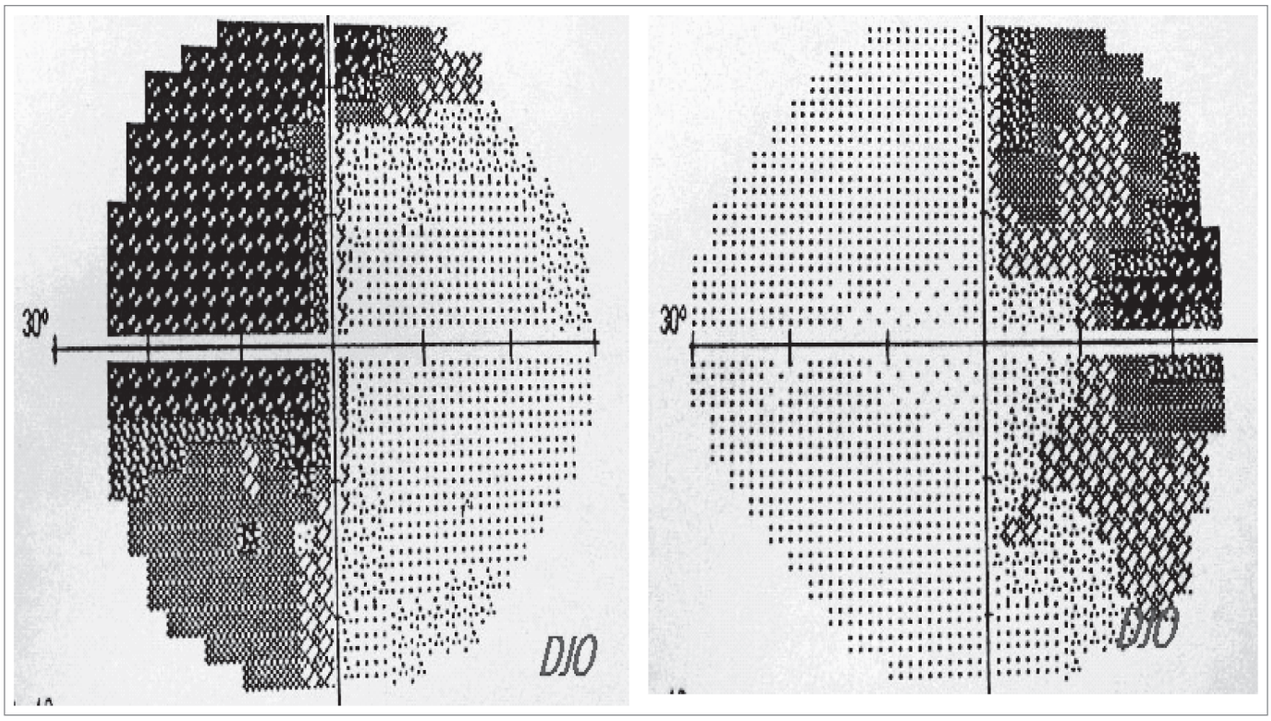


Figure 15.

Figure 12 is a right homonymous hemianopia. Note that the defect respects the midline and is likely to be due to left-sided lesion of the optic radiation as it approaches the occipital cortex. A lesion of the occipital cortex may produce macular-sparing homonymous hemianopia. This is most often seen in cerebrovascular accident involving the posterior cerebral artery.

This patient was seen in the eye clinic and initiated on treatment for primary open angle glaucoma. He was advised to inform his first degree relatives to go to the optician on an annual basis for screening for glaucoma.

Another patient attended eye clinic. This was his binocular visual field result (see Figure 16).

Answers to issue 2 questions (I)

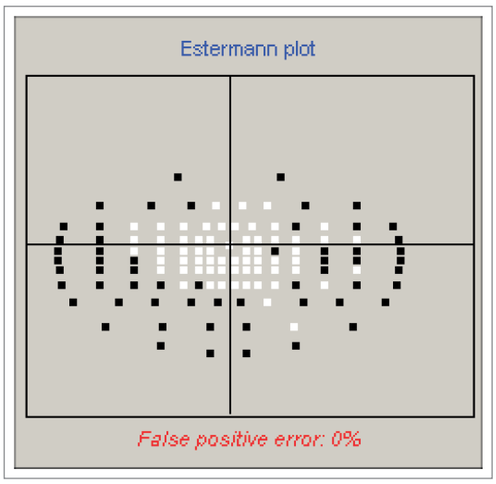


Figure 16: Esterman plot.

He is a driver and has driven in to the clinic today.

What is the recommended course of action if you are concerned about the impact of ocular pathology on the patients' safety to drive a car?

A. Inform that they are not safe to drive and get them to call a friend or relative to take the patient home.
B. Advise them to go to their GP to discuss the matter further
C. Do not say anything to the patient as you are an FY2 and not experienced enough to make this decision.
D. Ask the patient to contact and inform the DVLA who will arrange relevant tests and issue a decision to the patient.
E. Answer D and document this advice in the patient's notes.

Correct answer is E.

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Management of the discharging ear assessment answers

Raad John Glore, John O'Callaghan and David Bowdler

1/ e. Breastfeeding

2/ d. Innervates the stapedial muscle

3/ c. Is innervated in part by a sensory branch of the vagus

4/ c. The most likely diagnosis is otitis media

5/ d. She has Bell's palsy

6/ c. She can safely be treated in the community by oral antibiotics, paracetamol and follow-up by her GP

7/ a. Measures 8 × 9 mm and is 0.1 mm thick

8/ b. You will prescribe topical antibiotic steroid drops

9/ c. She needs urgent surgery to prevent complications due to chronic otitis media

10/ a. The pinna should be gently retracted postero-inferiorly in adult examination

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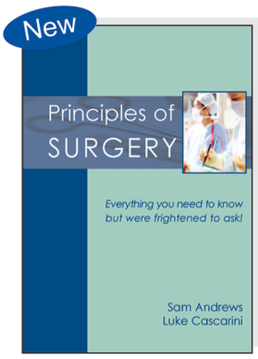

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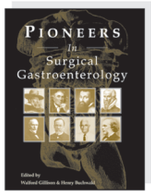

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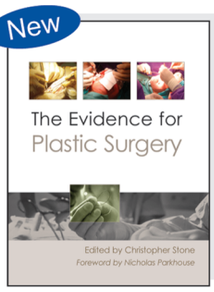

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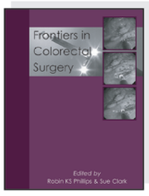

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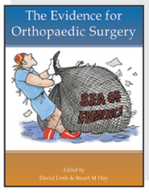

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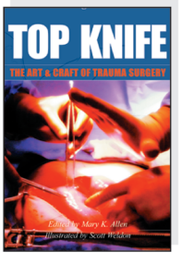

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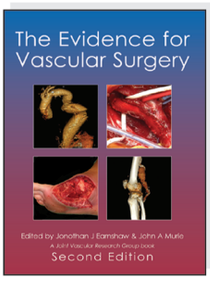

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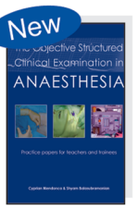

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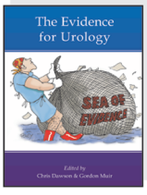

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