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Pediatric Cardiac Surgery, Fourth edition

Editors: Constantine Mavroudis and Carl L Backer

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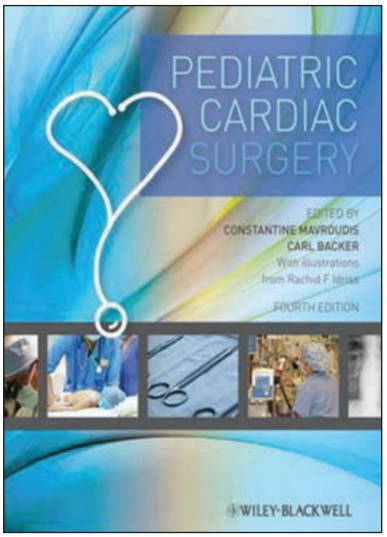
This comprehensive book gives an excellent overview of modern paediatric cardiac surgery. Since first published in 1985 "Pediatric Cardiac Surgery" has been a gold standard reference for paediatric and adult congenital heart surgeons and the wider multi-disciplinary team of cardiologist, intensivists, anaesthetist and nursing involved in the care of congenital heart surgery patients.

The fourth edition has been extensively rewritten with contributions by over 65 world-renowned experts. Each chapter reviews the embryology, clinical findings, assessment, diagnostic criteria, treatment options and postoperative care for each diagnosis. There are hundreds of illustrations rendered by the same artist to clarify important aspects of procedures. The new chapter layouts guide the reader through new treatment options and key developments since previous editions. For instance the interventional cardiology chapter has been replaced with a chapter on hybrid procedures for congenital heart disease. The new chapters review advances in management of tracheal defects, double out ventricles and hybrid management of paediatric heart disease. Advances in adult congenital heart disease are covered by new reviews on the management of right ventricular to pulmonary artery conduits, arrhythmia surgery and surgical conversion of the intra-cardiac to extra-cardiac Fontan.

This book is a recommend addition to any library on congenital heart surgery, and is a suitable textbook of choice for fellows, nurse practitioners or medics seeking a textbook overview of congenital heart surgery.



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In this Month's IMJ

Entry to medical school - the gender question. What has happened: O'Flynn et have analysed the gender differences in the scores obtained. One of the interesting findings is that males outperform females in logical reasoning/problem solving and non-verbal reasoning. On the other hand females outperform males in interpersonal understanding. The gender representation of those who secure a place varies yearly - equal in 2009, female dominance in 2010 and male dominance in 2011.

Table 3 Medical school applicant and entrant profile by gender and year at various stages of the admission process 2008-2011

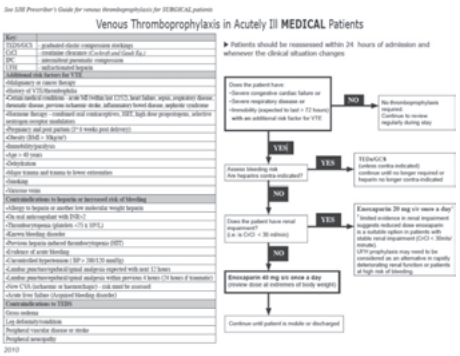
Year	Number of applicants	Number of eligible applicants†	Female % (n)	
			Eligible applicants†	Entrants
2008	2351	2351	N/A	59.0
2009	2913	1665	57.7 (960)	49.2 (212)
2010	3292	1885	60.3 (1136)	59.8 (263)
2011	3377	1781	57.0 (1019)	45.5 (192)

Antenatal Rubella in Ireland: O'Dwyer et al have analysed the national Rubella immunity data for expectant mothers 2009. The overall Rubella non-immune incidence was 6.4%. On examination of sub-groups the Rubella non-immune status was higher among primiparas (8%), those under 25 years (14.7%) and those born outside the EU (11.4%). The authors advise greater concentration on these more susceptible sub-groups.

Table 1 Rubella immune status analysed by age group

Age Group	Immune	Non-immune	Unknown
<20 years (n=2,253)	75.2% (n=1,695)	20.4% (n=459)	4.4% (n=99)
20-24 years (n=8,860)	83.5% (n=7,395)	12.5% (n=1,104)	4.1% (n=361)
25-29 years (n=18,062)	90.6% (n=16,365)	5.8% (n=1,047)	3.6% (n=650)
30-34 years (n=25,135)	92.6% (n=23,267)	4.5% (n=1,138)	2.9% (n=730)
35-39 years (n=17,081)	92.7% (n=15,833)	4.4% (n=746)	2.9% (n=502)
>40 years (n=3,398)	91.1% (n=3,096)	5.0% (n=171)	3.9% (n=131)
Not stated (n=21)	100% (n=21)	0% (n=0)	0% (n=0)
Total (n=74,810)	67,672	4,665	2,473

Venous thromboembolism prophylaxis in acute medical admissions to a university teaching hospital: Lyons et al have audited thromboprophylaxis prescription rates in their hospital. Pre-intervention 39% of at risk patients were prescribed thromboprophylaxis. A number of education measures were introduced and the post- intervention prescription rate increased to 57%. The authors point out that despite the audit over 40% of at risk patients are not receiving thromboprophylaxis.



Delayed diagnosis of anorectal malformation- a persistent problem: Tareen et al describe the pattern of delayed diagnosis of ano-rectal anomalies in newborns, a potentially life threatening condition. In the period 1999-2012 there were 29 cases of delayed diagnosis (21% incidence). When comparing a former period 1999-2009 with a more current period 2010-2012, the incidence of delayed diagnosis has remained unchanged at 21%. The authors recommend the recently circulated RCPI/HSE guideline on ano-rectal malformation detection.

Table 1 Trend of delayed diagnosis (1999-2012)

	Total incidence of ARM	Delayed diagnosis of ARM	Bowel Perforation
Cohort A (1999-2009)	99	21 (21.2%)	2 (9.5%)
Cohort B (2010-2012)	37	8 (21.6%)	1 (12.5%)
Total	136	29 (21.3%)	3 (10.3%)

Chinese whispers in the post anaesthesia care unit (PACU): Grover and Duggan have audited the quality of hand-over information from the anaesthetist to the recovery room nurses. Following structured training sessions the hand-over quality improved between pre and post intervention in terms of medical information 46% vs 77%, allergy history 42% vs 56% but remained unchanged for post-operative instructions 58% vs 59%. The authors emphasise the importance of training in hand-over skills.

Table 2 Comparison of handover of Background and Assessment data

Parameters	AuditA	Audit B	p Value
Allergy	42	56	0.048 *
Medical history	46.15	77	0.000 *
Anaesthesia Type	73	84	0.058
Airway Issues	53	64	0.114
Intraop. Copmlications	51	60	0.200

Higher specialist training in Paediatrics 2005-2010- the graduates reflections: O'Neill et al surveyed a group of 26 paediatric graduates who received their CCST in the period 2005-2010. Twenty one (81%) of the graduates are now working in Ireland as consultant paediatricians. Their positive experiences were the clinical training, role models and the quality of the training days. The negative reflections were lack of protected time for research, excessive clinical service and poor monitoring of trainers. The authors suggest ways in which the programme can be improved.

Table 1 Mean likert scores with number and % of positively skewed scores for Curriculum competencies

HST Competency	% Graduates who felt Competent at Graduation	Mean Likert Score	+ve Likert scew (%)
Inpatient Clinical Care	100	4.86	72
Clinical / Ethical and Legal Knowledge	100	4.96	72
Application of Evidence to Practice	96	3.72	40
Ability as clinical / academic supervisor	84	3.32	24
Scholarly / Research	76	2.88	16
Public Health	68	3.16	25
Health Economics / Policy	64	2.24	0
Healthcare systems modification	60	2.32	4

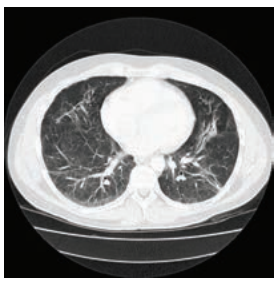


Figure 1
36 year old male patient: Ground glass opacity with consolidation and some airway thickening.

Pulmonary sequelae of severe H1N1 infection treated with high frequency oscillatory ventilation: Edgeworth et al have followed 4 patients who required HFO for H1N1 infection. At 6 months the spirometry measurements were normal but the DLCO was reduced at 73%. The lung CTs showed post inflammatory changes. At 19 months follow up the DLCO shows further improvement.

Economics and ethics of paediatric respiratory extra corporeal life support: Callaghan et al report that 75 children have received paediatric cardiac ECMO treatment. The average cost for an ECMO run in the authors' hospital is €65,000 per child treatment. The authors propose that the cardiac ECMO programme should be expanded to include children with respiratory disorders. Currently children with respiratory failure requiring ECMO are transferred to centres outside the State for treatment.

Table 1: Breakdown of patient type and survival to discharge rate for Our Lady's Children's Hospital, Crumlin (OLCHC) and ELSO (Extra Corporeal Life Support Organisation) comparative data

Survival Rates	OLCHC Survival Cardiology	ELSO Survival to Discharge for Cardiology Patients (July 2011)
Neonate	0 Patients	58%
Paediatric	5 patients, 100% survival to discharge from OLCHC	70%
	OLCHC Survival Post-Op Cardiac	**ELSO Survival to Discharge for Post-Op Cardiac Patients (July 2011)**
Neonate	27 patients, 65.2% survival to discharge from OLCHC	39%
Paediatric	31 patients, 60.7% survival to discharge from OLCHC	48%

Patient Safety instead of Adversarial Medicolegal Claims

In the UK the annual cost of claims has risen to €1.5 bn annually. Similar increases have been encountered in Ireland. Clare Dyer[1], an experienced legal correspondent, questions the value and effectiveness of the current tort systems. It doesn't appear to be making the patient safer. The present arrangement is expensive both in time and money. The court costs are substantial and sizable portion of any award goes to legal team rather than to the patient. Large amounts of money are being lost to the health service annually. The process is very challenging for doctors. The majority undergo periods of emotional distress during the lengthy, intrusive litigation process. One of the possible reasons that doctors react so adversely to litigation is that most of them are self-critical from the outset. Their distress is compounded by the fact that in tort law fault must be found in order for compensation to be paid. A feeling of being out of control pervades the experience[2]. In the US being sued is now considered the price of practising medicine. The stakes are both personal and very high. By age 65 years 75% of doctors in low risk and 99% in high specialties will have encountered personal litigation[3]. The term medical malpractice stress syndrome (MMSS) is increasingly being used to describe the commonly experienced array of psychological and physical symptoms including anxiety, depression, negative self-image, poor appetite and exacerbation of pre-existing medical problems. Downstream consequences include stopping seeing certain types of high risk patients, taking early retirement, discouraging others from entering medicine.

There are alternatives. No-fault schemes were again considered in the UK in 2011 but ultimately rejected. Although they would save on legal fees, it was felt they would increase the number of claims being filed and reduce the quantum for individual injured patients. Despite this setback the no-fault approach remains on the table and has been adopted in many developed countries. In the no-fault programme patients don't have to prove that hospitals or health care professionals were negligent but they do have to demonstrate that the treatment or medical process caused them harm. It has been in place in New Zealand, Sweden, Norway, Denmark and Finland since the 1980s. In France and Germany there are high rates of settlement without going to court. In the US, Florida and Virginia have introduced no-fault compensation for birth injury cases.

Another approach is to cap compensation amounts. This appears to be practical especially for smaller claims. Parts of the UK have a redress claims scheme for amounts less than £20,000.

Over the past 30 years the approach to real or perceived medical mishaps is based on the triad of blame, litigation and punishment in the form of monetary payment and/or sanctions. Don Berwick[4] US Institute for Healthcare Improvement has recently challenged this approach. In a Report addressing the issues surrounding the excess deaths in Mid Staffordshire he sets out a different model for improving patient safety and reducing harm. He was requested by the UK government to provide an 'outside opinion' on the Francis report which ran to 1700 pages and 290 recommendations. Berwick has taken a very different stance to other commentators. He advises to abandon blame as a tool and place more trust in the goodwill and good intentions of the staff. Fear is toxic to both safety and the environment. Recrimination and demoralisation must be resisted. The vast majority of staff wishes to do a good job, to reduce suffering and to be proud of their work. In most cases the cause of the mishap is the systems, procedures and the environment rather than the individual health care worker. The Guardian newspaper[5] commenting on the report described it as 'not so much a breath of fresh air as an exhilarating blast'. It also notes his most sparing use of the law.

There are three types of harm- harm due to error, harm due to system failure and more rarely harm due to wilful misconduct. Most mishaps take place in situations where well-intentioned staff is doing their best to care for their patients. Human error is common but unintended. The only constructive option is to record it, discuss the causation and learn from it. Managements that place an emphasis on blame and disciplinary measures simply drive errors underground and as a consequence safety improvement will not happen. In the occasional, rare case where there has been wilful or reckless harm, strong disciplinary action must of course be implemented.

Safety provision for patients needs to be proactive rather than reacting to an injury that has occurred. While 'zero harm' is probably unattainable, continual reduction should be the goal of all health organisations. Good leadership is required to provide clarity and consistency to the culture of safety. In addition to diagnosis and treatment, safety must be part of every patient's care.

Management can jeopardise patient safety in a variety of ways and instances. It may place targets and costs centre stage rather than the patient as happened in Mid Staffordshire. The voicing of bad news or criticism by staff is deemed unwelcome. There may be a failure to understand that not all problems can be solved within the organisation and within the existing budget. Some issues require outside expertise and innovative solutions. Some organisations have unclear responsibility structures and when safety issues arise staff is unclear as to who is in charge. Staff may be treated with lack of respect and operational changes implemented without consulting or informing them. Management needs to constantly be mindful of the best scientific evidence on staffing ratios. There is now clarity that for a general medical-surgical ward there should be no fewer than one registered nurse per 8 patients plus the nurse in charge. When this staffing level is breached, patient safety risks rise significantly.

Berwick specifically addresses doctors. He acknowledges that working in a publically funded health service such as the UK or Ireland, places one under the spotlight of constant scrutiny. Every clinician knows what it is like to be involved in an error even despite one's best efforts. The system can fail in so many ways. Common examples are the mislaid important scan report, the drug dose miscalculation when the unit is understaffed and fatigued and the patient who acquires a hospital infection. Education and commitment to safety is more important than rules and regulations. The avoidance of error is so important because mishaps undo all the good work and reputation of the organisation.

Two guiding principles emerge. The patient must feel and be safe from harm and the healthcare worker must feel safe from blame and sanction when carrying out his/her duties in an appropriate manner.

JFA Murphy
Editor

1. Dyer C. Fault lines: resolving clinical negligence claims. BMJ 2013;347:13-14
2. Charles SC. Coping with a medical malpractice suit. West J Med 2001;174:55-58
3. Studdert DM, Mello MM, Atul A et al. Claims, errors and compensation payments in medical malpractice litigation. N Engl J Med 2006;354:2024-33
4. Berwick D. A promise to learn- a commitment to act. Improving the safety of patients in England. 2013. NHS England
5. The Guardian newspaper editorial. Berwick report on the NHS: a fine institution. 6th Aug 2013

Duel Energy CT Imaging of Tophaceous Gout

Gout is characterized by an inflammatory response that is initiated by the precipitation of monosodium urate within and surrounding the joints as well as the soft tissue. This is the most common form of inflammatory arthritis and has been showing increasing incidence over recent years in association with increased incidence of the metabolic syndrome[1]. Arthritis Ireland believe the same increase is taking place in Ireland with up to 5% of the Irish population suffering from gout. Many associate alcohol consumption with gout but fructose in non alcoholic soft drinks and beers may also have a contributory role. Male patients who consume over 2 soft drinks daily are thought to have a 1.85 relative risk for developing gout[2].

Typical age of onset is 30-50 years old and the initial presentation is often with an acutely painful first metatarsophalangeal joint known as podagra. A diagnosis of gout is usually made on clinical grounds in combination with, serum urate levels and radiologic diagnosis. The presence of monosodium urate crystals in aspirated synovial fluid is definitive. Urate crystals are negatively birefringent under polarized light. Joint aspiration can be difficult in the acutely inflamed joint, the deformed joint and is not always performed for definitive diagnosis[3]. Using these diagnostic tools gout is usually easily diagnosed, but in certain cases the clinical and biochemical picture is ambiguous. For example patients atypical site of disease, a prolonged rate of onset, or polyarthropathy. Serum uric acid levels may be normal in an acute gouty attack[4]. Although there is hyperuricemia there may be concomitantly an acute inflammatory process that imitates gout.

Plain film radiographs are invaluable in the diagnosis of gout demonstrating typical peripheral erosions, soft tissue swelling and calcific tophi in the hands and feet. Characteristic locations include the first metatarsophalangeal joint of the foot. By the time erosions and tophi are present however this already indicates advanced disease and plain films are not the diagnosis of choice for early stage disease. Bone erosions take many years to develop and they may be seen on radiographs even in the absence of current active disease indicating a sequela of prior attacks of gout[4]. Ultrasound of the joints is a widely available bedside non invasive technique. Ultrasonography is particularly useful to image the inflammatory nature of gouty arthropathy, revealing synovial and soft tissue inflammation, and can analyse the composition and vascularity of tophi[5]. Ultrasound is considered less sensitive for osseus erosions than MRI but better than plain film[6]. Monosodium urate (MSU) tophi are very echogenic when US is used. Typical US features of gout include a double-contour sign or "urate icing"[7].

MRI is used in the characterization of inflammatory arthropathies due to its excellent soft tissue characterization, detecting the presence and extent of synovial involvement. MRI can indicate activity of disease with increased T2 signal intensity in active tophi and enhancement with administration of intra venous gadolinium. MRI is not routinely used in the diagnosis of gout but can be particularly useful if the differential diagnosis is osteomyelitis. Bone oedema is not a typical feature of gout[8].

Dual energy CT was developed for the evaluation of uric acid content of renal stones. On standard non contrast CT calcific tophi and calcific deposits for other reasons cannot be differentiated. So renal stones composed of uric acid could not be distinguished from stones made of harder calcium oxalate or cysteine using standard CT as both appear as hyperatennauting deposits with this modality. This is an important differentiation as softer stones such as uric acid stones are known to have a better response to lithotripsy than calcium oxalate stones. Dual energy Ct evolved to allow characterization of the composition of calcific deposits. This is possible due to acquisition of two image datasets with different attenuation characteristics by using two different tube Kilovoltage potentials (80 and 135Kvp). Different materials interact with the different kilovoltage potentials in a manner specific to their atomic density. The different material composition is then processed using a gout algorithm and colour coded images are produced reflecting differences in the composition of the material. Standard CT acquired simultaneous allows for high resolution depiction of bone and the extent of periarticular erosions.

Dual energy CT is not confined to use in the evaluation of renal stones and gout. It is also used for characterization of adrenal masses as well as cardiac imaging and vascular imaging. It can be used to create virtual 'non contrast images and thus reducing radiation doses. This technique, takes approximately 5 minutes to image the hands and feet. It is not associated with increased radiation doses over standard CT[9]. Typical effective dose is in the region of 0.1-2mSv, standard two film series of one foot is 0.12mSv. DECT can be used to detect uric acid crystals with moderate sensitivity and high specificity according to several retrospective studies[3]. Only one randomized control study has been performed confirming this[10]. DECT can be used to problem solve in difficult cases where there are atypical sites of disease, discordant serum uric acid levels, negative joint aspirates[4]. DECT can be used to exclude other causes of an acutely inflamed joint[2,3]. Cases with atypical presentations can delay diagnosis and treatment and have a consequence on patient outcome. To determine response to treatment, dual energy CT may prove to be the most sensitive method of quantitating tophus volume at baseline and following treatment.

With advancing imaging techniques we are provided with more sensitive techniques for detection of disease earlier in the pathogenesis of gout. Previously, the only imaging modality was plain film where erosions were seen on the joints many years into the disease process. Currently, ultrasound has been shown to detect early changes around the joint in patients with hyperuricaemia even in the asymptomatic setting[6]. With the rising incidence of hyperuricaemia, it poses the question how aggressive should we be with new imaging techniques such as US and DECT to detect subclinical disease prior to onset of irreversible changes.

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References

1. Arromdee E, Michet CJ, Crowson CS, O'Fallon WM, Gabriel SE. Epidemiology of gout: is the incidence rising? J Rheumatol 2002;29:2403-2406
2. Choi HK, Al-Arfaj AM, Eftekhari A, et al. Dual energy computed tomography in tophaceous gout. Ann Rheum Dis 2009;68:1609-1612
3. Nicolaou S, Liang T, Murphy DT, Korzan JR, Ouellette H, Munk P. Dual-energy CT: a promising new technique for assessment of the musculoskeletal system. AJR Am J Roentgenol;199:S78-86
4. Desai MA, Peterson JJ, Garner HW, Kransdorf MJ. Clinical utility of dual-energy CT for evaluation of tophaceous gout. Radiographics;31:1365-1375; discussion 1376-1367
5. McQueen FM, Doyle A, Dalbeth N. Imaging in gout--what can we learn from MRI, CT, DECT and US? Arthritis Res Ther;13:246
6. Chowalloor PV, Keen HI. A systematic review of ultrasonography in gout and asymptomatic hyperuricaemia. Ann Rheum Dis
7. Thiele RG. Role of ultrasound and other advanced imaging in the diagnosis and management of gout. Curr Rheumatol Rep;13:146-153
8. Poh YJ, Dalbeth N, Doyle A, McQueen FM. Magnetic resonance imaging bone edema is not a major feature of gout unless there is concomitant osteomyelitis: 10-year findings from a high-prevalence population. J Rheumatol;38:2475-2481
9. Henzler T, Fink C, Schoenberg SO, Schoepf UJ. Dual-energy CT: radiation dose aspects. AJR Am J Roentgenol;199:S16-25
10. Choi HK, Burns LC, Shojania K, et al. Dual energy CT in gout: a prospective validation study. Ann Rheum Dis;71:1466-1471

Entry to Medical School – the Gender Question. What has Happened?

