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Ulster Med J 2015;**84(1):**1-2

Editorial

NIECR - a quiet revolution.

If someone was to ask you to consider important advances in medicine, perhaps like me, you would think of Fleming's discovery of penicillin in the 1940s or the introduction of the portable defibrillator by Pantridge and team in the 1960s. I wonder if you would include today's health gadgets like the *Fitbit*.[1]

Another, quieter gradual revolution is going on in Northern Ireland at the minute. [2][3]

When I started my Consultant career in 1995, it was quite commonplace for a query from a general practitioner to require access to the notes which might take about a month to arrive back with me from Medical Records (who knows what journey those notes went on).

My answer to the query would then be dictated on to a cassette tape which would then join a row of similar tapes in a little plastic rack until my secretary reached the correct one. If the GP, frustrated by the delay, rang to find out what was happening, my secretary had to listen to the entire tape from the beginning to find the right segment.

All of this seems faintly ludicrous some 20 years later, sitting in my home office, dictating into a desk microphone and watching these words appear a second later on my PC.

The 6 Trusts in Northern Ireland are responsible for the healthcare of 1,800,000 people. Care is becoming more complex and often patients will attend more than one hospital site during their treatment. Many patients require intricate medication schedules which are changed frequently by general practitioner or hospital doctor. The "analogue era" of the 1990s can no longer meet our needs.

The Northern Ireland Electronic Care Record project was initially mooted in 2005 as a solution to these problems. It was recognised that one Trust alone could not afford to develop the infrastructure required for a viable project. In 2008, site visits to innovative centres in the USA and Canada led to a regional ICT programme board approving a "proof of concept" trial involving case records in Belfast City Hospital, Ulster Hospital Dundonald and 2 large family practices. The project went "live" in January 2010.

The aim of NIECR was to provide a single portal for viewing multiple sources of clinical information via a single logon to a single system which would eventually replace the multiplicity of laboratory, imaging, clinical and pharmacy applications that one must switch between to have a meaningful clinical encounter.

Converting information held in isolated proprietary systems proved to be a major hurdle for NIECR but so far, more than 16 separate patient information systems have been incorporated into the dataset and there are plans to incorporate not only imaging reports but also the digital image files themselves.

Consent to release of data and auditing of access formed a central part of the project with administrators able to review audit trails, especially in the setting of a "break the glass" privacy override.

5000 patient records were reviewed in the "proof of concept" phase. 78% of accesses were with full patient consent and 20% were with privacy overrides. 120 patients opted out of the system through their family practice – none opted out from a clinical setting. 74% of doctors surveyed felt that the new system led to a more rapid and correct diagnosis and 33% reported occasions when the system drew attention to a possible adverse event such as prescribing medication with a history of allergy.

Following the successful evaluation phase, NIECR started rolling out across the province in 2012. The system works using a master patient index number based on a unique 10 digit "H&C" number – old hospital number prefixes like CAH, AH or RV are becoming relics of the past.

Since roll-out, the system has become widely adopted throughout the province and the statistics are quite staggering:

STATISTICS UP TO SEPTEMBER 2014 [4]

Patient Records accessed – 2.45 Million

Cumulative Lab Results Viewed – 8.75 million

eReferrals Viewed – 2600 per week

Medications Viewed – 17,500 per week

Oncology MDM Letters Viewed – 1800 per week

Radiology Reports Viewed – 800,000

Patient Centre Documents Opened – 4.86 million

ECR launches from Out of Hours Centres in first 2 weeks since implementation– 2,000

Print Requests – 257,000

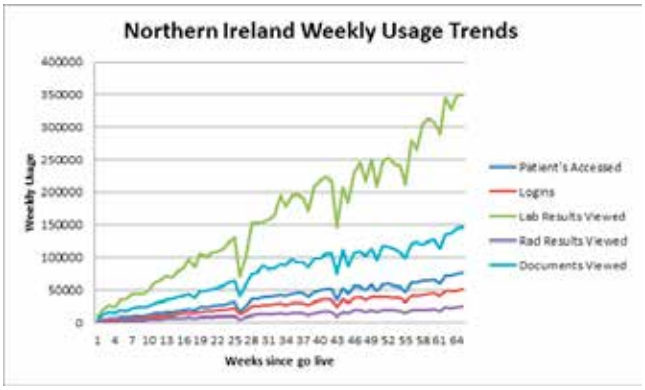

Fig 1. Weekly usage of the NIECR system.

Perhaps the most noteworthy advances are the trends towards electronic referrals to hospitals from GPs and the ability of Out of Hours and A&E departments to view full hospital records and medication lists (the latter are updated *twice daily*).

Increasingly, inter-hospital video-linked multi-disciplinary meeting discussions are being documented on the system.

Long term plans for NIECR include inbuilt care pathways and personal access [4] which just makes me wonder how long it will be until the device on my wrist uploads my daily heart rate, sweat biochemistry and step count to my GP – I might have some explaining to do at my next clinic appointment.

John Purvis
Honorary Editor

ACKNOWLEDGEMENTS

I am grateful to Professor Roy Harper for his assistance in preparing this editorial.

REFERENCES

1. The Fitbit philosophy. http://www.fitbit.com/uk/story Last accessed November 2014.
2. Harper R, OLoan D. NI Electronic Care Record (ECR). http://www.slideshare.net/healthcareisi/ni-electronic-care-record-des-oloan Last accessed October 2014.
3. Northern Ireland Electronic Care Record (NIECR). www.youtube.com/watch?v=GiILB54LgPE Last accessed November 2014.
4. Harper R. personal communication.

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We pass on our sincere thanks to all of our referees for 2014

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Review

The Thinking Doctor's Ward Round

Michael Trimble

Accepted 27 October 2014

Why the ward round? For folks of a certain age the very mention of ward rounds may conjure up the image of Sir Lancelot Spratt barking orders to an entourage of junior staff following in his wake. Whilst we no longer practice in such a hierarchical world, I fear we have neglected the importance of the ward round - and with it the importance of the clinical decision making process itself. If you ask a lay person what a surgeon does they will be able to answer: they