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Abstract
Reform of medical school selection has generated concerns that the process favours male applicants. The gender profile, HPAT - Ireland and Leaving Certificate scores of all applicants in 2009 -2011 (n=9582) and the gender profile of entrants from 2008 -2011 is presented. Small gender differences favouring males are evident in total HPAT-Ireland scores and subsection scores less than 7 and 4 points respectively with a total selection score impact of approximately 0.8%. In relation to Leaving Certificate performance, since 2009, eligible male applicants to medicine have tended to outperform females with less than 3 points mean difference which has an impact close to 0.7% as selection is still weighted in favour of this test. The gender profile of applicants securing a place has varied annually. Reforms may have inadvertently altered the gender distribution in medical school but there is no evidence that this is entirely attributable to the HPAT-Ireland test.

Introduction

The debate regarding the "feminisation" of medicine ripples continuously below the surface. Recent revised selection mechanisms to medical schools in Ireland, introduced in 2009 following the Fottrell report, appear to have unintentionally marginally reduced the proportion of female entrants to medical school provoking a media debate.[1,2] There was an official response.[3] Similar media debates have occurred in the UK. [4] Medicine was once a male-dominated profession reflecting the male preponderance in medical schools. Subsequently an increase in female undergraduate entrants has led to an even gender balance or slight female dominance in medical schools.[5] Any ideal admission process should be fair, transparent and without bias. There is no ideal gender composition nor is there an ideal demography in medical schools beyond ensuring that the population studying to become the doctors of tomorrow is broadly representative of society as a whole. Equity of access to medical school is not simply a gender question. There is concern regarding the access of minority groups and perhaps socio-economically disadvantaged candidates to a place in medical school when traditional tests are used.[5,6] Elsewhere, innovative approaches to entry and selection have not entirely resolved this issue and data is conflicting.[7,8] The UK data suggests that inclusion of an adjunct admission test, the UK Clinical Aptitude Test or UKCAT, may have slightly altered the gender balance in medical schools reducing the previous female dominance.[9]

Since 2009, entry and selection to medical school in Ireland is determined by scoring performance in six subjects in a single sitting of the state run school exit examination the Leaving Certificate (or equivalent), wherein matriculation requirements have been met and the score achieved in an adjunct admission test the Health Professions Admission Test or HPAT-Ireland. To be eligible to apply to medicine candidates must score above 480 points noting that an A1 grade of greater than 90% represents 100 points, an A2 grade of 85-89% represents 90 points etc. Furthermore, Leaving Certificate scores are moderated above 550 points and the maximum achievable Leaving Certificate score for the cohort evaluated was 560 points (this has changed in 2012 since the introduction of bonus maths points) while the maximum achievable HPAT-Ireland score is 300 points. (Therefore maximal entry scores were 860)[10] This latter test consists of a 2 hour multiple choice paper comprising 3 sections; 1) Logical Reasoning and Problem Solving; 2) Interpersonal Understanding; and 3) Non-Verbal Reasoning. As gender neutrality was a consideration in the adjunct admission test procurement process and is a consideration in any fair entry and selection mechanism, it is reasonable to evaluate the gender impact of the revised approach to entry and selection to medical schools in Ireland.

Methods

A National Research Group, Evaluating Revised Entry and Selection Mechanisms to Medicine, has been convened under the auspices of the Council of Deans of Faculties of Medical Schools in Ireland. The Research group comprises representation from academic medical education staff of each medical school, university admission officers, the Central Applications Office (CAO) and external experts. All candidates who sit HPAT-Ireland sign a waiver allowing their results to be analysed for research purposes. Leaving Certificate results and gender profiles were obtained from the CAO. Ethical approval for the research was processed in UCC. The following data was collected and gender profiles collated for the years between 2009 -2011 inclusive; Leaving Certificate scores of all applicants, HPAT-Ireland scores of all applicants (where medicine was the first or lower ranked choice) and gender profile of applicants and entrants in 2008. The analysis excluded candidates who presented A-levels, mature entrants and those admitted under specialised entry schemes for students with a disability or those from socioeconomically disadvantaged backgrounds. Some HPAT-Ireland performance data was obtained directly from the Australian Council for Education Research (ACER) the purveyors of HPAT –Ireland and is reproduced here with their permission. This data has been verified independently by the authors. All data was entered into and analysed using Stata version 12.1.

Results

Gender performance in the Leaving Certificate varies from year to year however since 2009 eligible male applicants to medical school have tended to slightly outperform females as is evident in Table 1. The observed differences of HPAT- Ireland total scores and HPAT-Ireland subsection performance of all applicants is outlined in Table 2. There is a slight gender difference in HPAT-Ireland performance favouring males most evident in 2009 but less apparent in 2010 or 2011. There is persistent subtle gender patterns at the level of HPAT-Ireland subsections with males consistently outperforming females in section 1. Logical Reasoning and Problem Solving and section 3 Non-Verbal Reasoning whilst females consistently outperform males in section 2 Interpersonal Understanding.

The gender profile at various stages in the process from application to admission is presented in table 3 including data from 2008, the year before revised mechanisms were introduced

Table 1 Unmoderated Leaving certificate scores of eligible female and male applicants 2009-2011

	Females mean (SD)	Males mean (SD)	Difference in means (95% CI)
2009	538 (34)	541 (35)	-2 (-5 to 1)
2010	544 (33)	544 (33)	-1 (-4 to 2)
2011	544 (32)	546 (34)	-2.5 (-6 to 1)

Table 2 Difference in female and male HPAT scores. Results presented as mean (95% confidence interval)				
	Difference in HPAT score (female-male)			
Year	Section 1	Section 2	Section 3	Total
2009	-3.0 (-3.7, -2.3)	0.6 (-0.1, 1.4)	-3.8 (-4.5, -3.1)	-6.2 ((-7.9, -4.5)
2010	-2.2 (-2.8, -1.5)	2.3 (1.6, -3.0)	-1.6 (-2.3, -1.0)	-1.6 (-3.1, 0.0)
2011	-3.2 (-3.9, -2.5)	1.0 (0.2, 1.8)	-2.0 (-2.7, -1.4)	-4.2 (-6.0, -2.4)

The maximum score on each section is 100.

and for 2009-2011 inclusive i.e. the 3 years following the introduction of the reforms. As is evident, females predominate in the total applicant pool, and in the eligible applicant pool however the gender representation of successful applicants i.e. those who secure a place in medical school has varied annually with near equal gender distribution in 2009, female dominance in 2010 and male dominance in 2011.

Table 3 Medical school applicant and entrant profile by gender and year at various stages of the admission process 2008-2011				
Year	Number of applicants	Number of eligible applicants†	Female % (n)	
			Eligible applicants†	Entrants
2008	2351	2351	N/A	59.0
2009	2913	1665	57.7 (960)	49.2 (212)
2010	3292	1885	60.3 (1136)	59.8 (263)
2011	3377	1781	57.0 (1019)	45.5 (192)

†meet matriculation subject requirements and score 480 points or more.

Discussion

The strength of this data analysis lies in the fact that it evaluates gender trends across the entire applicant and entrant cohorts for a number of years. The analysis aims to present trends to inform discussion. It should be noted that the gender balance in medical schools was not an issue of concern to the Fottrell Group nor was it a consideration. Rather, the report focussed on aligning entry and selection processes in Ireland with practices elsewhere and removing the perceived negative educational consequences of the "Points race" for all applicants. It is desirable that all high stakes tests are gender neutral. The Leaving Certificate has not been subjected to this scrutiny and indeed may favour females as indeed do other school exit examinations.[11,12] Previous evaluations of entry and selection mechanisms have been limited by the very small numbers of students and the fact that only modified versions of the HPAT- Ireland were used.[13] The mean scores of eligible male applicants in both tests used to determine admission are higher than female applicants and, although these are not statistically significant, the demand for places leads to clustering of applicant scores at an admission threshold so that such small statistically insignificant differences can affect outcomes.[14]

In relation to the HPAT-Ireland, there are some subtle gender differences in scores at subsection level and a small gender difference in total HPAT-Ireland score. This was perhaps most evident in 2009 but is overall less evident thereafter. At an applicant cohort level, it is hard to attribute overwhelming significance to these findings. The subtle differences observed in gender performance at the level of HPAT-Ireland subsections would appear to partially compensate for each other. Furthermore recent proposed changes to the scoring of HPAT-Ireland ,which will reduce the weighting applied to section 3 may reduce the gender differential observed in total HPAT-Ireland scores.[15] The largest controlled study evaluating the topic of MCQs and gender bias was conducted in the US in 1997 involving millions of students across a range of ages. It noted a slight gender bias favouring males who appeared to perform better in items requiring the interpretation of a figure or graphical information such as may occur in sections 1 and 3 of HPAT-Ireland.[16] It is interesting that males may also outperform females in the most commonly used adjunct admission test in the UK where similar factors may be at play.[9]

Our analysis of medical school applicants in 2009-2011 inclusive suggests that male applicants outperform female applicants in the Leaving Certificate and, although overall the differences are small, as the entry and selection process is still weighted in favour of the Leaving Certificate any gender differences in such test scores theoretically has approximately twice the effect of a similar difference in gender performance in HPAT-Ireland. This finding surprised us as it is known that females generally outperform males in such tests and previous female dominance in medical school was secondary to superior Leaving Certificate performance.[11]. We wonder whether external factors such as the prevailing economic climate may have influenced applicant behaviour. It is known that male applications to medicine tend to increase in times of economic uncertainty.[17] Perhaps the apparent security offered by a career in medicine has made such an option more attractive to high academic performing males in Ireland. Moderation and subsequent adjustment of the benefit of scoring above 550 points in the Leaving Certificate was introduced to remove the negative educational impact of the "points obsession" for all applicants and our data suggests that in recent years males would be expected to be most affected by such moderation. Medicine is the only course where such a moderation applies. It is perhaps the most contentious aspect of the reforms introduced.

Obviously a range of factors affect academic performance and test performance in general including motivation and commitment quite apart from any gender issue.[18] Females had predominated in medical schools in Ireland for some years. This is a trend mirrored internationally and not an Irish phenomenon.[5] In 2009, this trend was adjusted transiently but reverted in 2010 with females again predominating and this pattern has appeared to change annually. It is difficult to establish the impact of the stipulation that points must be scored from matriculation subjects in a single sitting as the gender profile of applicants who repeated the Leaving Certificate in the past was not a focus of this work, but it will now be examined. The perception that the inclusion of the HPAT-Ireland test in entry and selection decisions actively disadvantages females is not however borne out in any conclusive fashion by the evidence. The gender difference in mean gender scores in the total HPAT-Ireland and Leaving certificate is small. The entry and selection system is still weighted in favour of leaving certificate scores. In 2010, where least difference was evident in male and female leaving certificate scores and HPAT-Ireland scores, almost 60% of entrants were female.

The historic relative over-representation of females in medical school is a sensitive and emotive issue. All agree that selection to the profession should focus on selecting the best potential doctors but the debate as to the precise mechanism to be employed continues.[19] Proxy measures such as knowledge based tests and adjunct admission tests are, and will continue to be, widely used in a merit based system. The demographic of the medical workforce is of interest as this will inevitably influence systems based work practices but perhaps the extent of the gender aspect of this influence is sometimes overstated as flexible work practices in Healthcare are required to retain all graduates and not just females.[20,21] The gender debate may have gained attention however policy makers are more concerned about socio-demographic equity. Concerns regarding access to commercial HPAT preparatory courses and repeat effects have already led to recommendations being considered by all medical schools.[15]

In summary, the data analysis to date does not support any evidence of a definite gender bias associated with the introduction of the adjunct admission test HPAT- Ireland. This will continue to be analysed on an ongoing basis.

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References

1. Medical education in Ireland: a new direction Department of Health & Children, Dublin, 2006.
2. Houston M. Welcome for more men doing medicine. The Irish times. 25-08-09.
3. (CDFMSI). Letters to the Editor - Gender balance in medicine. Council of Deans of Faculties with Medical Schools of Ireland: Irish Times; 2009.
4. Laurance J. the medical timebomb :too many women doctors. The Independent. 2004.
5. The demography of medical schools : a discussion paper. British Medical Association. London: BMA, 2004.
6. McManus IC, Woolf K, Dacre J. The educational background and qualifications of UK medical students from ethnic minorities. BMC medical education. 2008;8:21. Epub 2008/04/18.
7. Puddey IB, Mercer A, Carr SE, Louden W. Potential influence of selection criteria on the demographic composition of students in an Australian medical school. BMC medical education. 2011;11:97.
8. iffin PA, Dowell JS, McLachlan JC. Widening access to UK medical education for under-represented socioeconomic groups: modelling the impact of the UKCAT in the 2009 cohort. BMJ. 2012;344:e1805.
9. James D, Yates J, Nicholson S. Comparison of A level and UKCAT performance in students applying to UK medical and dental schools in 2006: cohort study. BMJ. 2010;340:c478.
10. CAO. Summary report; New selection criteria for undergraduate entry to Medicine 2009. .
11. Hyland A. Commission on the Points System Final Report and Recommendations. Department of Education, 1999.
12. McManus IC, Powis DA, Wakeford R, Ferguson E, James D, Richards P. Intellectual aptitude tests and A levels for selecting UK school leaver entrants for medical school. BMJ. 2005;331:555-9.
13. Halpenny D, Cadoo K, Halpenny M, Burke J, Torreggiani WC. The Health Professions Admission Test (HPAT) score and leaving certificate results can independently predict academic performance in medical school: do we need both tests? Ir Med J. 2010;103:300-2.
14. O'Flynn S, Fitzgerald AP, Mills A. Modelling the impact of old and new mechanisms of entry and selection to medical school in Ireland: who gets in? Ir J Med Sci. 2013.
15. O'Flynn S, Mills,A, Fitzgerald,T. National research group evaluating revised entry mechanisms to medicine Interim Report -School Leaver Entrants. 2012.
16. Cole N. The ETS Gender Study: How Females and Males Perform in Educational Settings. Princeton: Educational Testing Service (ETS), 1997.
17. AAMC. The Changing Gender Composition of US Medical School Applicants and Matriculants, Association of American Medical Colleges Report. 2012.
18. Ferguson E, James D, Madeley L. Factors associated with success in medical school: systematic review of the literature. BMJ. 2002;324:952-7.
19. O'Flynn S. Entry and selection to medical school– Do we know what we should measure and how we should measure it? Medical Education - The state of the Art: Nova Science Publishers; 2010. p. 17-29.
20. Weizblit N, Noble J, Baerlocher MO. The feminisation of Canadian medicine and its impact upon doctor productivity. Medical education. 2009;43:442-8.
21. Meghen K, Sweeney, C, O'Flynn, S, Linehan, C, Boylan, GB. Women in Hospital Medicine: Facts, Figures and Personal Experiences. Ir Med J. 2013; 106: 39-42.

Antenatal Rubella Immunity in Ireland

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Abstract
The objective of the study was to identify those women attending for antenatal care who would have benefited from prepregnancy rubella vaccination. It was a population-based observational study of women who delivered a baby weighing ≤500 g in 2009 in the Republic of Ireland. The woman's age, parity, nationality and rubella immunity status were analysed using data collected by the National Perinatal Reporting System. Of the 74,810 women delivered, the rubella status was known in 96.7% (n=72,333). Of these, 6.4%(n=4,665) women were not immune. Rubella seronegativity was 8.0%(n=2425) in primiparous women compared with 5.2%(n=2239) in multiparous women (p<0.001), 14.7%(n=10653) in women <25 years old compared with 5.0%(n=3083) in women ≤25 years old (p<0.001), and 11.4%(n=780) in women born outside the 27 European Union (EU27) countries compared with 5.9%(n=3886) in women born inside the EU27 countries (p<0.001). Based on our findings we recommend that to prevent Congenital Rubella Syndrome, the health services in Ireland should focus on women who are young, nulliparous and born outside the EU.

Introduction
Rubella is usually a mild febrile illness of little significance in children and adult males.[1] About half the infections are subclinical and complications such as encephalitis and haemorrhagic manifestations are rare. Rubella infection in pregnancy, however, is of major public health importance because it is teratogenic in the non-immune woman.[1-4] The infection may result in miscarriage, fetal death or birth of an infant with congenital rubella syndrome (CRS). The spectrum of CRS depends on the gestational age at the time of infection. During the first trimester up to 85% of infants infected will develop CRS which may result in deafness, cataracts, heart defects, microcephaly, developmental delay, bone changes and hepatosplenic damage. CRS is rare when infection occurs after 20 weeks gestation. CRS is also important because it is preventable by vaccination.[3] In 2005, the World Health Organization (WHO) Regional Committee for Europe endorsed combined measles and rubella vaccine programmes which aimed to prevent CRS (<1 case per 100,000 live births) by 2010. The evidence, however, is that this goal was not met.[4,5]

Rubella has been a notifiable disease in Ireland since 1948.[6] A rubella vaccination programme for girls between their 12th-14th birthdays was introduced in 1971. The Measles, Mumps, Rubella (MMR) vaccine was introduced in 1988 for all children at the age

CPD available online at www.imj.ie and questions on page 255

of 15 months to two years and for females aged 10-14 years. A second dose of MMR was introduced for all children in 1992. In 1999 the age for the second dose of MMR was dropped from 10-14 years to 4-5 years of age. CRS as a distinct entity only became notifiable in 2004. By 2005, the incidence of rubella was 0.4/100,000 (17 cases) and there were no cases of CRS. The last case was reported in 2004, in contrast to 106 cases of CRS reported between 1975-90.[7]

In Ireland, women are routinely screened for rubella immunity at their first antenatal visit. The proportion of pregnant women tested by the National Virus Reference Laboratory who were rubella non-immune had fallen to 3.5% by 2004.[1] However, recent rubella immunity in Ireland has been sub-optimal, well below the 95% level required to ensure herd immunity to rubella transmission.[2,6] This may have been related to parental concerns about the risks of vaccination in young children.[8,9] In a recent comparison of rubella seroepidemiology in Australia and 16 European countries, only 5 countries had achieved a protective immunity of >95% among women of childbearing age.[2] It was concluded that Belgium, Bulgaria, England/Wales and Ireland were most likely to experience small epidemics. The purpose of this study was to analyse the demography of women booking for antenatal care in Ireland who were rubella seronegative, and to identify those women who may have benefited from prepregnancy vaccination.

Methods

The National Perinatal Reporting System (NPRS) is within the Health Research and Information Division of Ireland's Economic and Social Research Institute (ESRI). It is the only complete national reporting system on births and is responsible for the collection, processing, management and reporting on data of all live births and stillbirths nationally. Since 1999, the ESRI has managed the NPRS on behalf of the Department of Health and the Health Service Executive. For the data the NPRS has developed a custom designed data entry and validation software system and the details of the methodology are published in the Annual Report. In this study a p value of > 0.05 was considered significant.

Demographic details on all women who delivered a baby weighing 500g or more was collected using the Birth Notification Form from all 20 maternity hospitals in 2009. The standard practice is to test the woman's immunity to rubella at the first antenatal visit and protective immunity is defined as ≤10 IU/ml. After delivery rubella immunity is coded as immune, not immune or unknown/not stated. Women who are not immune are offered rubella vaccination post-partum. Nationality was defined as the woman's place of birth. Nationalities were coded and classified into a set of groups devised by the Central Statistics Office (CSO). Information on a woman's nationality was reported for the first time in 2004. Information on when the woman took up residence in Ireland is not recorded. For economic reasons, Ireland was one of only three of the 15 European Union (EU) countries who opened up its labour market in 2004 and thus, a country which historically had high rates of emigration then experienced one of the highest rates of immigration in the EU.[10]

Results

Of the 74,810 women delivered, the rubella status was known in 96.7%. Of the 72,337 women where the rubella status was known, 6.4% (n=4,665) were non-immune. In women where the rubella immune status was known, 8.0% (n=2425) of 30,331 primiparous women were seronegative compared with 5.3% (n=2239) of 42,002 multiparous women (p<0.001). The rubella immune status is shown analysed by age group in Table 1, and by mother's nationality in Table 2. In 10,653 women <25 years, 14.7% (n=1563) were seronegative compared with 5.0% of the 61,663 women ≤25 years (n=3,102) (p<0.001) (Table 1).

Where the rubella immune status was known, in 6765 women born outside the EU 27 countries 11.5%(n=776) were seronegative compared with 5.9%(n=3,886) in 65,469 women born in the EU 27 countries (p<0.0001). Where the rubella immune status was known in primiparous women from the EU 27 countries (n=27,667), the rubella seronegativity rate was 7.5% (n=2070) compared with 13.4%(n=352) in the 2,620 primiparous women born outside the EU 27 countries (p<0.0001). Where the rubella immune status was known in multiparous women from the EU 27 countries (n=37,799), the rubella seronegativity rate was 4.8%(n=1815) compared with 10.2%(n=424) in the 4,145 women from outside the EU 27 (p<0.001).

Table 3 shows that age is more influential than parity on the rate of rubella seropositivity. The higher rate of seropositivity in multiparous women is probably due to the policy of offering postpartum vaccination to women identified antenatally as rubella seronegative.[6] In view of the findings from the analysis by age and parity, in Table 4 we analysed the nationality groups according to whether they were <25 years of age or ≤25 years ago. This shows that few women born in Africa or Asia were <25 years when they booked for antenatal care, yet their rubella seronegativity rate was high at 9.6% and 12.8% respectively (Table 3).

Table 1 Rubella immune status analysed by age group

Age Group	Immune	Non-immune	Unknown
<20 years (n=2,253)	75.2% (n=1,695)	20.4% (n=459)	4.4% (n=99)
20-24 years (n=8,860)	83.5% (n=7,395)	12.5% (n=1,104)	4.1% (n=361)
25-29 years (n=18,062)	90.6% (n=16,365)	5.8% (n=1,047)	3.6% (n=650)
30-34 years (n=25,135)	92.6% (n=23,267)	4.5% (n=1,138)	2.9% (n=730)
35-39 years (n=17,081)	92.7% (n=15,833)	4.4% (n=746)	2.9% (n=502)
>40 years (n=3,398)	91.1% (n=3,096)	5.0% (n=171)	3.9% (n=131)
Not stated (n=21)	100% (n=21)	0% (n=0)	0% (n=0)
Total (n=74,810)	67,672	4,665	2,473

Table 2: Rubella immune status analysed by mother's nationality

Nationality	Immune	Non-immune	Unknown
Ireland (n=56948)	91.3% (n=51,971)	5.7% (n=3,254)	3.0% (n=1,723)
UK (n=1927)	87.5% (n=1,687)	7.9% (n=152)	4.6% (n=88)
EU 15* (n=1074)	90.4% (n=971)	6.6% (n=71)	3.0% (n=32)
EU 15-27** (n=7726)	90.0% (n=6,954)	5.3% (n=409)	4.7% (n=363)
Rest of Europe (n=666)	86.3% (n=575)	11.4% (n=76)	2.3% (n=15)
Africa (n=2535)	86.0% (n=2,181)	9.6% (n=244)	4.3% (n=110)
Asia (n=3012)	(n=2,507)	12.8% (n=386)	4.0% (n=119)
America (n=650)	87.7% (n=570)	9.8% (n=64)	2.5% (n=16)
Other (n=165)	94.5% (n=156)	3.6% (n=6)	1.8% (n=3)
Not stated (n=107)	93.5% (n=100)	2.8% (n=3)	3.7% (n=4)
Total (n=74810)	90.5% (n=67,672)	6.2% (n=4,665)	3.3% (n=2,473)

EU 15* excludes Ireland and UK but includes countries who joined EU before May 2004
EU 15-27** Accession States includes countries who joined the EU after May 2004

Table 3 Rubella seropositivity analysed by age and parity

	Primigravida N	Primigravida %	Multigravida N	Multigravida %	Total N	Total %
<20 years	1532	75.0	163	78.0	1695	75.2
20-24 years	4782	82.8	2613	84.7	7395	83.5
25-29 years	8367	90.4	7996	90.8	16365	90.6
30-34 years	9027	92.5	14239	92.6	23267	92.6
35-39 years	3575	91.9	12261	92.9	15833	92.7
>40 years	611	89.4	2485	91.5	3096	91.1

Table 4 Nationalities analysed by age group

	<25 years N	<25 years %	≥25 years N	≥25 years %
Ireland (n=56948)	7754	13.6	49194	86.4
UK (n=1927)	340	17.6	1587	82.4
EU 15* (n=1074)	64	6.0	1010	94.0
EU 15-27** (n=7726)	1963	25.4	5763	74.6
Rest of Europe (n=666)	112	16.8	554	83.2
Africa (n=2535)	442	17.4	2093	82.6
Asia (n=3012)	317	10.5	2695	89.5
America (n=650)	92	14.2	558	85.8
Other (n=165)	5	3.0	160	97.0
Not stated (n=107)	24	24.2	83	77.6
Total (n=74810)	11,113	14.9	63697	85.1

EU 15* excludes Ireland and UK but includes countries who joined EU before May 2004
EU 15-27** Accession States includes countries who joined the EU after May 2004

Discussion

This comprehensive national study shows that the percentage of pregnant women in Ireland with immunity to rubella in 2009 was less than the WHO target of 95%.[11] Demographic analysis showed that the women who were most at risk of rubella infection were younger women, first-time mothers and women with a nationality from outside the 27 EU countries. The number of women recorded as rubella non-immune has increased from 3.5% in 2004 to 6.2% in 2009.[1] The high rate of rubella seronegativity in women <25 years of age is of concern. This may be related to the low percentage uptake of Measles, Mumps and Rubella (MMR) a decade ago in response to misguided parental concerns about the risks of vaccination.[8,9] More recently, immunisation coverage has improved but the 2007 National Report on preventing CRS recommended that routine immunisation activities need to be strengthened to ensure that at least 95% of children receive two doses of MMR.[6]

In Ireland the increase in rubella seropositivity in older women and in multiparous women is probably due, in part, to antenatal screening for rubella susceptibility and postnatal vaccination (Table 3).[6] It may also be due, in part, to the widespread practice of screening for rubella susceptibility in women presenting with a history of primary or secondary infertility, and offering vaccination to women who are seronegative. The increased rate of rubella seronegativity in the general population in 2009 is associated with an increase in immigrants.[10] Women coming from non-EU countries, where rubella vaccination was not standard, were more likely to be non-immune to rubella. In the 2007 measles and rubella elimination national strategy document it is recommended that rubella seronegative women should be identified and offered the MMR vaccine.[5] This non-EU group of immigrants is a relatively small cohort of women. Focusing on this easily identifiable group for screening and vaccination prepregnancy would be cost-effective. It may also be more cost efficient to vaccinate without serological testing women from countries without rubella programmes.[6] Two of the last four confirmed cases of CRS in Ireland were born to women who were non-nationals and the nationality of the other two was unknown.[6]

In the United Kingdom (UK), there were 13 cases of rubella infection in pregnancy reported between 2005 and 2009. Eight of the 13 were known to have occurred in women born outside the UK.[12] Five of the six cases of CRS in the same period occurred in women who were born outside the UK.[12] In a Catalonian study of 1538 women, rubella seropositivity was higher in indigenous women (94.9%) compared with immigrant women (89.0%).[13] Immigration into Spain increased from 600,000 in 1996 to over 4 million in 2006, mostly from Latin America (36%), Western Europe (21%), Eastern Europe (18%) and Morocco (14%) which led to an increase in susceptibility to rubella infection nationally.[14] This increase was associated with a rubella outbreak in babies born to immigrant women.

The high rates of seronegativity in African and Asian women (Table 4) cannot be explained by their young age and are more likely to be explained by vaccination policies where they lived before arriving in Ireland. The two WHO regions that have not set specific goals for controlling rubella by 2009 were Africa and South-East Asia. Both regions have reported an increase in the number of cases of rubella infection in 2000-9, partly due to improved reporting. A decreased rate of rubella immunity amongst African and South-East Asian immigrants has also been reported among women who gave birth at an inner city Canadian hospital between 2002-7.[14] We are not in a position to explain the high rate of non-immune in women from the Americas but studies from Spain have reported cases of congenital rubella in women born in Latin America.[15] There is evidence that rubella viruses circulating in the Region of Americas may be different phylogenetically.[16-18] There are two virus clades (formally called genotypes), which differ in their nucleotide sequences by 8-10%. Some rubella virus genotypes are geographically restricted and Clade 2 viruses have not been found in the Region of the Americas.[18]

Efforts to harmonise public policies and healthcare practices within the EU include vaccination and surveillance of infectious diseases.[11,19] Childhood immunisation programmes are now established in all European countries. Rubella vaccination is part of the universal immunisation programme in all countries in Europe and the Americas. Since 1996, there has been a gradual increase of countries in Eastern Mediterranean region and Western Pacific Region that have introduced rubella-containing vaccines. However, only two of 46 member countries in the African region and four of 11 member countries in the South East Asian region use rubella-containing vaccine. Economic migration into and within the EU is desirable for many reasons. However, immigrants into Ireland after 4-5 years of age may be missed by current vaccination programme. This vulnerable group should ideally be screened before or shortly after arrival in all EU countries.[14,19] Particular attention needs to be given to all immigrants from Africa, South-East Asia and the Americas. Such a policy should also improve rubella herd immunity and help meet the renewed WHO European regional goal.[20]

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References

1. Cotter S, Gee S, Connell J. Rubella and congenital rubella infection in Ireland. EPI Insight 2005; May pp 2-3.
2. Nardone A, Tischer A, Andrews N, Backhouse J, Theeten H, Gatcheva N, Zarvou M, Kriz B, Pebody RG, Bartha K, O'Flanagan D, Cohen D,

Duks A, Griskevicius A, Mossong J, Barbara C, Pistol A, Slacˇ iková M, Prosenc K, Johansenr K, Millera E. Comparison of rubella seroepidemiology in 17 countries: progress towards international disease control targets. Bulletin of the World Health Organization 2008; 86:118-125.
3. Lee JY, Bowden S. Rubella virus replication and links to teratogenicity. Clin Microbiol Rev 2000;13:571-87.
4. Forsgren M. Prevention of congenital and perinatal infections. Euro Surveill 2009; 14:2-4.
5. WHO Regional Committee for Europe. Renewed commitment to measles and rubella elimination and prevention of congenital rubella syndrome in the WHO European region by 2015. Moscow. September 2010.
6. Eliminating measles and rubella and preventing congenital rubella infection: a situation analysis and recommendations. Committee of the Department of Health and Children 2007.
7. Jennings S, Thornton L. The epidemiology of rubella in the Republic of Ireland. Commun Dis Rep CDR Rev 1993; 16:115-17.
8. Ramsey ME, Yarwood J, Lewis D, Campbell H, White JM. Parental confidence in measles, mumps and rubella vaccine: evidence from vaccine coverage and attitudinal surveys. Br J Gen Pract 2002; 52:912-16.
9. Murphy JF. Fallout of the enterocolitis, autism, MMR vaccine paper. Ir Med J 2011; 104:36.
10. Quinn E. Policy analysis report on asylum and migration: Ireland mid-2004 to 2005. European Migration Network, 2006.
11. World Health Organization (WHO). Eliminating measles and rubella and preventing congenital rubella infection: WHO European Region strategic plan 2005-2010.
12. Guidance on viral risk in pregnancy. Health Protection Agency, January 2011.
13. Dominguez A, Plans P, Espunes J, Costa J, Torner N, Cardenosa N, A, L. Rubella immune status of indigenous and immigrant pregnant women in Catalonia, Spain. Eur J Public Health 2007; 17:560-64.
14. McElroy R, Laskin M, Jiang D, Shah R, Ray JG. Rates of rubella immunity among immigrant and non-immigrant pregnant women. J Obstet Gynaecol Can 2009; 31:409-13.
15. Carnicer-Pont D, Pena-Ray I, de Aragon M, de Ory F, Dominguez A, Torner N, Caylà JA, Regional Surveillance Network. The Regional Surveillance Network. Eliminating congenital rubella syndrome in Spain: does massive immigration have any influence? Eur J Public Health 2008; 18:688-690.
16. Frey TK, Abernathy ES, Bosma TJ, Starkey WG, Corbett KM, Best JM Katow S, Weaver SC . Molecular analysis of rubella virus epidemiology across 3 continents, North America, Europe, Asia, 1961-1997. J Infect Dis 1998; 178:642-50.
17. Zheng DP, Frey TK, Icenogle J, Katow S, Abernathy ES, Song KJ, XU WB, Yarulin V, DestjatskovaRG, Aboudy Y, Enders G, Croxson M. Global distribution of rubella virus genotypes. Emerg Infect Dis 2003; 9:1523-30.
18. Best JM, Castillo-Solorzano C, Spika JS, Icenogle J, Glasser JW, Gay NJ, , . Reducing the global burden of congenital rubella syndrome: Report of the World Health Orgainsation Steering Committee on research related to measles and rubella vaccines and vaccination, June 2004. J Infect Dis 2005; 192:1890-7.
19. Pandolfi E, Chiaradia G, Moncada M, Rava L, Tozzi AE. Prevention of congenital rubella and congenital varicella in Europe. Euro Surveill 2009; 14:16-20.
20. Muscat M, Zimmerman L, Bacci S, Bang H, Glismann S, Molbak K, , . Toward rubella elimination in Europe: An epidemiological assessment. Vaccine 2012; 30:1999.

Venous Thromboembolism Prophylaxis in Acute Medical Admissions to a University Teaching Hospital

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Abstract
The objective of this study was to assess appropriate thromboprophylaxis prescription rates in a university hospital and to re-audit after a series of interventions. The notes of all acute medical patient admissions over a 4-week period were assessed for VTE risk factors and prescription of thromboprophylaxis. Subsequently, a series of hospital wide interventions including educational initiatives and a new drug prescription chart were introduced. 2 years post intervention the audit was repeated. Pre-intervention, 104 of 265(39%) "at risk" patients were prescribed appropriate thromboprophylaxis. Post intervention the prescription rate increased to 108 of 188(57%) "at risk patients". The results of the pre- intervention audit are consistent with the published literature. While there was a significant increase in prescription rates post intervention, over 40% of "at risk" patients still did not receive thromboprophylaxis highlighting the challenge in attempting to close the gap between guidelines and actual practice.

Introduction

VTE is a common preventable cause of morbidity and mortality in hospitalised medical patients. These patients, often with one or more risk factors, have an overall 8-fold increased relative risk of developing VTE during or post hospital admission[1]. The in-hospital fatality rate of VTE has been shown to be as high as 12 % with long-term case fatality rates of 30% at 3 years[2]. Patients diagnosed with VTE subsequently, have an increased risk of re-thrombosis, chronic pulmonary hypertension and post thrombotic syndrome, which may cause significant morbidity.[3-5] Furthermore, therapeutic anti-coagulation is not without a significant bleeding risk.[6] Failure to prevent VTE also has significant implications in terms of utilisation of healthcare resources[7,8] with the need for potential future hospital re-admission, diagnostic imaging and long-term therapeutic anti-coagulation and monitoring. In those medical inpatients not receiving thromboprophylaxis, the incidence of objectively confirmed VTE is approximately 10-20%.[9] Thromboprophylaxis with low dose heparin has been show in numerous large clinical trials to effectively reduce the incidence of both Deep Vein Thrombosis (DVT) and Pulmonary Embolism (PE).[9-13] A meta-analysis of nine randomised control trials, that included 20,000 patients, demonstrated that prophylaxis led to a reduction in the rates of fatal PE, symptomatic PE and symptomatic DVT in the order of 64%, 58% and 53% respectively.[13] Prophylaxis has been shown to be safe with no significant increase in incidence of bleeding[12,14,15] and is also cost effective.[16,17]

Despite compelling evidence and numerous clinical guidelines emphasising the importance of VTE risk assessment and appropriate use of primary prophylaxis, rates of VTE prophylaxis use remain universally poor. The Endorse study, a multi-national

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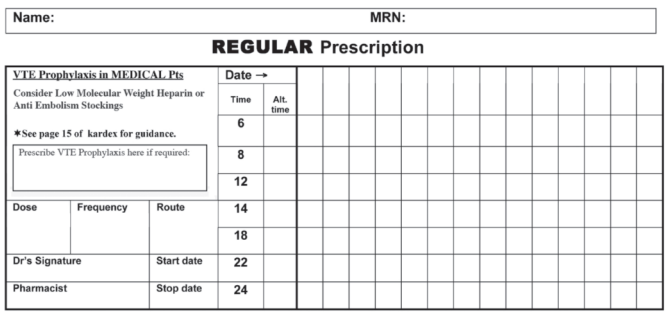
cross sectional study, assessed 37, 356 medical inpatients and determined 15,487 (41.5%) were at-risk for VTE. However, only 6,119 (39%) of this at-risk group received appropriate prophylaxis[18]. The aim of our study was two-fold. Initially we aimed to assess the practice in our institute in terms of rates of VTE prophylaxis use in at-risk medical patients. Subsequently we wished to evaluate the impact of a hospital-wide strategy that aimed to increase rates of appropriate prescription of VTE prophylaxis.

Methods

St James Hospital (SJH) is a university-based teaching hospital and tertiary referral centre that is on continuous call for emergency medical admissions. On average, 5,000 acute general medical patients are admitted annually. The first part of the study was a prospective observational study to record the proportion of acute medical admissions risk-assessed for VTE and appropriately prescribed thromboprophylaxis. All patients admitted to the hospital on acute medical "take" over a 4-week period were included in the study. A list of all the patients admitted over a 24-hour period was recorded and a review of the medical notes and drug prescription chart for each patient was performed 48 hours post admission. This automatically excluded any patients discharged within the first 48 hours of their admission.

Exclusion criteria consisted of the following: Discharge within 48 hours, transfer of care to other disciplines, therapeutic anticoagulation on admission, admission working diagnosis of a VTE with commencement of therapeutic anticoagulation and confirmed or suspected diagnosis of significant haemorrhage contraindicating the use of thromboprophylaxis. Patients' medical notes were reviewed for risk factors for VTE. Risk factors were identified based on the American College of Chest Physicians (ACCP) and National Institute of Clinical Excellence (NICE) guidelines. If, on review, patients were assessed to be at-risk for VTE, they were then screened for contraindications to thromboprophylaxis. The prescription of thromboprophylaxis was determined by review of the drug prescription chart. After completion of this initial part of the study the results were presented at the Hospital Grand Rounds. Subsequently a series of planned interventions developed in discussion with the Pharmacy Department, Haematology Department and General Medical Physicians, with a view to re-audit after implementation of the interventions.

The interventions that were implemented included the following: Educational posters with reminders to risk-assess patients and including the relevant risks were placed in the Acute Medical Admissions Unit and medical wards. Prescribing doctors were targeted in a series of didactic lectures. A new drug prescription


Name: MRN:

REGULAR Prescription

VTE Prophylaxis in MEDICAL Pts

Consider Low Molecular Weight Heparin or Anti Embolism Stockings

*See page 15 of kardex for guidance.

Prescribe VTE Prophylaxis here if required:

Dose | Frequency | Route

Dr's Signature | Start date

Pharmacist | Stop date

Date →

Time | Alt. time

6 8 12 14 18 22 24

Figure 1 Physical reminder to consider VTE prescription in the acute medical admission drug prescription chart

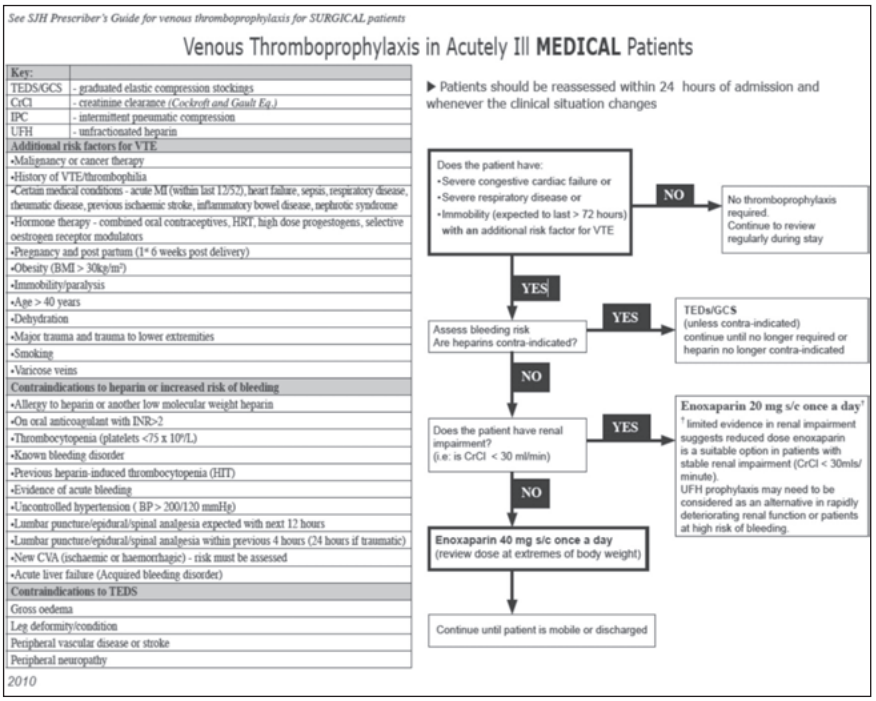


Figure 2 Risk factors assessment for the acute medical admission

chart was introduced on a trial basis. In this new prescription chart, the regular medications section included a printed portion reminding the medical teams to assess for VTE and prescribe as appropriate. (see Figure 1). A detailed summary list of risk factors for VTE were also printed on the back page of the new drug prescription chart for easy reference and as a reminder (see Figure 2). The Hospital Prescriber's guide included detailed sections regarding risk-assessment for VTE in both the hard copies and the online hospital system version. Following the implementation of the interventions detailed, a re-evaluation of the appropriate prescription of thromboprophylaxis was performed 2 years later, again over a 4-week period and with the same methodology as in the first part of the study. Statistical analysis was performed using a chi-square test or Fisher's test as appropriate.

Results

Pre-Intervention

The first loop of the audit recruited a total of 523 patients, mean age 63 (+/- 21), M:F 1:1.09, over 28 days with an average of 18.7 patients admitted per take. 149 patients were excluded based on the criteria listed above, leaving 374 to be further assessed for presence of risk factors for VTE. 283 individuals were deemed to have risk factors present, of which a small proportion (18 patients) had contraindications to Heparin. 104 of the remaining 265 patients were appropriately placed on TP, which accounted for 39% of the cohort. This left 61% of at-risk patients not placed on appropriate thromboprophylaxis (see Figure 3).

Post-Intervention

The second loop of the audit recruited a total of 425 patients, mean age 62 (+/- 20), M:F 1:1.33, were recruited into the study over the 28 days. After the exclusion of 130 patients, 295 were assessed for risk factors. 205 of these patients were at-risk, of which 17 individuals had contraindications to Heparin. 108 (57%) of the remaining 188 patients were appropriately placed on Heparin. 90 patients had no risk factors for VTE; of these, 12 individuals (13%) were inappropriately placed on LMWH (see Figure 4). Post intervention figures showed an increase in prescription of TP to appropriate at-risk patients from 39% (104/265) to 57% (108/188), $p<0.001$ and chi square statistic 14.634. The number of patients without risk factors for VTE

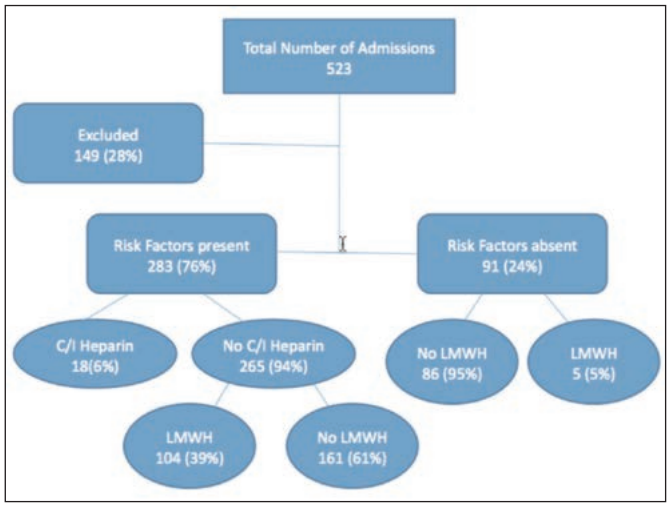


Figure 3 Flow chart of the pre-intervention audit

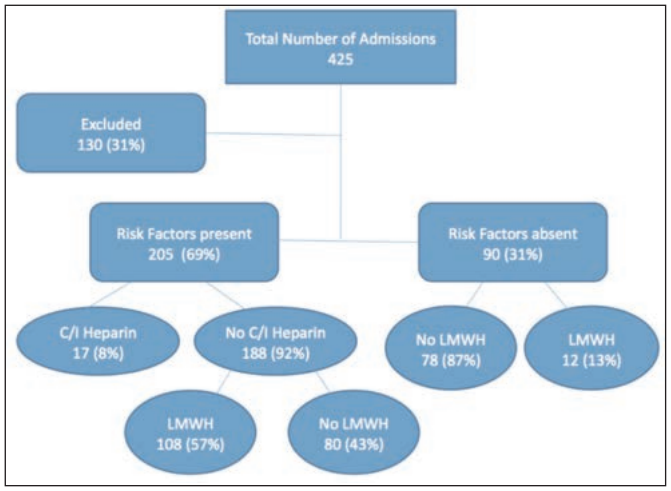


Figure 4 Flow chart of the post-intervention audit

inappropriately placed on TP, increased from 5% (5/91) to 13% (12/90), p = 0.071, chi square statistic 3.267.

Discussion

Despite longstanding recommendations and a robust evidence base showing its effectiveness and safety, the rates of thromboprophylaxis use remain universally poor. In the US the low rates of VTE prophylaxis use have led to an increasing interest from regulatory authorities such as the Agency for Healthcare Research and Quality and the National Quality Forum. The issue has also received significant attention at government level in England where it is estimated that there are over 25,000 deaths each year from VTE contracted in-hospital and that the overall cost of managing VTE each year is £640 million.[19] This has led to a national strategy on VTE and an expert working group to develop recommendations on VTE risk-assessment and prevention. In the UK, under the CQUIN payment framework, a certain proportion of remuneration to hospitals is based on meeting agreed set targets, one of which is that a minimum of 90% of all patients are risk- assessed for VTE.

The initial component of our study was a prospective, observational study evaluating use of VTE prophylaxis in a cohort of acute unselected general medical admissions over a 4-week period. As predicted, a large proportion, over three-quarters, were assessed to be at-risk for VTE. However, only 39% of this at-risk group was prescribed appropriate primary prophylaxis. While disappointing, this result is not at all surprising and is consistent with the published literature on under use of thromboprophylaxis in the acute medical population; indeed the rate is the same as the average rate of prophylaxis use demonstrated in the multi-national ENDORSE study.[18] While one previous study[20] in the Irish setting has shown a significant improvement in VTE prophylaxis rates in a general medical population one month post educational intervention alone, there is a significant evidence to suggest that education alone or indeed any single intervention alone is not effective in maintaining improved practice long term, and that hospital-wide strategies that include multi-faceted quality improvement interventions may ensure sustained long-term improvement with relatively few resources.[18,21-23]

This evidence informed our attempts in designing a robust system of interventions, designed to increase and maintain VTE prophylaxis rates. While education still had a large, central role we also incorporated other interventions, including physical reminders in the form of posters in clinical areas, the incorporation of VTE prophylaxis guidelines in the in-hospital prescriber's guide and in all drug prescription charts and importantly the addition of a pre-printed prophylaxis "box" in the prescription chart. A deliberate decision was made to delay re-audit for at least one year to ensure that the re-audit would accurately reflect "real" practice in the hospital and not measure a potential spike in prescription rates that might be expected immediately after the initial audit and interventions. As such the post -intervention result, that 57% of at-risk patients were prescribed prophylaxis, is a true reflection of actual practice in the hospital. While this is a significant improvement from the baseline 39% and represents a 46% relative increase in prescribing rates, the results are disappointing when one considers that over 40% of at-risk patients still do not receive appropriate prophylaxis. It is worth noting also that while there was an increase in the number of patients inappropriately prescribed prophylaxis, 5% (5/91) to 13% (12/90), this was not a statistically significant change (p=0.071.)

While we can take some encouragement from these results, there is obviously a need for further significant improvements to the hospital strategy to ensure that all at-risk patients receive appropriate prophylaxis. Potential initiatives include the expansion of the role of the clinical pharmacist as a "champion" of thromboprophylaxis and also the use of a computer based alert program as described by Kucher.[24] To be successful, any planned strategy will need to incorporate ongoing re-audit, the results of which would be used to guide future interventions and feedback to prescribing physicians. At a hospital level, we would hope that an ongoing robust process of multi-faceted interventions to include education, audit and feedback will foster a cultural change where systematic risk-assessment of patients and the appropriate use of VTE prophylaxis become an institutional priority for both physicians and hospital management. Of course, given ongoing healthcare resource limitations, it could well be that future changes to healthcare policy, potentially including an incentive payment structure linked to satisfactory adherence to VTE guidelines, will play a major role in guiding clinical practice.

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References

1. Heit JA, Silverstein MD, Mohr DN, Petterson TM, O'Fallon WM, Melton LJ 3rd. Risk factors for deep vein thrombosis and pulmonary embolism: a population-based case-control study. Arch Intern Med. 2000 Mar 27;160:809-15.
2. Anderson FA Jr, Wheeler HB, Goldberg RJ, Hosmer DW, Patwardhan NA, Jovanovic B, Forcier A, Dalen JE. A population-based perspective of the hospital incidence and case-fatality rates of deep

veinthrombosis and pulmonary embolism. The Worcester DVT Study. Arch Intern Med. 1991 May;151:933-8.
3. Kearon C. Natural history of venous thromboembolism. Circulation. 2003 Jun 17;107:I22-30.
4. Franzeck UK, Schalch I, Jäger KA, Schneider E, Grimm J, Bollinger A. Prospective 12-year follow-up study of clinical and hemodynamic sequelae after deep vein thrombosis in low-risk patients (Zürich study). Circulation. 1996 Jan 1;93:74-9.
5. Prandoni P, Lensing AW, Cogo A, Cuppini S, Villalta S, Carta M, Cattelan AM, Polistena P, Bernardi E, Prins MH. The long-term clinical course of acute deep venous thrombosis. Ann Intern Med. 1996 Jul 1;125:1-7.
6. Levine MN, Raskob G, Beyth RJ, Kearon C, Schulman S. Hemorrhagic complications of anticoagulant treatment: the Seventh ACCP Conference on Antithrombotic and Thrombolytic Therapy. Chest. 2004 Sep;126:287S-310S.
7. Caprini JA, Botteman MF, Stephens JM, Nadipelli V, Ewing MM, Brandt S, Pashos CL, Cohen AT. Economic burden of long-term complications of deep vein thrombosis after total hip replacement surgery in the United States. Value Health. 2003 Jan-Feb;6:59-74.
8. Bergqvist D, Jendteg S, Johansen L, Persson U, Odegaard K. Cost of long-term complications of deep venous thrombosis of the lower extremities: an analysis of a defined patient population in Sweden. Ann Intern Med. 1997 Mar 15;126:454-7.
9. Geerts WH, Heit JA, Clagett GP, et al. Prevention of venous thromboembolism. Chest. 2001 Jan;119:132S-175S.
10. Sagar S, Massey J, Sanderson JM. Low-dose heparin prophylaxis against fatal pulmonary embolism. Br Med J. 1975 Nov 1;4:257-9.
11. Halkin H, Goldberg J, Modan M, Modan B. Reduction of mortality in general medical in-patients by low-dose heparin prophylaxis. Ann Intern Med. 1982 May;96:561-5.
12. Collins R, Scrimgeour A, Yusuf S, Peto R. Reduction in fatal pulmonary embolism and venous thrombosis by peri-operative administration of subcutaneous heparin. Overview of results of randomized trials in general, orthopedic, and urologic surgery. N Engl J Med. 1988 May 5;318:1162-73.
13. Dentali F, Douketis JD, Gianni M, Lim W, Crowther MA. Meta-analysis: anticoagulant prophylaxis to preventsymptomatic venous thromboembolism in hospitalized medical patients. Ann Intern Med. Feb 2007 146: 278–88.
14. Nurmohamed MT, Rosendaal FR, Büller HR, Dekker E, Hommes DW, Vandenbroucke JP, Briët E. Low-molecular-weight heparin versus standard heparin in general and orthopaedic surgery: a meta-analysis. Lancet. 1992 Jul 18;340:152-6.
15. Koch A, Bouges S, Ziegler S, Dinkel H, Daures JP, Victor. Low molecular weight heparin and unfractionated heparin in thrombosis prophylaxis after major surgical intervention: update of previous meta-analyses. N. Br J Surg. 1997 Jun;84:750-9.
16. Mamdani MM, Weingarten CM, Stevenson JG . Thromboembolic prophylaxis in moderate-risk patients undergoing elective abdominal surgery: decision and cost-effectiveness analyses. Pharmacotherapy. 1996 Nov-Dec;16:1111-27.
17. Sullivan SD, Kahn SR, Davidson BL, Borris L, Bossuyt P, Raskob G. Measuring the outcomes and pharmacoeconomic consequences of venous thromboembolism prophylaxis in major orthopaedic surgery. Pharmacoeconomics. 2003;21:477-96.
18. Cohen AT, Tapson VF, Bergmann JF, Goldhaber SZ, Kakkar AK, Deslandes B, Huang W, Zayaruzny M, Emery L, Anderson FA Jr; ENDORSE Investigators. Venous thromboembolism risk and prophylaxis in the acute hospital care setting (ENDORSE study): a multinational cross-sectional study. Lancet. 2008 Feb 2;371:387-94.
19. 2005 UK House of Commons Health Committee. Report on the Prevention of Venous Thromboembolism in Hospitalised Patients. www.publications.parliament.uk/pa/cm200405/cmselect/cmhealth/.../99.pdf.
20. Kent BD, Nadarajan P, Akasheh NB, Sulaiman I, Karim S, Cooney S, Lane SJ, Moloney ED. Improving venous thromboembolic disease prophylaxis in medical inpatients: a role for education and audit. Ir J Med Sci. 2011Mar;180:163-6.
21. McKenna GS, Karthikesalingam A, Walsh SR, Tang TY, Quick CR. Prevention of venous thromboembolism: improving practice in surgical patients. Int J Surg 2009 Feb;7:50-3.
22. Gladding P, Larsen F, Durrant H, Black P. Education together with a preprinted sticker improves the prescribing of prophylactic enoxaparin. NZ Med J. 2007 Mar 23;120:U2461.
23. Maynard G, Stein J. Designing and implementing effective venous thromboembolism prevention protocols: lessons from collaborative efforts. J Thromb Thrombolysis. 2010 Feb;29:159-66.
24. Kucher N, Koo S, Quiroz R, Cooper JM, Paterno MD, Soukonnikov B, Goldhaber SZ. Electronic alerts to prevent venous thromboembolism among hospitalised patients. N Engl J Med 2005 Mar 10; 352: 969-77.

Delayed Diagnosis of Anorectal Malformation – A Persistent Problem

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Abstract
Delayed diagnosis of anorectal malformation (ARM) is an avoidable event associated with significant complications and morbidity. Previous studies have suggested higher than expected rates of delayed diagnosis, especially when a threshold of 24 hours of life is used to define delayed diagnosis. The aim of this study is to highlight the prevalence of delayed diagnosis of ARM in Ireland and to determine if any improvement in rates of delayed diagnosis of ARM has occurred since we previously examined this problem over a 10 year period in 2010. We compared trends in the incidence of delayed diagnosis of ARM between two cohorts, A (1999-2009) and B (2010-2012). Delayed diagnosis was defined as one occurring after 48 hours of life. Delayed diagnosis occurred in 29 cases (21.3%) in total, with no difference in the incidence of delayed diagnosis between cohort A (21 patients [21.2%]) and cohort B (8 patients [21.6%]) being recorded. The rate of bowel perforation in patients with delayed diagnosis was 10.3% (3 cases). Our findings highlight the importance of a careful, comprehensive clinical examination in diagnosing ARM and suggest this is still sub-optimal. We strongly support the use of a nationally devised algorithm to aid diagnosis of ARM in order to avoid life-threatening complications.

Introduction

Anorectal malformation (ARM) is a common paediatric congenital malformation with an incidence of approximately 1:2500 to 1:5000[1]. Its occurrence has a male preponderance and it is associated with several syndromes such as trisomy 21 and Cat Eye syndrome. Early diagnosis and timely surgical intervention is the key to successful outcome. It is expected that most cases should be diagnosed within the first 24 hours of life on routine

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inspection of the perineum, although some are only diagnosed following the development of features such as abdominal distension or bilious vomiting. The importance of perineal examination was seen as early as the second century BC, when Sonarus recommended anal examination for all neonates[2]. While routine neonatal examination has been strongly advocated in the literature, and practiced widely, the delayed diagnosis of ARM continues to be a common problem[3,4]. Female neonates with ARM frequently exhibit anatomical anomalies more facilitative to the passage of meconium than in males and thus delayed diagnosis appears to be more common in this population.

The delay in diagnosis is associated with early life-threatening complications such as sepsis, bowel perforation and death. Late complications include constipation and mega-rectum. These complications not only alter the surgical management but cause significant social and psychological morbidity[5-7]. We have previously carried out a 3 year review demonstrating an unacceptably high rate of delayed diagnosis of ARM with a median time to diagnosis of day 4 of life[8]. The aim of this study is to highlight the current prevalence of delayed diagnosis of ARM in Ireland and to determine if any improvement in rates of delayed diagnosis of ARM has occurred since our previously published study in 2010.

Methods

The records of all patients diagnosed with ARM presenting to Our Lady's Children's Hospital Crumlin and Children's University Hospital Temple Street between 1999 and 2012 were retrospectively reviewed. These 2 centres are the regional referral units for neonatal paediatric surgery for the Republic of Ireland. Our study consisted of 2 cohorts to examine for changes in the timing of diagnosis of ARM. Cohort A included cases from 1999 to 2009. This population was previously studied in 2010. Cohort B consisted of cases diagnosed between 2010 and 2012. Demographic and clinical data were recorded with particular attention to clinical presentation (clinical features suggestive of anorectal malformation, such as constipation, abdominal distension, bilious vomiting, sepsis, and failure to pass meconium), timing of diagnosis (given in hours of life), type of ARM (high vs low; rectourethral, anovestibular etc.) and any complications as a consequence of late diagnosis, such as perforation and sepsis. Delayed diagnosis was defined as diagnosis made after 48 hours of life. Data collection and statistical analysis were carried out using a statistical software package (Microsoft® Excel 2007).

Results

The medical records of 136 cases with a recorded diagnosis of ARM between 1999 and 2012 were reviewed in the study. The ratio of males to females was 1:1.7. The commonest symptoms at presentation were abdominal distension (58%), bilious vomiting (35%), delayed passage of meconium (19%), sepsis (14%), and constipation (14%). In total, 29 patients (21.3%) out of 136 had delayed diagnosis (Table 1). The age at diagnosis ranged from days 3 of life to 7 years with median age of day 4 of life. The delay in diagnosis led to large bowel perforation in 3 cases (10.3%). Ten patients (34.5%) had a high ARM with 17 patients (65.5%) having a low malformation (Table 2). Unfortunately there was no improvement in the rate of delayed diagnosis of ARM between the 2 cohorts (21.2% vs 21.6%).

Associated congenital anomalies

Patients from both cohorts who had delayed diagnosis had a high incidence of synchronous congenital anomalies. In cohort A only 4 (19%) cases had no associated anomalies, while none of those in cohort B were without an associated anomaly. Examples of encountered pathologies from cohort B included bilateral cleft lip (1 case), VSD/ASD (4 cases), tracheo-oesophageal fistula (1 case), and bilateral hydroureteronephrosis (1 case). Conversely, in this same cohort, 8 of 22 patients (36%) whose diagnoses were not delayed had no associated congenital anomaly.

Delayed diagnoses

An unusual case recorded involved a 7 year old girl with developmental delay and a history of perinatal hypoxic insult who was diagnosed following presentation with chronic constipation. She ultimately underwent a primary modified posterior sagittal anorectoplasty (PSARP). Another neonate was transferred on day 3 of life from a regional hospital with abdominal distension and suspected intestinal obstruction, having passed meconium and been documented to have a normal anus. Clinical assessment revealed an imperforate anus while examination of his x-rays from the transferring hospital showed the nasogastric tube was curled up in the upper oesophagus consistent with tracheo-oesophageal fistula/oesophageal atresia (TOF/OA). One neonate with a background of bilateral cleft lip was diagnosed at 4 weeks of age following an episode of urosepsis.

Table 1 Trend of delayed diagnosis (1999-2012)

	Total incidence of ARM	Delayed diagnosis of ARM	Bowel Perforation
Cohort A (1999-2009)	99	21 (21.2%)	**2 (9.5%)**
Cohort B (2010-2012)	37	8 (21.6%)	**1 (12.5%)**
Total	**136**	**29 (21.3%)**	**3 (10.3%)**

Table 2 Classification of ARM with delayed diagnosis (n=29)

Classification	Fistula	No. of cases (%)
High ARM (10)	Recto urethral	5 (50%)
	Rectovesical	1 (10%)
	None	4 (4%)
	Male	*3*
	Female	*1*
Low ARM (19)	Perineal	13 (68%)
	Male (anocutaneous)	9
	Female (anterior perineal)	4
	Vestibular	6 (32%)

The proportion of patients whose initial surgical management following delayed diagnosis involved diverting colostomy formation was similar in both cohorts, with 11 patients (52.4%) in cohort A and 5 patients (62.5%) in cohort B being managed this way. Five patients (23.8%) in cohort A and 2 patients (25%) in cohort B underwent primary anoplasty. Four patients (19.1%) in cohort A and one aforementioned patient (12.5%) from cohort B were treated with a primary modified PSARP (mini-PSARP). One patient in cohort A (4.8%) was treated with primary diverting ileostomy due to gross large bowel dilatation and perforation of the sigmoid colon. No patient in either group underwent a primary PSARP.

Discussion

Anorectal malformations are a spectrum of conditions ranging from imperforate anal membrane to complete caudal regression[4]. Most of these anomalies can be easily identified by inspection of perineum during routine neonatal examination and immediate referral should be made to a tertiary care centre for appropriate management[9,10]. If the diagnosis of anorectal malformation is delayed, the child is likely to have a significantly higher incidence of serious complications with associated major stress to carers[5]. A study on Cohort A was published in 2009 which revealed that approximately 21% of all children presenting to a paediatric surgical tertiary referral centre had a delay in diagnosis of their ARM in excess of 48 hours, with an associated burden of morbidity including bowel perforation, which occurred in 2 patients (9.5%)[8]. The similar trend observed in cohort B (Table 1) is disappointing. One study of 52 consecutive cases of anorectal malformation found that rates of delayed diagnosis are approximately double this when 24 hours of life is used as the threshold for defining delayed diagnosis[7]. Of note the rate of

bowel perforation in that study population, at approximately 10%, is similar to that recorded in our population. It appears somewhat fortunate that we have not experienced any mortality in either cohort when mortalities have been described in the setting of delayed diagnosis in other papers.

Nonetheless, widespread problems exist internationally regarding the diagnosis of anorectal malformations, something which is recognised in the literature[7,11-13]. One retrospective review of 75 cases, which used 24 hours of life as the threshold criterion for delayed diagnosis, suggests that this phenomenon is much more common than was previously thought while another review of 36 cases suggested the problem is particularly prevalent in the developing world[5,14]. A number of other congenital anomalies (cardiac, congenital cataracts and developmental dysplasia of hip) may be missed on routine neonatal check[15,16]. One aforementioned case in our study was transferred on the third day of life from regional hospital with not only a previously undiagnosed anorectal malformation but also an undiagnosed TOF/OA. However it could be argued that an ARM is a far less subtle congenital anomaly than congenital cardiac or hip pathology.

Current guidelines indicate that detailed examination for significant congenital anomalies should be performed by an appropriately trained clinician between 24 and 48 hours of birth[17,18]. The passage of meconium alone should not be taken as an indication of normal anal anatomy as meconium may also be passed via a fistula. Similarly, the presence of an anus does not exclude ARM[8]. We emphasize that the neonate should be fully undressed and the perianal area must be cleaned of meconium. Careful, comprehensive clinical examination of a baby should include documentation of the position, appearance and patency of the anus. The Royal College of Physicians of Ireland (RCPI) has recently constructed an algorithm to aid in the diagnosis of anorectal malformations (Figure 1). We strongly recommend adherence to this algorithm to improve diagnosis of ARM, and improve the current unacceptably high rate of delayed diagnosis. At present in this country delayed diagnosis of ARM is a common occurrence and carries the risk of severe life-threatening complications in the short term, and increased morbidity in the longer term. This situation is unacceptable. Despite our previous study highlighting the issue, there has been no improvement in pick-up rates. Adherence to a clinical algorithm may be the only way to make delayed diagnosis of anorectal malformations the rarity it should be.

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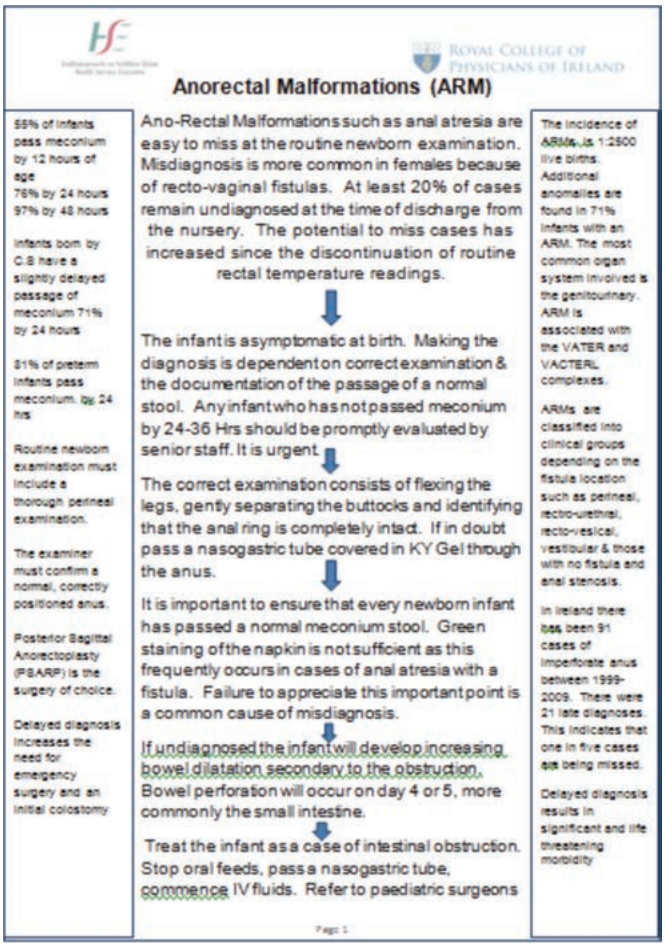

Figure 1 Recommended national algorithm for diagnosis of anorectal malformation

References

1. Holschneider AM, Hutson JM. Anorectal malformations in children. 4th ed.,Springer, Heidelberg, Germany, 2006; 32.
2. O'Neill J, Rowe MI, Grosfeld JL, Fonkalsrud EW, Coran AG. Paediatric surgery.5th ed, St Louis,Mosby,1998; 1425-48.
3. Hall DM, Health for all Children. Oxford. OUP; 1996.
4. Kim HLN, Gow KW, Penner JG, Blair GK, Murphy JJ, Webber EM. Presentation of low anorectal malformations beyond the neonatal period. Paediatrics2000;105:e68.
5. Lindley RM, Shawis RN, Roberts JP. Delays in the diagnosis of anorectal malformations are common and significantly increase serious early complications. Acta Paediatr 2006; 95:364-8.
6. Eltayeb AZ. Delayed presentation of anorectal malformations: The possible associated morbidity and mortality. Paediatr Surg Int 2010; 26:801-806.
7. Haider N, Fisher R. Mortality and morbidity associated with late diagnosis of anorectal malformations in children. Surgeon 2007; 5:327-330.
8. Turowski B, Dingemann J, Gillick.J. Delayed diagnosis of imperforate anus: an unacceptable morbidity. Pediatr Surg Int 2010; 26: 1083-1086.
9. Position statement of the Fetus and Newborn Committee of the Paediatric Society of New Zealand. Routine examination of the newborn. N Z Med J 2000; 113:361-3.
10. Pena A. Management of anorectal malformations during the newborn period. World J Surg 1993; 17:385-92.
11. Chakravartty S, Maitey K, Ghosh D, Choudhury CR, Das S. Successful management in neglected cases of adult anorectal malformation. Singapore Med J2009; 50:e280-2.
12. Devdas D, Curry J. Don't be fooled by meconium. Arch Dis Child Educ Pract 2009. Ed.92:ep135-8.
13. Sinha S, Kanojia R, Wakhlu A, Rawat JD, Kureel SN, Tendon RK. Delayed presentation of anorectal malformation. J Indian Assoc Paediatr Surg 2008; 13:64-8.
14. Sharma S, Gupta DK. Delayed presentation of anorectal malformation for definitive surgery. Pediatr Surg Int 2012; 28: 831-4.
15. Mebeg A, Otterstad JE, Froland G et al. Early neonatal screening of neonates for congenital heart defects: the cases we miss. Cardiol Young 1999;9(2):169-174.
16. Jones D. Neonatal detection of developmental dysplasia of hip (DDH). J Bone Joint Surg 1998; 80:943-5.
17. Moss GD, Cartilidge PH, Speidel BD, Chambers TL. Routine examination in the neonatal period. BMJ 1991; 302:878-9.
18. Bloomfield L, Rogers C, Townsend J, Wolke D, Quist-Therson E. The quality of routine examinations of the newborn performed by midwives and SHOs; an evaluation using video recordings. J Med Screen 2003; 10:176-80.

Chinese Whispers in the Post Anaesthesia Care Unit (PACU)

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Abstract
We audited verbal handover of information by anaesthetists to recovery room nurses based on Situation, Background, Assessment and Recommendation. In Audit A, 100 handovers for elective procedures were included. For audit B, a second cohort of 100 patients was examined post educational session. There was an improvement in handover of medical background (46.15% Audit A, 77% Audit B, p<0.001) and allergy status (42% Audit A, 56% Audit B, p= 0.048). Handing over immediate postoperative instructions remained unchanged (58% Audit A, 59% Audit B) and there was a 4% decline in verbal handover of instructions for ward care. Nurse satisfaction with handovers improved by 12%. We conclude that a structured process of information transfer, led to improved handover of immediate care. Further education focussed on the importance of instructions for the ward to maintain continuity of care is recommended.

Introduction

There have been numerous papers on the quality, content and communication process involved in handing over patients at admission to or discharges from ICU and at change of a duty shift[1-3]. In anaesthesia there is a routine transition of care from an anaesthetist to the recovery room (PACU: Post Anaesthesia Care Unit) nurse. A recent review of literature identified 31 papers dealing with handovers in the postoperative period with many recommendations suggested. However, only 4 of these studies, all dealing with postoperative handover to ICU mainly in the paediatric population, introduced an intervention and assessed its impact on quality of handover or teamwork[4]. The Association of Anaesthetists of Great Britain and Ireland guidelines[5] state that "the anaesthetist must formally handover care of a patient to a recovery room nurse or other appropriately trained member of staff. The anaesthetist is responsible for ensuring that this transfer is accomplished safely." This ensures safety and continuity of care for patients. The document, however, fails to mention the essential content that this handover must contain. Despite best intentions, various activities in the dynamic recovery room environment distract from a smooth transfer of information and care. The information transfer process is usually informal, with the anaesthetist and nurses differing on the time and content of handover[6].

In the AIMS study, 1 in 20 incidents recorded occurred during recovery[7]. Kluger and Bullock claimed that poor communication contributed to 14% of the 419 incidents[8]. The Closed Claims Study in the United States[9] and Hines et al[10] have cited recovery room mishap rates of 5-23.7%. This highlights the problem that exists and a potential area of improvement. The aim of our audit was to assess the quality of current anaesthetic handover to nurses in the recovery room and to evaluate the short term effect of a structured framework for transfer of information, on the quality of handover.

Methods

The audits were conducted in the recovery room of Beaumont Hospital, Dublin where the routine nurse: patient ratio is 2:1.The audits were registered with the hospital clinical governance and audit committee. A questionnaire based on the Situation Background Assessment and Recommendations (SBAR) system[11,12] was formulated. Recovery nurses completed this questionnaire after the anaesthetist had handed over the patient and left the recovery. The responses were based on information voluntarily imparted by the anaesthetist. The anaesthetists were unaware of both the content of the questionnaire and timing of the audit. Following Audit A, the results were presented to the department and use of a structured framework, based on the SBAR, advised. We further suggested conducting handovers in recovery following a defined process "Connect, Observe, Listen, Delegate" (COLD) as recommended by Professor Mari Bottiet et al[13]. Educational sessions were in the form of an audiovisual presentation, electronic reminders, posters at hospital meetings and memory aid at recovery bays.

After an interval of one month, audit B, was conducted to assess change in quality of handover and subjective nurse assessment of satisfaction with handover process. To prevent operator bias, handovers were audited on randomly selected days. Pearson's chi 2 test was applied and p<0.05 was taken as statistically significant. A difference of >10% was taken as clinically significant.

- **S**ituation
  Name, Age, ASA grade
  Operation type
  Theatre
  Allergies
- **B**ackground
  Medical background
- **A**naesthetic Assessment
  Type
  Airway issues
  Intraoperative complications and management
- **R**ecommendations in PACU
  Airway
  Post op concerns
  Prescriptions for PACU and ward
  Postoperative plan for PACU and ward
  Continued invasive monitoring if appropriate

Figure 1 Questionnaire based on SBAR

Results

Audits were conducted over a period of 2 months each (February 2012 to June 2012) at a month's interval. To ensure that data was anonymous, patient demographics, transfer anaesthetists' grade and the recording nurse's identification were omitted.

Situational data
In Audit A, more than 90% anaesthetists handed over information regarding type of surgery the patient had undergone which was similar in Audit B (p=0.62). 62% patients in audit A were handed over to the recovery nurses by name in audit A with a 14% increase in audit B which was statistically significant (p=0.032). Their age and ASA group were included in 12% (p=0.089) and 16% (p=0.018), respectively, of more handovers in audit B and 16% more anaesthetists included information regarding the operating room number (p=.033).

Background data
In audit A 42% of handovers included information on allergy status and 46% on medical background of patients. Compared to Audit A, 14% more anaesthetists mentioned allergy status

Table 1 Handover of patient's Situational information			
Parameter	**Audit A**	**Audit B**	**p Value**
Name	62	76	0.032 *
Age	46	58	0.089
ASA	27	43	0.018 *
Operation Type	91	93	0.602
Operating Room	39	55	0.023 *

*denotes a statistically significant value P<0.05

Table 2 Comparison of handover of Background and Assessment data			
Parameters	**AuditA**	**Audit B**	**p Value**
Allergy	42	56	0.048 *
Medical history	46.15	77	0.000 *
Anaesthesia Type	73	84	0.058
Airway Issues	53	64	0.114
Intraop. Copmlications	51	60	0.200

*denotes a statistically significant value P<0.05

Table 3 Comparison of handover of miscellaneous data			
Data	**Audit A**	**Audit B**	**p Value**
Postop Concerns	45	51	0.396
Invasive monitors	61	50	0.118
Nurse Satisfaction	56	68	0.08

*denotes a statistically significant value P<0.05

(p=0.48) and 31% (p<0.001) more included medical background in audit B which were both statistically significant.

Assessment data
This included information regarding anaesthesia type, type of airway used, difficult airway issues and intraoperative complications. Nearly 11% more handovers included this information in Audit B compared to audit A. After educational sessions, there was an improvement of 15%, 13% and 9% in handover of information regarding intraoperative administration of antibiotics, antiemetics and fluids, respectively. Handover of analgesics administered intraoperatively, remained unchanged at 85%. These changes were, however, not statistically significant (see Table 2).

Recommendation data
Though, in audit B, 6% more anaesthetists verbally handed over advice regarding analgesia for the recovery room than in audit A, there was no change in the numbers handing over instructions regarding other drug therapy in recovery. Nurse satisfaction with the quality of handover improved from 56% in audit A to 68% in audit B, but was not statistically significant (p=0.08). 11% fewer anaesthetists issued verbal instructions regarding fate of invasive monitoring lines in audit B.

Discussion

Handovers have an important role to play in transfer of information regarding patients' progress and maintaining continuity of care, organisation of care with respect to immediate post op care and a learning opportunity for all involved. Clinical handover is defined as "the transfer of clinical and professional responsibility of some or all aspects of care of a patient to another person or professional group on a temporary or permanent basis"[14]. Hence transfer of relevant information should be organised, quick, coherent and complete in 100% of handovers[12]. A recent publication from Boston, suggests that poor quality handovers may be responsible for a longer stay in recovery which in turn impacts on theatre effectiveness. This held true even when the authors corrected for pain intensity and severity of illness[15]. Smith et al had concluded in their paper[7] that this important link in a patient's care pathway was conducted in an informal manner despite the patient having been under close observation of an anaesthetist just minutes before transfer and while he may still be under residual effects of anaesthesia. Also "local negotiations", where the senior recovery nurse made alternate arrangements to gather information and provide appropriate care rather than challenge an unsatisfactory standard of care were prevalent .

Recovery has a dynamic environment, plenty of distractions, a venue where both intra and inter professional handovers are the routine and has a high turnover of patients. Such a situation is fraught with errors arising from miscommunication or omission of information transfer. There are multiple guidelines for standards of post anaesthesia care but content of handovers has been a largely neglected part of training and assessment[16]. All the transferred information may not be necessarily recalled. Hence it is prudent on the part of the parties involved to not only ensure a smooth transfer of care, but also to stop and listen.

Audit A demonstrated that the quality of handover observed in our recovery room was in keeping with that reported in other publications. Anwari[17] surveyed 276 patient handovers in a single centre in Riyadh. He assessed the handovers by assigning score for data, anaesthetists behaviour and nurse satisfaction. In his survey, 40% anaesthetists verbally reported the ASA status of the patient, 36% informed recovery nurses about premedication used and 64% about intra operative analgesia. 15% of anaesthetists in that survey informed nurses about course of surgery and complications during anaesthesia and 21% about the surgical procedure. 80% of anaesthetists gave clear post op instructions. Nearly half of the handovers were judged as satisfactory by the nurses. As in Anwari's study, handover on intra operative analgesia was the most commonly included information at 85% of handovers in audits A and B. This most likely reflects anaesthetists' attitude of responsibility for provision of analgesia. Clear instructions for post operative care in recovery were given regarding analgesia, antiemetics, fluids to be administered and O2 therapy in 70% , 61%, 52%,and 50% of handovers in audit A and remained largely unchanged in audit B. In audit A, nurse satisfaction with the handover, was in keeping with Anwari's findings. With education, this improved to 68% which was not statistically significant although it is clinically significant. However, nurse satisfaction is subjective, hence, open to bias and influenced by various human factors such as interpersonal skills, habits and manners. Post education, there was significant increase in the handover of ASA grading and medical and allergy history. This may be the result of anaesthetist's concept of "important information" for appropriate care of patients.

Anaesthetists involved may become aware of the ongoing audit and change practice in the short term, thus introducing bias. An attempt was made to overcome this by random selection of days when handovers were audited. Since the repeat audit was undertaken after a short interval of a month, we cannot comment on long term validity of results. Furthermore, we did not attempt to look at the contribution of poor handovers towards incidents or length of stay in the recovery. It has been previously suggested that introducing a formal structure to the handover process would facilitate transfer of information. This in turn may reduce "adverse events" from lack of communication which in an Australian survey was found to have a 14% contribution towards "incidents" in recovery room[9].

We introduced SBAR format for handover[12] to lend a formal structure to handovers in the recovery. The repeat audit demonstrated a change in focus of information transfer to the situational, background and intra operative areas of the handover. Even though verbal handover of instructions for the ward showed a downward trend, recovery nurses were more satisfied with the information they received. We attribute this to presence of written post op instructions, which this audit did not include. Though we did not audit follow up on our suggestion of "COLD", it could be another reason for increased nurse satisfaction. Audit B showed a trend towards improved transfer of information, but the numbers were far from the "ideal" 100%. Simulation based handover learning may have a role in improving handovers. Weinger et al reported that in 981 handovers, simulator based training resulted

in a statistically significant improvement in handover to recovery nurses[18]. Handovers by participants who had received simulator based training were judged more effective. Kalmen et al[19] got similar results from training medical students in the art of handovers in simulated inpatient settings. At present formal training in handovers for anaesthetists is sadly lacking.

We conclude that though anaesthesia is recognised as a safety conscious speciality, we do not recognise recovery handovers as an important link in the chain of safe care. In our opinion, introducing a formal structure to handovers, simulation based training and daily use of SBAR based handovers will ensure adequate transfer of information and continuity of care.

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References

1. World Health Organization Patient safety solution: communication during patient handovers. http://www.who.int/patientsafety/solutions/patientsafety/PS-Solution3.pdf (Accessed 16/01/2012).
2. Fletcher KEMM, Saint SM, Mangrulkar RSM: Balancing continuity of care with residents' limited work hours: defining the implications. Acad Med, 2005, 39–43.
3. Li P, Stelfox HT, Ghali WA, A Prospective Observational Study of Physician Handoff for Intensive-Care-Unit-to-Ward Patient Transfers. The American Journal of Medicine: 2011; 124: 860–867.
4. Segall N, Bonifacio AS, Schroeder RA, Barbeito A, Rogers D, Thomlow DK, Emery J, Kellum S, Wright MC, Mark J: On behalf of the Durham VA Patient Safety Centre of Inquiry. Can We Make Postoperative Patient Handovers Safer? A Systematic Review of the Literature Anesth Analg 2012; 115:102–15.
5. Immediate post anaesthetic recovery.AAGBI, 2002 http://www.aagbi.org/publications/guidelines/docs/postanaes02 (accessed 16/01/2012). 6. Smith AF, Pope C, Goodwin D and Mort M. Interprofessional handover and patient safety in anaesthesia: observational study of handovers in the recovery room British Journal of Anaesthesia 101:332–7.
7. Runciman WB, Sellen A, Webb RK, Williamson JA, Currie M, Morgan C, Russell WJ. The Australian Incident Monitoring Study. Errors, incidents and accidents in anaesthetic practice. Anaesth Intensive Care.1993; Oct 21:506-19.
8. Kluger MT and Bullock MFM: Recovery room incidents: a review of 419 reports from the Anaesthetic Incident Monitoring Study (AIMS): Anaesthesia, 2002; 57, 1060-1066.
9. Zeitlin GL. Recovery room mishaps in the ASA Closed Claims study. ASA Newsletter 1989; 53; 28-30.
10. Hines R, Barash PG, Watrous G, and O'Connor T. Complications occurring in the postanesthesia care unit: a survey. Anesthesia and Analgesia 1992; 74: 503-9.
11. Handover of responsibility for patients in the post anaesthetic care unit: Raising the Standard: A compendium of audit recipes (Second edition 2006) Royal College of Anaesthetists U.K.
12. Institute for Healthcare Improvement: SBAR technique for communication www.ihi.org/IHI/Topics/PatientSafety/SafetyGeneral/Tools (accessed 16/01/2012).
13. Interprofessional communication and team climate in complex clinical handover situations: issues for patient safety in the private sector FINAL REPORT April 2009.
14. Safer Handover: Safer Patients. Australian Medical Association, 2006, 8.
15. Bittner EA, George E, Eikermann M, Schmidt U: Evaluation of the association between quality of handover and length of stay in the post anaesthesia care unit: a pilot study. Anaesthesia 2012; 67:548-489.
16. Vimlatia L, Gilsanzb F and Goldik Z: Quality and safety guidelines of post anaesthesia care Working Party on Post Anaesthesia Care (approved by the European Board and Section of Anaesthesiology, Union Europe ´enne des Me´ decins Spe´cialistes) European Journal of Anaesthesiology 2009; 26:715–72.
17. Anwari JS. Quality of handover to the post anaesthesia care unit nurse: Anaesthesia 2002; 57,484-500.
18. Weinger MB, Slagle JM, Kuntz A, Banerjee A, Schildcrout JS et al: Improving actual handover behaviour with a simulation-based training intervention. Proceedings of the Human Factors and Ergonomics Society Annual Meeting September 2010; vol. 54 no. 12 957-961.
19. Klamen DL, Reynolds KL, Yale B, Aiello M: Students learning handovers in a simulated in-patient unit. Medical Education 2009; 43, 1097–1098.

Delayed Prescribing of Antibiotics for Respiratory Tract Infections: Use of Information Leaflets

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Abstract
The appropriate prescribing of antibiotics is a challenge in primary care[1,2]. We performed an interventional trial to determine if providing an information leaflet on antibiotics with a delayed antibiotic prescription influenced the patient's decision to use the antibiotic for a respiratory tract infection (RTI). The control group (n=69) where given a delayed prescription and the intervention group (n=46) were given an information leaflet on antibiotics with the delayed prescription. In the control group, 72% (n=50) of patients indicated they subsequently used the antibiotic, and in the intervention group, 43%(n=20) indicated they used the antibiotic, this difference was statistically significant (p = 0.0018.) The key conclusion of this study is that delayed prescriptions should be issued with an appropriate information sheet.

Introduction
The majority of respiratory tract infections (RTI's) are self-limiting, and do not require antibiotic treatment[3]. A delayed prescription is given to the patient with the understanding that it is only to be used if specific symptoms worsen or if there is no improvement within a defined period of time. Use of a delayed antibiotic prescription has been suggested as a tool to reduce antibiotic usage, and could potentially have a positive impact in preventing

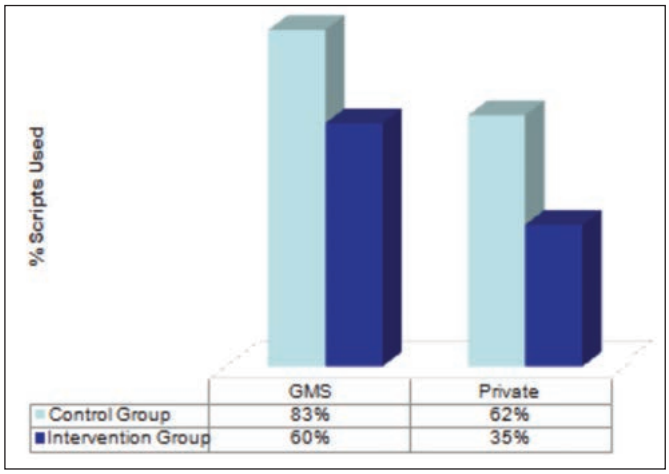

Figure 1 Control Group v Intervention Group

antibiotic resistance[4]. A patient's decision to fill the prescription and use the antibiotic may be influenced by how the delayed prescription is explained in the consultation[5]. Written information regarding the appropriate use of antibiotics could be used to improve patient education and may further reduce the number of prescriptions filled. The aim of the study was to examine the use of delayed prescriptions for RTI's, and to determine if concurrently providing the patient with an information leaflet on the appropriate use of antibiotics in RTI's and their potential side effects influences the rate of antibiotic use.

Methods

This was an intervention trial design. Ethical approval was obtained from the TCD/HSE GP Training Scheme Ethics Committee. The control group (n = 69) were given a delayed prescription for RTI, and the intervention group (n = 46) were given a delayed prescription with an information leaflet outlining role of antibiotics in RTI's, indications for use and potential side effects. Cases were included on the basis of their serial presentation at a Teaching Practice with four doctors. Basic demographic information was recorded for each patient given a delayed prescription. Data for the control group was recorded over a 5 week period and then the intervention group over a consecutive 5 week period. All patients presenting with RTI during the defined periods were included in the study. Verbal consent was obtained during the consultation. Data was collected by the treating Doctor in the practice, including current patient contact details. Each patient was subsequently contacted by telephone at 10-14 days post consultation, and asked if they had used the antibiotic on the delayed prescription.

Results

A total of 115 delayed prescriptions were presented; 69 in the control group (delayed prescription alone) and 46 in the intervention group (delayed prescription and information sheet). Both the proportion of fee paying versus primary care service eligible patients (65:50), together with the range of patient age indicated a robust degree of case mix, typical and representative of routine General Practice consulting. In the control group, 72% of patients used the antibiotic, and in the intervention group, 43% indicated they used the antibiotic, which difference was statistically significant (p = 0.0018), indicating that use of an information sheet with the delayed prescription was effective in very significantly reducing use of antibiotics. This effect was most evident among fee paying patients, who were less likely to use the antibiotic in both groups (Figure 1).

Discussion

Appropriately reducing the use of antibiotics for self limiting viral infections continues to be an important objective in routine prescribing. This study observes the impact of a simply designed practice information sheet on when it is appropriate to use an antibiotic, what steps should be taken to self care an uncomplicated viral RTI together with clear information on common negative consequences of inappropriate antibiotic use. Despite the modest sample size, a clear and significant reduction in antibiotic use is evident in the intervention group. This study was carried out in a Training Practice, where antibiotic prescribing is more likely to be conservative[6], which renders the reduction in antibiotic use even more significant. This study demonstrates that use of an accompanying information leaflet is highly effective at reducing the use of antibiotics in delayed prescribing. It supports the uniform use of such leaflets based on a modest study utilising an intervention trail methodology on a small sample. It is proposed to conduct a larger block randomised control trial in order to confirm the approach can be generalised.

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References

1. Antibiotic Prescribing: A challenge for Primary Care. MeReC National Prescribing Bulletin Vol 11 No 5 2000, www.npc.nhs.uk/merec/other_non.../merec_bulletin_vol11_no12.pdf.
2. Harnden A, Perera R, Brueggemann AB, Mayon White R, Crook D, Thomson A, Mant D. Respiratory Infections for which general practitioners consider prescribing an anti biotic: a prospective study. Arch Dis Childhood 2007; 92: 594-597.
3. Jochen WL, Boumans D, Lardinois R, Gonzales R, Hopstaken RM, Butler C, Dinant G. Public beliefs on antibiotics and respiratory tract infections. British Journal of General Practice 2007; 57:942-944.
4. Strategy for Control of Antibiotic Resistance in Ireland 2011. Health Service Executive Health Protection Surveillance Centre (www.hpsc.ie/A-Z/MicrobiologyAntimicrobialresistanceinIrelandSARI/com).
5. Little P. Delayed Prescribing of antibiotics for upper respiratory tract infections. BMJ 2005 Vol 331 p 301 (editorial).
6. Lo YYC, Lam CLK, Mercer SW, Fong DYT. Does vocational training in family medicine have an impact on antibiotic prescribing pattern? Family Practice 2011; 28:56-62.
7. Why no antibiotic? http://www.patient.co.uk/health/Antibiotics-Why-No-Antibiotic?.html.

Hip Pain and Cauda Equina Syndrome

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Abstract
Acute cauda equina syndrome secondary to a spinal epidural abscess as a result of a psoas abscess is very uncommon. We report the case of a 64-year old with a 6-day history of left hip pain, which progressively worsened until she presented to the emergency department with systemic infective symptoms and classical acute cauda equina syndrome. A good clinical outcome was achieved by urgent posterior decompression, followed by CT-guided drainage of the psoas abscess and appropriate antibiotic treatment.

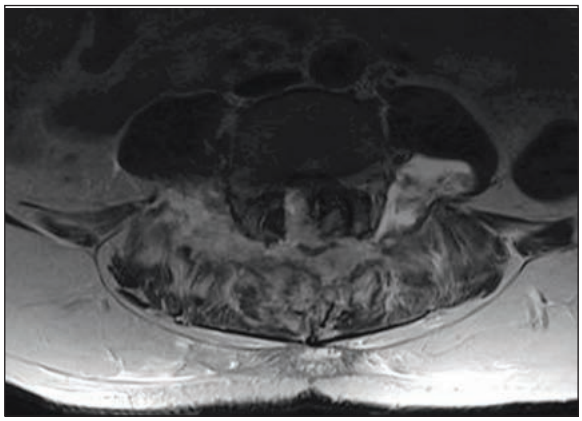
Case Report

A 64-year old woman presented with sudden onset urinary retention and left lower limb weakness. She complained of a 6-day history of left groin pain, with a 2-day history of discomfort in her left flank. She had no urinary or faecal incontinence. Systemically, she complained of general malaise and occasional fever. She had no significant past medical or drug history. On physical examination she had left flank and midline lower lumbar tenderness. Neurological examination revealed loss of power in her left lower limb (Grade 3/5 in L4 and L5). Paraesthesia in these regions was also noted. Her right limb had normal power and sensation. Lower limb reflexes were present and normal. Perianal sensation was present but decreased, and anal tone was intact and normal. A distended bladder was palpable and on insertion of a catheter a residual of 1400mls was present. Laboratory findings revealed elevated inflammatory markers (ESR 96mm/hr, CRP 221mg/L), a normal haemoglobin (11.3g/dL) and raised white cell count (16.3x109/L). Blood cultures were taken. An urgent MRI of the lumbar spine was performed and showed a large left psoas mass communicating with the epidural space at L4/L5 and causing compression of the cord (Figures 1 and 2). The patient underwent emergency posterior lumbar decompression and CT-guided drainage of the abscess. Pus from the spinal canal cultured staphylococcus aureus. She was treated aggressively with IV flucloxacillin, benzylpenicillin and fusidic acid. This was guided by the culture and sensitivities from the blood cultures and intra-operative samples taken. Postoperatively her neurological deficits fully resolved, as did the psoas abscess following long-term IV antimicrobial treatment.

Discussion

Acute cauda equina syndrome is a surgical emergency, which usually presents with buttock and lower extremity pain as well as bowel/bladder dysfunction, saddle anaesthesia, and lower extremity motor and sensory dysfunction. Causes include trauma, lumbar disc herniation, spinal stenosis, spinal neoplasms, inflammatory conditions or iatrogenic injury. Acute cauda equina syndrome due to an epidural abscess is extremely rare, but several cases have been reported[1,2]. This patient initially complained of left hip pain prior to the lumbar back pain, lower limb weakness or urinary symptoms and so the authors believe this is a unique case of a psoas abscess which progressed into the epidural space and eventually resulted in acute cauda equina syndrome. A psoas abscess is a rare retroperitoneal infection, with 40% occurring in those older than 40 years[3]. Risk factors include diabetes mellitus, alcoholism, immunosuppressive therapy or intravenous drug abuse[3]. It is associated with a mortality rate of approximately 20%[4]. Staphylococcus aureus is the usual cause of a primary psoas abscess[3]; other pathogens include serratia marcescens, pseudomonas aeruginosa, haemophilus aphrophilus and proteus mirabilis[3,5]. Enteric bacteria are usually the cause of a secondary psoas abscess[3].

The mainstay of treatment is drainage and appropriate antibiotic therapy. Spinal epidural abscesses are well recognised but are uncommon, with a reported frequency of 0.2–3 per 10000 admissions annually[6]. It usually occurs in patients between 30 and 60 years of age[7]. Risk factors are similar to those for psoas abscess, with staphylococcus aureus the most common organism[7]. Streptococci, pseudomonas, enteric gram-negative bacilli, dental flora and fungi have also been reported[2]. MRI is essential to fully evaluate the extent of a spinal epidural abscess, with advantages over CT myelography[8]. Age <60 years old, early intervention, lower limb neurology <72hrs, incontinence, and <50% compression of the thecal sac have been shown to affect outcome[9,10]. The development of acute cauda equina syndrome from an epidural/psoas abscess is very rare. A high index of suspicion is required for a patient presenting with systemic infective symptoms along with the classical symptoms of acute cauda equina syndrome. This case highlights that early diagnosis and surgical intervention, along with carefully tailored antibiotic treatment, are essential for a good clinical outcome.



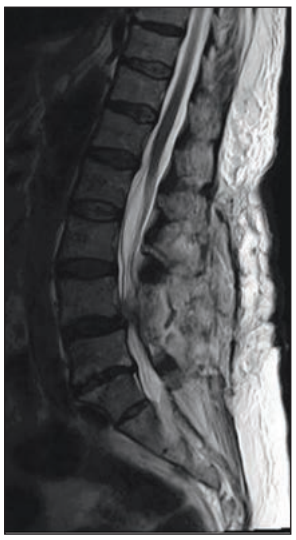


Figure 1
Axial MRI image showing the psoas abscess communicating with the epidural space and surrounding the spinal cord.

Figure 2
Sagittal MRI image demonstrates the abscess compressing the spinal cord at the L4/5 level

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References

1. Hopkins TJ, Raducan V, Sioutos N, White A, 3rd. Lumbar lymphoma presenting as psoas abscess/epidural mass with acute cauda equina syndrome. A case report. Spine (Phila Pa 1976). 1993 May;18:774-8.
2. Lenehan B, Sullivan P, Street J, Dudeney S. Epidural abscess causing cauda equina syndrome. Ir J Med Sci. 2005 Jul-Sep;174:88-91.
3. Santaella RO, Fishman EK, Lipsett PA. Primary vs secondary iliopsoas abscess. Presentation, microbiology, and treatment. Arch Surg. 1995 Dec;130:1309-13.
4. Kao PF, Tsui KH, Leu HS, Tsai MF, Tzen KY. Diagnosis and treatment of pyogenic psoas abscess in diabetic patients: usefulness of computed tomography and gallium-67 scanning. Urology. 2001 Feb;57:246-51.
5. Walsh TR, Reilly JR, Hanley E, Webster M, Peitzman A, Steed DL. Changing etiology of iliopsoas abscess. Am J Surg. 1992 Apr;163:413-6.
6. Khanna RK, Malik GM, Rock JP, Rosenblum ML. Spinal epidural abscess: evaluation of factors influencing outcome. Neurosurgery. 1996 Nov;39:958-64.
7. Reihsaus E, Waldbaur H, Seeling W. Spinal epidural abscess: a meta-analysis of 915 patients. Neurosurg Rev. 2000 Dec;23:175-204; discussion 5.
8. Hlavin ML, Kaminski HJ, Ross JS, Ganz E. Spinal epidural abscess: a ten-year perspective. Neurosurgery. 1990 Aug;27:177-84.
9. Dauwe DM, Van Oyen JJ, Samson IR, Hoogmartens MJ. Septic arthritis of a lumbar facet joint and a sternoclavicular joint. Spine (Phila Pa 1976). 1995 Jun 1;20:1304-6.
10. Wu LL, Chen ST, Tang LM. Nonsurgical treatment of spinal epidural abscess: report of a case. J Formos Med Assoc. 1994 Mar;93:253-5.

Uterine Sarcoma after Tamoxifen Therapy for Breast Cancer

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Abstract
Tamoxifen has been shown to significantly reduce the risk of tumour recurrence in women with receptor positive breast cancer and has been used for chemoprevention in women with both non-invasive cancer and those with a high risk of developing breast cancer. An established and accepted risk with this treatment is the increased incidence of adenocarcinoma of the endometrium. Less well recognised is uterine sarcoma, a rare and aggressive tumour accounting for under five percent of uterine malignancies, with five year survival rates in the order of 50%.

Introduction
All cases of uterine sarcoma encountered in our gynae-oncology service since 2007 were reviewed. Those who had been previously treated with tamoxifen underwent a comprehensive chart review. In addition a literature search was performed using Medline.

Case Report
The first patient is a fifty-three year old para 0 who was diagnosed with Grade 3 estrogen (ER) and progesterone (PR) positive, invasive ductal carcinoma of the right breast. After treatment with surgery, chemotherapy, radiotherapy tamoxifen was prescribed for five years. Several weeks after completing treatment post-menopausal bleeding developed and an MRI demonstrated a large pelvic mass. Histology proved to be high grade endometrial stromal sarcoma. The second patient was a seventy six year old para 6 who was diagnosed with a Grade 1 low grade cribriform ductal carcinoma with minimal lobular carcinoma in-situ (LCIS) of the left breast and was treated by left breast wide local excision. After adjuvant radiotherapy this lady was commenced on tamoxifen which she received for 5 years.

She presented with post-menopausal bleeding and examination revealed a large pelvic mass. Histology proved this to be carcinosarcoma (Malignant Mixed Mesodermal Tumors), which had metastasized to the lungs. The third patient is a forty-seven year old para 3 who was diagnosed during pregnancy with Grade 2 ER/PR positive invasive ductal carcinoma of right breast with lympho-vascular invasion and ductal carcinoma in-situ (DCIS). She was treated with right mastectomy followed by chemotherapy, radiotherapy and adjuvant hormonal therapy tamoxifen was initiated. This lady subsequently complained of irregular vaginal bleeding and a dry cough. Histology of a large pelvic mass identified a leiomyosarcoma, which was also proven histological to have metastasized to the lungs.

Discussion
Tamoxifen binds to oestrogen receptors and elicits oestrogen agonist or antagonist depending on the target tissues. The efficacy of Tamoxifen in breast cancer is due to its anti-oestrogen properties but it exhibit weak oestrogen effects to endometrium. The literature on histological endometrial changes in patients treated with Tamoxifen reports variable figures on pathologic findings. These include simple and atypical hyperplasia, hyperplasia with polyp formation (single and multiple), polyp-cancer and adenocarcinoma[1]. From the study, it is indicated that gynaecological symptoms in women with Tamoxifen warrant full investigation. Reports estimate that Tamoxifen increases the risk of endometrial cancer two to threefold[3].

Other studies suggest that Tamoxifen enhances the risk of developing more aggressive form of uterine malignancies[2,3]. Uterine sarcomas are rare form of uterine malignancies occurring in 2% to 5% of all patients with uterine malignancies[4]. In a review of all National Surgical Adjuvant Breast and Bowel Project (NSABP) trials, the rate of sarcoma in women treated with Tamoxifen was 17 per 100,000 patient years versus none in the placebo group[5]. Similarly in a separate trial of high risk women without breast cancer taking Tamoxifen as part of breast cancer prevention trial with medial follow up of 6.9 years, there were 4 sarcomas in the Tamoxifen group versus none in placebo group 5. This is compared with the incidence of 1 to 2 per 100,000 patient years in the general population[6]. Pelvic radiation was risk factor for developing uterine sarcoma. Duration of Tamoxifen administration is crucial for its effectiveness, but this also effects related to the partial oestrogenic activity of the drug. A lot of reports published in recent years have demonstrated a significant association between longer duration of Tamoxifen treatment and the appearance of uterine sarcoma[7,8]. Most of the Tamoxifen associated sarcomas were MMMT (Malignant Mixed Mesodermal Tumours)[9,10].

The purpose of this report is to highlight the association of tamoxifen and uterine sarcoma, and to emphasize the need for formulating a standardized follow-up protocol by multidisciplinary team including breast surgeons, oncologists (Radiation and Medical) and GPs for women receiving tamoxifen. Any women on Tamoxifen who developed gynaecological symptoms should be referred to Gynaecologist for review.

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References
1. Ismail S.M. Pathology of endometrium treated with Tamoxifen. J Clin Pathol 1994; 47:827-833.
2. Sesti F, Patrizi L, Ermini B, Palmieri G, Orlandi A, Piccione E. High grade endometrial stromal sarcoma after Tamoxifen therapy for breast cancer. Gynaecol Obstet Invest 2005; 60:117-120.
3. Curtis RE, Freedman DM, Sherman ME, Fraumeni JF Jr. Risk of malignant mixed mullerian tumours after Tamoxifen therapy for breast cancer. J Natl Cancer Inst 2004; 96:70-74.
4. Avarette HE and Nguyen, H. 1995. Gynaecologic cancer. In Murphy G.P, Lawrence W. Jr, Lenhard R.E Jr. American Cancer Society textbook of Clinical oncology. 2nd ed. Atlanta: American Cancer Society, 552-79.
5. Wickerham D.L, Fisher B, Wolmark N, Bryant J, Costantino J, Bernstein L. Association of Tamoxifen and uterine sarcoma. J Clin Oncol, 2002; 20:2758-60.
6. Mouridsen J.E, Palshof T, Patterson J, Battersby L. Tamoxifen in advance breast cancer. Cancer Treat Rev, 1978; 5:131-41.
7. Bergman L, Beelen MLR, Galee MPW, Hollema H, Benraadt J, van Leeuwen FE. Risk and prognosis of endometrial cancer after Tamoxifen for breast cancer. Lancet 2000; 356:881-7.
8. Lasset C, Bellen MLR, Gallee MPW. Tamoxifen and risk of endometrial cancer. Lancet 2001; 357:410-4.
9. ACOG Committee Opinion. Tamoxifen and endometrial cancer. Int J Gynaecol Obstet. 1996; 53:197-9.
10. Altaras M.M, Aviram R, Cohen I, , , . Role of prolonged stimulation of Tamoxifen therapy in the aetiology of endometrial sarcomas. Gynaecol Oncol, 1993; 49:255-8.

Case 3: Aspergilloma

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Case Report

A 71 year-old man presented for pre-operative assessment prior to a radical neck dissection for squamous cell carcinoma of the tongue. He was an ex-smoker, with known pulmonary fibrosis and bronchiectasis of undetermined aetiology. He denied any respiratory symptoms with no shortness of breath, cough or wheeze. Respiratory examination was notable only for bibasal crackles. Blood work was normal. His mantoux skin test was negative. Imaging evaluation was initially with a chest radiograph, followed by a CT scan of the chest. Both of these examinations are shown in figures 1 and 2 respectively.

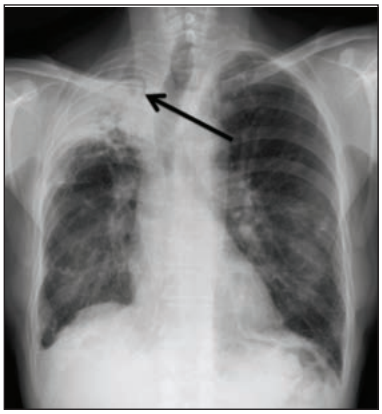

Figure 1
Chest radiograph reveals a cavitating lung lesion in the right lung apex (black arrow) that contains a mycetoma (intertwined hyphae of aspergillus fumigatus colonising a pre-existing cavity, usually from TB). Note the volume loss in the right upper lobe with deviation of the trachea.

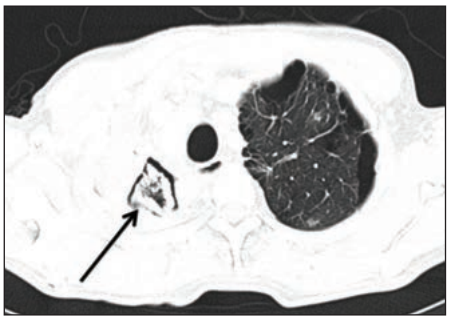

Figure 2
Transverse CT confirms the presence of a mycetoma, or aspergilloma. There is a crescent shaped airspace separating the fungus ball from the wall of the cavity, the so-called 'Monod sign' (black arrow). Classically the mycetoma will move according to patient positioning.

Discussion

Cavitation is a common complication of tuberculosis (TB) infection of the lungs. It is usually located in the upper lobes and superior segments of the lower lobes, often in the presence of other imaging findings of granulomatous infection. In the presence of a chronic lung cavity, secondary infection with aspergillus (usually a. fumigatus) can occur. It typically occurs in a cavity caused by prior TB but may however occur in association with lung bullae, sarcoidosis or other cavitatory lung disease. Pulmonary manifestations of aspergillus infection include aspergilloma, semi-invasive aspergillosis, angio-invasive aspergillosis and invasive tracheobronchial aspergillosis[1]. Most mycetomas (or fungal balls) are aspergillomas, and in fact these terms are often used interchangeably. They generally develop in a pre-existing lung cavity in immunocompetent individuals following inhalation of airborne spores. The clinical disease spectrum ranges from the completely asymptomatic patient with aspergilloma, as in this case, to presentation with life-threatening haemoptysis[2].

Diagnosis can be made with sputum culture and bronchoalveolar lavage, however occasionally requires transthoracic or open lung biopsy. A serum aspergillus precipitin test and elevated serum galactomannan (an aspergillus cell wall component) levels are also helpful in the diagnosis of aspergillosis[3]. Imaging findings include a fungus ball or sponge-like mass within an existing cavity (representing hyphae, mucous and fibrin), often with a surrounding crescent of air, the so-called Monod sign. It may be mobile within the cavity and change position depending on patient positioning, or may fill the entire cavity. In asymptomatic patients no treatment is warranted and patients should be managed expectantly. In symptomatic patients anti-fungal therapy with voriconazole has been attempted with variable reported degrees of success[4]. Bronchial artery embolization may be employed to control haemoptysis. In severe cases, surgical resection may be the only viable option, but this is associated with considerable mortality, especially if there is significant co-existing pulmonary disease[5].

Semi-invasive pulmonary aspergillosis, also known as chronic necrotizing pulmonary aspergillosis, is a sub-acute disease seen in immunosuppressed patients, for example patients on steroids, with diabetes, alcoholism and occasionally in the setting of sarcoidosis. CT findings include nodules, masses and consolidation. Angio-invasive pulmonary aspergillosis usually occurs in febrile, neutropenic patients and has characteristic CT findings of pulmonary nodules with surrounding ground-glass change, the so-called halo sign representing surrounding pulmonary haemorrhage. When the infection starts to clear and a granulomatous response ensues, air is seen to surround a part of the nodule giving the so-called 'air-crescent sign', a sign that indicates effective treatment and a favourable outcome[6]. This is not to be confused with Monod's sign of a crescentic slip of air around a mycetoma, as mentioned earlier. Other fungal infections to consider in the immunosuppressed patient are invasive candidiasis and mucormycosis.

Allergic bronchopulmonary aspergillosis (ABPA) is a separate disease entity that is essentially an abnormal immune response to aspergillus spores, almost always in patients with underlying lung disease, such as asthma or bronchiectasis. The cause of the mycetoma in our patient was felt to be secondary to prior TB infection. He did very well following treatment with anti-fungal agents and remains asymptomatic.

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References

1. Franquet T, Muller NL, Gimenez A, Guembe P, de La Torre J, Bague S. Spectrum of pulmonary aspergillosis: histologic, clinical, and radiologic findings. Radiographics : a review publication of the Radiological Society of North America, Inc. 2001 Jul-Aug;21:825-37.
2. Soubani AO, Chandrasekar PH. The clinical spectrum of pulmonary aspergillosis. Chest. 2002 Jun;121:1988-99.
3. Pfeiffer CD, Fine JP, Safdar N. Diagnosis of invasive aspergillosis using a galactomannan assay: a meta-analysis. Clin Infect Dis. 2006 May 15;42:1417-27.
4. Kousha M, Tadi R, Soubani AO. Pulmonary aspergillosis: a clinical review. European respiratory review : an official journal of the European Respiratory Society. 2011 Sep 1;20:156-74.
5. Park CK, Jheon S. Results of surgical treatment for pulmonary aspergilloma. Eur J Cardiothorac Surg. 2002 May;21:918-23.
6. Abramson S. The air crescent sign. Radiology. 2001 Jan;218:230-2.

Higher Specialist Training in Paediatrics 2005-2010. The Graduates Reflections

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Abstract
This study of paediatric trainees, who were awarded their CSCST from 2005 to 2010, evaluated their training experience and assessed whether the curriculum goals were achieved. From an incomplete database 23 (57.7%) graduates based in Ireland and 3(19%) based abroad responded. Twenty one (81%) of respondents were currently working in Ireland as consultants, 20(80%) had a post membership qualification and 23 (92%) had travelled abroad for fellowships. Positive experiences included clinical training (44%), positive role models (44%), quality of the training days (52%).Negative experiences included lack of protected time for research (52%), excessive clinical service (28%), and poor monitoring of trainers (20%). Mean Likert scores for curriculum competencies were clinical care 4.9, clinical knowledge 5, application of evidence 3.7, academic supervisor skills3.3, knowledge of public health 3.2, health economics 2.2, and healthcare systems modification 2.3. The curriculum deficiencies can be addressed through the diploma in Leadership and Quality in Healthcare which has been developed by the Health Service Executive and the College of Physicians but an adequate database of graduates needs to be maintained.

Introduction

The establishment of the Higher Specialist Training (HST) program in paediatrics, in 1999, marked a transition from individual self directed training in paediatrics to a formal process with the establishment of a defined curriculum, structured training and assessment. The first Specialist Paediatric Registrars (SPR) who completed the full 5 years of training received their certificates of satisfactory completion of specialist training (CSCST) in the Higher Specialist Training (HST) in General Paediatrics in 2005. While trainees in program reported favourably on their experiences[1] this study was under taken to assess graduates perceptions on the achievement of curriculum goals, and their views on the training experience inclusive of the strengths and weaknesses.

Methods

A mixed model questionnaire was constructed to survey graduates of the Higher Specialist Training Program in General Paediatrics. Closed questions elicited demographic information and quantified the training process. Likert scales were designed to encompass four levels of certainty; definitely, probably,possibly and not at all. There were six possible choice boxes (cuing at 1 not at all and 6 definitely) which encompassed intermediate scores as required. An example of the question structure can be seen in Figure 1. They assessed the graduates perceptions of competency in the 7 core elements of the paediatric HST curriculum which include clinical care, ethical and legal knowledge, application of evidence to practice, ability to supervise, and undertake research, have appropriate knowledge in the areas of public health, health economics, and healthcare systems. Open questions were utilized to assess perceived strengths and weaknesses of the program. The questionnaire was tested for internal validity by piloting it amongst colleagues who had completed the specialist paediatric registrar (SpR) program and also currently enrolled trainees.

Data from the Royal College of Physicians in Ireland (RCPI) indicated that 87 paediatric SPRs were awarded their CSCST between 2005 and 2010. We utilized the trainee e-mail addresses that were available from the RCPI to survey the SPRs however the database was not current with failure to deliver rate of e-mail delivery in 21 (24.1%). We were unable to determine the number of email addresses that were both current and active. Consequently from the database the authors defined a convenience sample of graduates where their current location was known with a degree of certainty or to whom the initial e-mail sent was delivered. For 87 graduates, 60 addresses were deemed reliable, 44 (73.3%) located in Ireland and 16 (26.7%) abroad however 4 doctors, based in Ireland, were on maternity leave therefore 56 doctors were surveyed by post and by email. Quantitative data was analyzed using SPSS 14.0 for word. Qualitative data was analyzed using the framework approach until data saturation was reached.

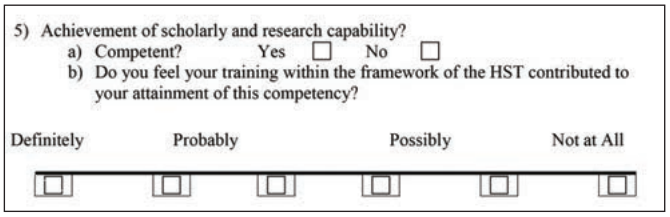

Figure 1 Sample of questionnaire structure assessing key competencies of the SpR curriculum

Results

Responses of graduates based in Ireland were 23(57.5%) and from abroad were 3(19%). The male: female ratio was 3:1. Each graduate year was represented with a minimum of 3 to a maximum of 6 responses. All respondents, with 1 exception, had attended medical school in Ireland. The mean time spent in the training program was 5.2 years, range 5 -7 years.

Twenty (80%) graduates completed a post membership qualification. Eleven identified barriers which prevented completion in the allotted time which were related to family circumstances (5), lack of resources (4), clinical workload (3), attainment of permanent consultancy prior to finishing (2) and relocation (1). Twenty three 23 (92%) travelled overseas for fellowships, including 4 who completed dual fellowships. Twenty one fellowships were in a chosen in paediatric subspecialties and 2 in general paediatrics. Fellowships locations were Canada (11), United Kingdom (6), USA (5), Australia (3) and France (1). Fourteen fellowships were research and clinical with 9 being clinical. Twenty one (81%) respondents were currently in Consultant posts which included General Paediatrics 7, Community Paediatrics 2, and subspecialist practice inclusive of , Endocrinology 3, Respiratory 3, Neonatology 2, Gastroenterology 2, Intensive Care 1, Neurodevelopment 1. It emerged in qualitative analysis that the most common reason people diverted from their proposed career plan was availability of an alternative consultancy and that quality of life issues pushed people away from jobs in tertiary referral centers.

The beliefs related to curriculum competency are outlined in Table 1. Qualitative themes related by the trainees were classified as either positive or negative. Positive qualitative themes were the

Table 1 Mean likert scores with number and % of positively skewed scores for Curriculum competencies

HST Competency	% Graduates who felt Competent at Graduation	Mean Likert Score	+ve Likert scew (%)
Inpatient Clinical Care	100	4.86	72
Clinical / Ethical and Legal Knowledge	100	4.96	72
Application of Evidence to Practice	96	3.72	40
Ability as clinical / academic supervisor	84	3.32	24
Scholarly / Research	76	2.88	16
Public Health	68	3.16	25
Health Economics / Policy	64	2.24	0
Healthcare systems modification	60	2.32	4

clinical competency gained through training in Ireland for 44%, the exposure to excellent role models for 44%, the quality of the SPR training days for 52%, the recognition that overseas fellowships were important for 40%, and the attempts to standardize the assessment process for 22%. The negative themes included, lack of protected time for study and research for 52%, excessive clinical service provision for 28%, poor monitoring of trainers for 20%, mismatch between clinical rotations and career goal of the trainee for 16%, and a lack of management training for 12%.

Discussion

This study evaluated the perceptions of graduates of the HST program in General Paediatrics as they related to the achievement of the curriculum goals and their views on the strengths and weaknesses of the program. Such views are important as the trainees are the future leaders of paediatrics in Ireland and their insights should be drivers for change[2]. Positive findings include the achievement of the curriculum goals as they relate to clinical practice which is also reflected in the qualitative themes. This is similar to the Canadian experience where 96% of paediatricians felt they were adequately or very well trained[3]. The negative findings suggest that curriculum goals are not being achieved in areas of health policy, public health and healthcare modification. These deficiencies may be relevant to other postgraduate training bodies and could be addressed by online educational modules. The diploma in Leadership and Quality in Healthcare developed by the Health Service Executive and the Royal College of Physicians of Ireland could also address these deficiencies. The curriculum for training must also reflect potential future megatrends, a process undertaken by the American Academy of Paediatrics[4], if trainees are to be adequately prepared for their professional careers.

The inadequacy of time for study and research cited by trainees highlights a central dilemma of training where there is the need for appropriate 'down time' for reflection and the consolidation of learning[5]. The development of a paediatric faculty educational leadership committee would provide a mechanism to disseminate and educate on issues of educational innovation to trainees and trainers[6]. Consultants undertaking this role would have to be supported with a reduction in their clinical commitment. A major weakness of this survey is the absence of an adequate database through which all graduates could have been contacted which may has implications for the retention of paediatric trainees as once gone from the scheme they may be unaware of the job opportunities available for them. The M:F response rate is at variance with the HST program in paediatrics where the M:F is 1:2 suggesting that the low female response rate may be related to the absence of an appropriate database. Many of the respondents, of this survey, are currently working in Ireland as consultants, and incorporating their views into future changes to the paediatric training program needs to be considered as their insights can lead to improved training.

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References

1. Byrne OC, Boland B, Nicholson AJ, Waldron M, O'Neill MB. Ir Med J.2005;98:13-15
2. Klaber RE, Roland. Engaging paediatricians in planning the training of our future workforce. Arch Dis Child 2012; 97:517-520
3. Lieberman I, Hilliard RI. How well do residency programmes prepare residents for clinical practice and their future careers? Med Educ, 2006; 40:539-546
4. Starmer AJ, Duby JC, Slaw KM, Edwards LE and the members of the Vision of Paediatrics 2020 Task force. Paediatrics 2010; 126:971-980.
5. Douglas-Jones D, McGuinness GA, First LA, Leslie LK, and the Residency Review and Redesign in Paediatrics Committee. Paediatrics 2009; 123:S1-S7.
6. Hobson WL, Carey JC, Bale JF. Academy of Pediatric education and leadership: preparing leaders for educational innovation. Pediatrics 2011; 128:1-4
7. Amin H. Postgraduate medical education and training in paediatrics. Paediatr Child Health.2009; 14:305-306.

Pulmonary Sequelae of Severe H1N1 Infection Treated with High Frequency Oscillatory Ventilation

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Abstract

During the recent influenza A (H1N1) pandemic, due to severe respiratory failure many patients required treatment with alternative ventilator modalities including High Frequency Oscillatory Ventilation (HFOV). We present four such patients treated with HFOV at an academic, tertiary referral hospital in Ireland. We detail outcomes of clinical examination, pulmonary function testing, quality of life assessment and radiographic appearance on CT Thorax at follow-up at 6 months. Further clinical assessment and pulmonary function testing were performed at median 19months (range 18-21 months) post-discharge. At initial review all patients were found to have reduced gas transfer (median predicted DLCO 74%) with preservation of lung volumes and normal spirometrical values at 6 months (median FVC 5.42L[101% predicted] and FEV14.5L[101.2% predicted] respectively), with improvements in gas transfer (median predicted DLCO 83%)at subsequent testing. Post-inflammatory changes on CT thorax at 6 months were seen in all 4 cases. To our knowledge this is the first report to document the long-term effects of severe H1N1 infection requiring high frequency oscillation on respiratory function. We conclude that the effects on respiratory function and pulmonary radiological appearance are similar to those observed following conventional treatment of Acute Respiratory Distress Syndrome [ARDS].

Introduction

In the management of ARDS the use of 'Rescue therapies' including high frequency oscillatory ventilation [HFOV] and extracorporeal membrane oxygenation [ECMO] are generally reserved for patients refractory to conventional ventilation. In this series of four patients with H1N1 infection requiring HFOV, we investigate outcome at six months, on PFTs and radiological appearance on CT, with further follow up of PFTs at mean 19.25 months following discharge.

Six month follow up included physical examination, resting oxygen saturation measurement, quality of life assessment using Short Form 36(SF-36), PFTs and 64-slice CT scan. Evaluation at mean 19.25 months consisted of clinical assessment, resting oxygen saturation measurement and PFTs. PFTs were measured in accordance with international guidelines[1]. Similar methodology for grading CT thorax findings as severe acute respiratory syndrome (SARS) studies was used[2,3]. We classified the predominant CT pattern as: normal attenuation; consolidation; ground- glass opacification (hazy areas of increased attenuation without obscuration of the underlying vessels); [mixed pattern (combination of consolidation, ground glass opacities and reticular opacities in the presence of architectural distortion); ground glass attenuation with traction bronchiectasis; or honeycomb pattern. The extent of disease was quantified by dividing each lung into three zones: upper (above the carina), middle (below the carina but above the inferior pulmonary vein), and lower (below the inferior pulmonary vein). Each zone was assigned a score: 1 when <25% involvement, 2 when 25-50% involvement, 3 when 50-75% involvement, and 4 when >75% involvement. The total of all 6 zones was recorded, with a maximal possible score of 24. Assessment was in consensus by two radiologists, blinded to the patients' clinical information.

Case 1

A 36-year-old male smoker presented febrile, tachypnoeic and agitated in mild type 1 respiratory failure. Chest x-ray showed bilateral infiltrates. Sputum cultured streptococcus pneumoniae for which ceftriaxone was commenced. Following positive H1N1 screen oseltamavir was commenced. His condition however, deteriorated rapidly requiring full ventilator support. CT thorax performed on day nine of ICU admission demonstrated bilateral infiltrates with right lower lobe consolidation. Bronchoscopy demonstrated normal proximal airways with minimal secretions to sub-segmental level. Due to worsening respiratory status on day 10 HFOV was commenced. A right-sided pneumothorax developed on day 4 of HFOV requiring chest drain insertion. He gradually improved and after a 51 day ICU admission was transferred to a general respiratory ward for a period of intensive rehabilitation prior to discharge. At review six months later, CT thorax showed residual scarring in both lungs, particularly at the apices and left upper lobe anteriorly with interval resolution of small pneumatocoeles. Findings were predominantly consolidative, ground glass and reticular. CT score was 8/24 (Figure 1, Table 1). SF-36 demonstrated moderate limitation in physical and mental wellbeing (Table 2). PFTs demonstrated a mild decrease in DLCO, with improvement on follow-up testing (Table 1). Resting oxygen saturations were normal at both follow-up assessments.

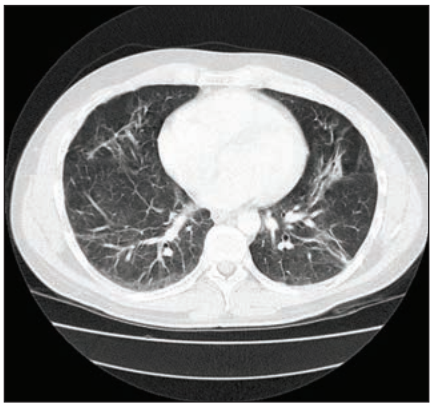

Figure 1
36 year old male patient: Ground glass opacity with consolidation and some airway thickening.

Case 2

A 56-year-old female non-smoker with breast carcinoma presented with a 2-day history of non-productive cough, breathlessness and fever. Three cycles off luorouracil, epirubicin and cyclophosphamide had been completed three months prior to presentation. The patient was pyrexial and in respiratory failure. Chest x-ray demonstrated bi-basal consolidation. H1N1polymerase chain reaction (PCR) was positive. Piperacillin/tazobactam, vancomycin and oseltamivir were commenced. Non-invasive ventilation was well tolerated initially but the patient deteriorated requiring intubation and HFOV. HFOV was continued for 22 days. She suffered severe critical illness neuromyopathy but following intensive physiotherapy was ultimately discharged home well. At six-month follow-up she had moderate impairment in DLCO with normal spirometry. Resting oxygen saturations were normal. CT thorax revealed post-inflammatory changes with a predominantly reticular pattern and CT score was 12/24. Her DLCO showed interval improvement at 19 months (Table 1). Unfortunately SF-36 data is not available.

Table 1 Summary of patient characteristics and follow-up findings

Patient	Sex	Age (years)	APACHE II score	LOS in ICU (days)	Total duration of ventilation (days)	Duration of HFOV (days)	HRCT pattern	HRCT score		FVC in litres (% predicted)	FEV1 in litres (% predicted)	DLCO (% predicted)
1	M	36	20	51	49	25	Mixed	8	At 6 month follow up	6.01L (114.5%)	4.8L (111.6%)	74%
									At 19 month follow up	6.09L (116.9%)	4.65L (108.6%)	83%
2	F	56	21	33	25	22	Reticular	12	At 6 month follow up	2.85L (103.4%)	2.29L (98.1%)	60%
									At 19 month follow up	2.99L (109.4%)	2.41L (104.2%)	69%
3	M	31	20	42	40	30	Ground-glass attenuation	10	At 6 month follow up	5.83L (112.1%)	4.87L (112.8%)	71%
									At 21 month follow up	5.83L (112.1%)	4.87L (112.8%)	87%
4	M	33	19	13	11	1	Mixed	18	At 6 month follow up	5.42L (101%)	4.5L (101.2%)	87%
									At 18 month follow up	5.73L (107.7%)	4.78L (108.9%)	106%

Case 3
A 31 year old non-smoking male was admitted to another hospital with abdominal pain requiring open appendicectomy. He developed post-operative respiratory failure and CXR revealed extensive bilateral consolidation. He was intubated but responded poorly to conventional ventilation and was transferred to our centre for HFOV. H1N1 PCR was positive. He received teicoplanin, metronidazole, fluconazole, oseltamivir and ciprofloxacin. On day 21 he developed bilateral pneumothoraces requiring chest drain insertion. HFOV was required for 30 days in total. The patient made a dramatic recovery and was discharged home 13 days later. CT thorax at 6 months showed predominantly ground-glass changes with CT score 10/24.Resting oxygen saturations were normal. SF-36 demonstrated moderate limitations in physical, social and emotional wellbeing (Table 2). Follow-up PFTs demonstrated mild impairment in DLCO which had improved at 21 months (Table 1).

Case 4
A 33-year-old male presented with flu-like illness and respiratory failure. He had well-controlled asthma requiring intermittent salbutamol treatment only. He was intubated and commenced on HFOV. Chest x-ray demonstrated bilateral consolidation with effusions. H1N1 PCR was positive. Clarithromycin, piperacillin/tazobactam, vancomycin and oseltamivir were commenced. Following ten days the patient was extubated to non-invasive ventilation. Due to on-going hypoxia a CTPA was performed, which demonstrated lower lobe pulmonary emboli for which he was anti-coagulated. Following rehabilitation at ward level the patient was discharged. At six months DLCO was 87% predicted, with spirometry within normal limits. Resting oxygen saturations were normal. CT demonstrated mild linear fibrotic changes bilaterally, most marked in the left upper lobe. CT score was 18/24. SF-36 data demonstrated poor functioning in role limitation and social functioning (Table 2). At 18-month follow up, interval improvement in PFTS was noted (Table 1).

Table 2: SF-36 scores at 6 month follow up

%	Patient 1	Patient 2	Patient 3	Patient 4
Physical functioning	70	N/A	95	90
Role limitations due to health	0	N/A	95	25
Pain	68	N/A	80	55
General health	55	N/A	55	45
Role limitations due to emotional problems	33	N/A	100	0
Energy/fatigue	55	N/A	80	65
Emotional well-being	48	N/A	92	48
Social functioning	88	N/A	88	25

Discussion

Recent publications describe characteristics and outcomes of patients with severe H1N1 infection treated in the ICU setting. Patients deemed high risk were aged less than 5 or greater than 65 years of age, pregnant, obese or had pre-existing medical conditions[4-7]. The use of therapy such as HFOV is generally reserved for ARDs patients who fail conventional treatment. In this study we present four cases of severe H1N1 infection requiring HFOV. Mean HFOV duration was 19 days with a mean ICU stay of 35 days. Two of four patients developed pneumothoraces with bilateral pneumothoraces in one case. Average age was 40 years, and ¾patients were male (Table 1). The respiratory and neuropsychological sequelae post-ARDs are well documented[8,9]. In our cohort, despite the necessity for HFOV spirometry was normal at 6months. DLCO was however low, with mean 73% predicted at 6 months and mean 86% predicted at median 19.25 months follow-up. In a previous study following ARDS survivors FEV1 and FVC normalised at 6 months while DLCO remained low[8]. More recently a five-year follow up of ARDS survivors has demonstrated similar, mild impairment in DLCO at 1, 2, 3, 4 and 5 years[9]. Our findings are consistent with these. A previous report documenting HRCT and BAL findings of 12 patients post- SARS reported persistent CT changes at 90 days[8]. In our cohort, persistent CT changes were noted in all patients, characterised as mixed pattern, which were predominantly reticular, and ground glass in nature. The Short Form 36 Questionnaire (SF-36) is a validated assessment tool utilised to monitor and compare disease burden[11]. It determines current quality of life as a percentage of that one-year ago. Herridge et al previously demonstrated poor functioning in the physical domains in ARDS survivors with improvements physical functioning, role and social functioning scores at 1 year follow up[8].

In conclusion, by 6 months, despite the necessity for prolonged ventilation, FVC and FEV1 were in the normal range but DLCO was reduced in all subjects. There was radiological evidence of mild, persistent pulmonary parenchymal abnormality characterised as predominantly ground glass and reticular in nature. Repeat PFTs at mean 19.25 months showed interval improvement in DLCO. To the best of our knowledge this is the first report of patient follow up which focuses specifically on those who required HFOV for treatment of ARDS due to H1N1 infection.

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References

1. Kumar A, Zarychanski R, Pinto R, Cook DJ, Marshall J, Lacroix J, Stelfox T, Bagshaw S, Choong K, Lamontagne F, Turgeon AF, Lapinsky S, Ahern SP, Smith O, Siddiqui F, Jouvet P, Khwaja K, McIntyre L, Menon K, Hutchinson J, Hornstein D, joffe A, Lauzier F, Singh J, Karachi T, Wiebe K, Olafson K, Ramsey C, Sharma S, Dodek P, Meade M, Fowler RA. Critically ill patients with 2009 influenza A (H1N1) infection in Canada. JAMA. 2009 Nov 4;302:1872-9.
2. Pellegrino R, Viegi G, Brusasco V, Crapo RO, Burgos F, Casaburi R, Coates A, van der Grinten CP, Gustafsson P, Hankinson J, Jensen R, Johnson DC, MacIntyre N, McKay R, Miller MR, Navajas D, Pedersen OF, Wanger J. Interpretative strategies for lung function tests. Eur Respir J. 2005 Nov;26:948-68.
3. Ooi GC, Khong PL, Muller NL, Yiu WC, Zhou LJ, Ho JC, Lam B, Nicolaou S, Tsang KW. Severe acute respiratory syndrome: temporal lung changes at thin-section CT in 30 patients. Radiology. 2004 Mar;230:836-44.
4. Wang CH, Liu CY, Wan YL, Chou CL, Huang KH, Lin HC, Lin SM, Lin TY, Chung KF, Kuo HP. Persistence of lung inflammation and lung cytokines with high-resolution CT abnormalities during recovery from SARS. Respir Res.2005; 6:42.
5. Bautista E, Chotpitayasunondh T, Gao Z, Harper SA, Shaw M, Uyeki TM, Zaki SR, Hayden FG, Hui DS, Ketter JD, Kumar A, Lin M, Shindo N, Penn C, Nicholson KG. Clinical aspects of pandemic 2009 influenza A (H1N1) virus infection. N Engl J Med. 2010 May 6;362:1708-19.
6. Dominguez-Cherit G, Lapinsky SE, Macias AE, Pinto R, Espinosa-Perez L, de la Torre A, Poblano-Morales M, Baltazar-Torres JA, Bautista E, Martinez MA Rivero E, Valdez R, Ruiz-Palacios G, Hernadez M, Stewart TE, Fowler RA. Critically Ill patients with2009 influenza A (H1N1) in Mexico. JAMA. 2009 Nov 4;302:1880-7.
7. Miller RR, 3rd, Markewitz BA, Rolfs RT, Brown SM, Dascomb KK, Grissom CK, Friedrichs MD, Mayer J, Hirshberg EL, Conklin J, Paine R 3rd, Dean NC. Clinical findings and demographic factors associated with ICU admission in Utah due to novel 2009 influenza A (H1N1) infection. Chest. 2010 Apr;137:752-8.
8. Herridge MS, Cheung AM, Tansey CM, Matte-Martyn A, Diaz-Granados N, Al-Saidi F, Cooper AB, Guest CB, Mazer CD, Mehta S, Stewart TE, Barr A, Cook D, Slutsky AS. One-year outcomes in survivors of the acute respiratory distress syndrome. N Engl J Med. 2003 20;348:683-93.

9. Herridge MS, Tansey CM, Matte A, Tomlinson G, Diaz-Granados N, Cooper A, Guest CB, Mazer CD, Mehta S, Stewart TE, Kudlow P, Cook D, Slutsky AS, Cheung AM. Functional disability 5 years after acute respiratory distress syndrome. N Engl J Med. 2011 Apr 7;364:1293-304.
10. Rubenfeld GD, Caldwell E, Peabody E, Weaver J, Martin DP, Neff M, Stern EJ, Hudson LD. Incidence and outcomes of acute lung injury. N Engl J Med. 2005 Oct 20;353:85-93.
11. Ware JE, Kosinski M, Bayliss M, McHorney WH, Raczek A. SF-36 physical and mental health summary scales: a user's manual. Boston: The Health Institute, New England Medical Centre; 1994.

Economics and Ethics of Paediatric Respiratory Extra Corporeal Life Support

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Abstract
Extra corporeal membrane oxygenation (ECMO) is a form of life support, which facilitates gas exchange outside the body via an oxygenator and a centrifugal pumping system. A paediatric cardiac ECMO programme was established in 2005 at Our Lady's Children's Hospital, Crumlin (OLCHC) and to date 75 patients have received ECMO, the majority being post operative cardiac patients. The outcome data compares favourably with international figures. ECMO has been most successful in the treatment of newborn infants with life threatening respiratory failure from conditions such as meconium aspiration, respiratory distress syndrome and respiratory infections. There is no formal paediatric respiratory ECMO programme at OLCHC, or anywhere else in Ireland. Currently, neonates requiring respiratory ECMO are transferred to centres in Sweden or the UK at an average cost of €133,000/infant, funded by the Health Service Executive E112 treatment abroad scheme. There is considerable morbidity associated with the transfer of critically ill infants, as well as significant psycho-social impact on families. OLCHC is not funded to provide respiratory ECMO, although the equipment and expertise required are similar to cardiac ECMO and are currently in place. The average cost of an ECMO run at OLCHC is €65,000. There is now a strong argument for a fully funded single national cardiac and respiratory paediatric ECMO centre, similar to that for adult patients.

Introduction

Extra corporeal membrane oxygenation (ECMO) is a form of extra corporeal life support (ECLS) that provides respiratory support by facilitating gas exchange outside the body via an oxygenator, as well as cardiovascular support via a centrifugal pumping system. Technological advancements in the last decade have seen ECMO become more sophisticated and widespread. An adult ECLS programme was established in the Mater Misericordiae University Hospital in 2009, and provides ECMO for adults with both cardiac and respiratory disease. A cohort of patients was treated with ECMO there during the H1N1 influenza pandemics[1]. Prior to this programme the majority of these patients would have either not survived or been transferred overseas for ECMO.

Our Lady's Children's Hospital cardiac ECMO programme

A paediatric ECMO programme was established in Ireland in 2005, for post-operative cardiac patients in Our Lady's Children's Hospital, Crumlin (OLCHC). As of 31st Decemeber 2011, 75 patients have received ECMO in OLCHC. The majority (63) was post-operative cardiac patients (mainly patients with complex congenital heart disease who could not be weaned from cardio-pulmonary bypass immediately post-operatively), five were cardiology patients and seven were respiratory patients. ECMO is provided in the eight bed cardiac intensive care unit; two nurses are required per patient on ECMO, meaning the overall unit capacity is reduced to seven beds when there is a patient on ECMO. There is no formal provision for paediatric patients requiring respiratory ECMO at OLCHC or anywhere else in Ireland.

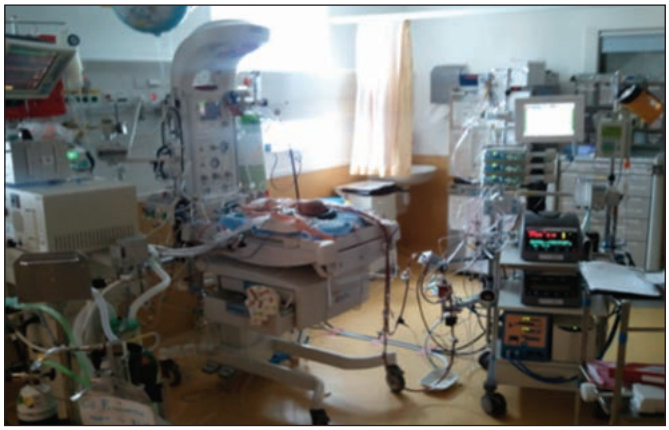

Figure 1 Respiratory ECMO at Our Lady's Childrens Hospital, Crumlin. April 2011

Paediatric respiratory ECMO

Although ECMO was first developed for use in adults, it has been most successful in the treatment of newborn infants with life-threatening pulmonary failure[2]. Robert Bartlett, a thoracic surgeon, first described its use in 1974 in a neonate with severe meconium aspiration syndrome in his paper Esperanza[3] (named after the baby). ECMO is beneficial in conditions such as meconium aspiration syndrome, primary pulmonary hypertension, congenital diaphragmatic hernia, respiratory distress syndrome and respiratory sepsis[4]. ECMO allows time for the lungs to recover, while maintaining adequate gas exchange. The UK Collaborative ECMO trial has shown it to be cost effective and reduce neurological morbidity and overall mortality[5]. The Extracorporeal Life Support Organization (ELSO) maintains a registry of cases in which ECMO was performed. Over 200 centres from around the world have contributed data. Currently, there are over 46,000 cases in the registry including over 29,500 newborns, 11,000 children, and 4,500 adults with respiratory and cardiac failure. The ELSO registry reports overall survival rates of 75% in neonatal respiratory failure[6].

The current situation in Ireland is that children requiring ECMO for respiratory support are referred to centres in Sweden or the UK. These centres provide a retrieval service and generally patients are placed on ECMO by the retrieving team prior to air transfer. The cost is borne directly by the HSE E112 treatment abroad

Table 1: Breakdown of patient type and survival to discharge rate for Our Lady's Children's Hospital, Crumlin (OLCHC) and ELSO (Extra Corporeal Life Support Organisation) comparative data

Survival Rates	OLCHC Survival Cardiology	ELSO Survival to Discharge for Cardiology Patients (July 2011)
Neonate	0 Patients	58%
Paediatric	5 patients, 100% survival to discharge from OLCHC	70%
	OLCHC Survival Post-Op Cardiac	**ELSO Survival to Discharge for Post-Op Cardiac Patients (July 2011)**
Neonate	27 patients, 65.2% survival to discharge from OLCHC	39%
Paediatric	31 patients, 60.7% survival to discharge from OLCHC	48%

scheme, rather than by the referring hospital. A recent study by EL-Khuffash of 11 neonates requiring respiratory ECMO reports a total cost of €1,197,000 and a median total cost of €133,000 per infant transferred[8]. The cost of air transfer is €25,000. The cost of ECMO provision at one centre (Karolinska, Sweden) is €9,000 /day. In the event that a respiratory ECMO bed is not available abroad an economic and ethical dilemma ensues. As outlined ECMO for cardiac support is available at OLCHC; the lack of financial or resource provision for respiratory ECMO means it is not officially provided, although the equipment and expertise required to provide it are almost identical to that of cardiac ECMO. It seems unethical not to offer such support when it is clinically indicated, given that the equipment and skilled personnel are already available. Inevitably however, this will have an impact on the hospital budget, and presumably will affect the provision of other services within the hospital. The ethical concepts of beneficence and justice would appear to be in direct conflict. There are a number of issues pertaining to the provision of respiratory ECMO for children in Ireland, which are highlighted by two recent cases.

Case 1
A male infant with a congenital diaphragmatic hernia (CDH) and refractory hypoxia was referred to Sweden and the UK for ECMO; an iatrogenic lung contusion during chest drain insertion had compounded the hypoxia. No ECMO bed was available overseas but the consensus from these centres was that ECMO was clinically indicated, particularly given the reversibility of the lung contusion. In view of this, and in spite of the lack of a formal programme, ECMO was commenced at OLCHC. The infant was weaned from ECMO five days later and underwent surgical repair of his CDH.

Case 2
A female infant with acute respiratory distress syndrome (ARDS) secondary to adenovirus infection was referred to Sweden for ECMO. Severe refractory hypoxia necessitated urgent institution of ECMO and stabilisation in OLCHC by the local cardiac surgeons. She was then transferred to Karolinska, Sweden by their retrieval team for ongoing ECMO support.

In case 1, the lack of an ECMO bed overseas meant that unless ECMO was provided at OLCHC, the infant would almost certainly die. In view of this, and following consultation with hospital management, ECMO was commenced. During the five days of ECMO support the cardiac ICU was reduced from a capacity of eight to seven beds. The cost of equipment and staffing was met from the hospital budget. In case 2 urgency necessitated that the infant be cannulated and placed on ECMO in OLCHC, whilst awaiting arrival of the transfer team. The baby was then transferred by air to Sweden for ongoing ECMO support, a support that could have been provided at OLCHC at a lower cost. There is significant morbidity associated with the transfer of critically ill neonates. For example, a UK study on neonatal transfer found that of 2402 transfers over a seven year period, 562 were associated with at least one critical incident and that eight of these were potentially catastrophic incidents[9]. The psychological, social and economic burden that overseas transfer places on parents, at an already stressful time, must also be considered.

Time for a single paediatric cardiac and respiratory ECMO centre?
This discussion is not intended to debate the merits or otherwise of paediatric respiratory ECMO; that is a separate issue. It is intended to highlight the current inequity whereby high quality ECMO is available to cardiac patients (although the programme is only partially HSE funded), yet children with respiratory disease, in whom clinicians believe ECMO is indicated, are referred overseas. There is now a strong argument for a fully funded single national cardiac and respiratory paediatric ECMO programme, similar to that provided for adult patients. There is a proven track record of cardiac ECMO at OLCHC; although overall numbers are small the outcome results are good, with a 65% survival to discharge rate in neonatal cardiac surgery ECMO patients (compared with a 39% ELSO average for cardiac neonates). Indeed the OLCHC programme has been recognised internationally with the ELSO Clinical Excellence Award in 2010 (one of only four European centres to achieve this award). We estimate the average cost of an ECMO run at OLCHC to be €65,000, which compares favourably with the figures from EL-Khuffash et al of €133,000 abroad. The advantage of having both cardiac and respiratory ECMO provided at one site would mean maintenance of a critical patient load and the associated expert personnel and equipment.

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References

1. Nicolay N, Callaghan MA, Domegan LM, Oza AN, Marsh BJ, Flanagan PC, Igoe DM, O'Donnell JM, O'Flanagan DM, O'Hora AP. Epidemiology, clinical characteristics and resource implications of pandemic (H1N1) 2009 in intensive care units in Ireland. Crit Care Resusc. 2010 Dec;12:255-61.
2. Philip J. Wolfson The development and use of extracorporeal membrane oxygenation in neonates. Ann Thorac Surg 2003;76:S2224-S2229.
3. Bartlett RH. Esperanza. Presidential address. Trans Am Soc Artif Intern Organs 1985;31:723-6.
4. McNally H, Bennett CC, Elbourne D, Field DJ. United Kingdom collaborative randomized trial of neonatal extracorporeal membrane oxygenation: follow-up to age 7 years. Pediatrics 2006; 117: e845-e854.
5. Petrou S, Bischof M, Bennett C, Elbourne D, Field D, McNally H. Cost-effectiveness of neonatal extracorporeal membrane oxygenation based on 7-year results from the United Kingdom Collaborative ECMO Trial. Pediatrics 2006; 117: 1640-1649.
6 Tiruvoipati R, Pandya H, Manktelow B, Smith J, Dodkins I, Elbourne D, Field D. Referral pattern of neonates with severe respiratory failure for extracorporeal membrane oxygenation. Arch Dis Child Fetal Neonatal Ed 2008 ; 93: F104-F107.
7. http://www.citizensinformation.ie/en/health/hospital_services/hospital_treatment_abroad.html.
8. A EL-Khuffash, E Kieran, K Palmer, E Molloy. Neonatal Respiratory Extracorporeal Membrane Oxygenation (ECMO) Referrals. Ir Med J. 2011 Mar;104:78-81.
9. SJ Moss, ND Embleton, AC Fenton. Towards safer neonatal transfer: the importance of critical incident review. Arch Dis Child. 2005; 90:729–732.

Can Lithium Unmask the Preclinical Parkinsonian Features?

Sir

Drug induced Parkinsonism(DIP) is diagnosed when symptoms of parkinsonism start during the use of the offending drug and in the absence of a history of symptoms of parkinsonism before initiation of the drug.[1] We describe a case of Parkinsonism that was clinically diagnosed as DIP but DAT scan pointed towards idiopathic Parkinson's disease(PD).

A sixty seven year old man presented with rest tremor in both hands for last 6 years with intensification in last 6 months. He is a known case of Bipolar Mood disorder treated with lithium. According to the patient the rest tremor began 2 months after starting lithium therapy for his bipolar mood disorders. The tremor started in his right hand and later the left hand was also involved, increasing in severity and interfering with activities of daily living in the last 6 months. On examination he had asymmetrical (left >right) rest and postural tremor in both of his hands, with rigidity and bradykinesia in both hands (left> right). There was no gaze restriction, autonomic dysfunction or focal neurological deficit. Serum electrolytes including copper studies were normal. Lithium level was in the therapeutic range. MRI scan of the brain was normal.

A diagnosis of DIP was made as his symptoms started shortly after initiation of lithium therapy. However we were reluctant to withdraw the lithium therapy as his mood disorder was well controlled. As it was clinically impossible to distinguish DIP from idiopathic Parkinson's disease a 123I-ioflupane scan (DAT) scan was performed within a week of his presentation to us (at the 6th year of his symptoms). The scan displayed relatively well demonstrated caudate nuclei bilaterally, apparently normal uptake of activity in the left putamen but reduction in uptake the right putamen/posterior striatum (Benamer et al Scale grade 1).[2] There was evidence of abnormal functioning of the dopamine transporters on presynaptic dopaminergic neurons (Figure 1). All those scan findings were suggestive of idiopathic PD rather than DIP. DAT uptake in the striatum is significantly decreased even in early stages of PD (pre-synaptic dopaminergic receptor deficit) as the motor symptoms of PD do not appear until 60-80% of dopaminergic neurons degenerate. Most drugs have no affinity for the pre-synaptic dopaminergic receptors. DAT scan may show symmetric uptake in the bilateral striatum in patients with pure DIP, even in cases of significant Parkinsonism. However the sensitivity and specificity of DAT in diagnosing DIP needs further evaluation.[1]

The clinical diagnosis of DIP requires remission of symptoms on withdrawal of the implicated drug. However, in some cases symptoms can persist, progress or reappear after initial

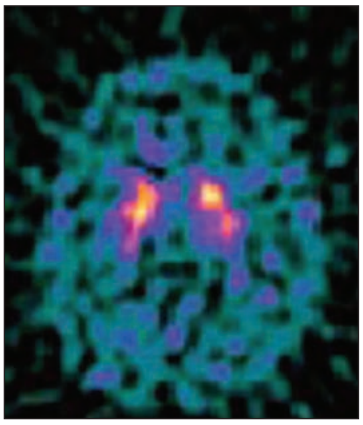

Figure 1
DAT scan showing abnormal functioning of the dopamine transporters on the presynaptic dopaminergic neurons

disappearance of Parkinsonism.[1] Interestingly, Lewy bodies (a pathological hallmark of idiopathic PD but not helpful in clinical diagnosis) have been demonstrated in autopsy of two DIP patients who recovered after stopping the offending drug.[3] Lithium, an infrequent cause of Parkinsonism was thought to act by depleting Dopamine stores at the Striatum or by increasing central cholinergic activity.[4] We surmise that Lithium (even within therapeutic range) might have unmasked the latent or preclinical stages of Parkinsonism in our patient.[1]

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References

1. Hae-Won Shin, Sun Ju Chung. Drug-Induced Parkinsonism. J Clin Neurol. 2012; 8: 15–21.
2. Hani T. S. Benamer, Jim Patterson, Donald G. Grosset , et al. Accurate differentiation of parkinsonism and essential tremor using visual assessment of [123I]-FP-CIT SPECT imaging: The [123I]-FP-CIT study group. Movement Disorders.2000;15: 503–510.
3. Rajput AH, Rozdilsky B, Hornykiewicz O, Shannak K, Lee T, Seeman P. Reversible drug-induced parkinsonism. Clinicopathologic study of two cases. Arch Neurol. 1982; 39:644–646.
4. Holroyd S, Smith D. Disabling parkinsonism due to lithium: a case report. J Geriatr Psychiatry Neurol. 1995;8:118–119.

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Antenatal Rubella Immunity in Ireland

V O'Dwyer, S Bonham, A Mulligan, C O'Connor, N Farah, MM Kennelly, MJ Turner. Ir Med J. 2013; 106: 232-5.

Question 1

The proportion of women attending for antenatal care who were Rubella non-immune were

a) 4.4%
b) 5.4%
c) 6.4%
d) 7.4%
e) 8.4%

Question 2

The proportion of primipara women who were Rubella non-immune were

a) 8%
b) 9%
c) 10%
d) 11%
e) 12%

Question 3

The proportion of women <25 years who were Rubella non-immune were

a) 10.7%
b) 11.7%
c) 12.7%
d) 13.7%
e) 14.7%

Question 4

Rubella status was known for

a) 30-40,000 women
b) 40-50,000 women
c) 50-60000 women
d) 60-70000 women
e) 70-80000 women

Question 5

Rubella has been a notifiable disease since

a) 1948
b) 1958
c) 1968
d) 1978
e) 1988

Venous Thromboembolism Prophylaxis in Acute Medical Admissions to a University Teaching Hospital

O Lyons, J Loh, M Lim, D O'Riordan, B Silke. Ir Med J. 2013; 106: 235-8.

Question 1

Pre-intervention the proportion of at risk patients who received thromboprophylaxis was

a) 29%
b) 39%
c) 49%
d) 59%
e) 69%

Question 2

Post- intervention the proportion of at risk patients who received thromboprophylaxis was

a) 27%
b) 37%
c) 47%
d) 57%
e) 67%

Question 3

The number of patients recruited for the first loop of the audit was

a) 223
b) 323
c) 423
d) 523
e) 623

Question 4

The number of patients recruited for the second loop of the audit was

a) 325
b) 425
c) 525
d) 625
e) 725

Question 5

The number of acute general medical patients admitted to St James hospital annually is

a) 3500
b) 4000
c) 4500
d) 5000
e) 5500

Delayed Diagnosis of Anorectal Malformation - A Persistent Problem

F Tareen1, D Coyle1,2, OM Aworanti2, J Gillick. Ir Med J. 2013; 106: 238-40.

Question 1

The total number of cases of delayed anorectal malformation diagnosis was

a) 27
b) 29
c) 31
d) 33
e) 33

Question 2

The rate of bowel perforation in infants with delayed diagnosis of anorectal malformation was

a) 7.3%
b) 8.3%
c) 9.3%
d) 10.3%
e) 11.3%

Question 3

Delayed diagnosis of anorectal malformation is one where the diagnosis has not been made by

a) 24 hours
b) 36 hours
c) 48 hours
d) 60 hours
e) 72 hours

Question 4

The total number of cases with a recorded diagnosis of anorectal malformation between 1999 and 2012 was

a) 96
b) 106
c) 116
d) 126
e) 136

Question 5

The male to female ratio in the series was

a) 1:1.3
b) 1:1.4
c) 1:1.5
d) 1:1.6
e) 1:1.7

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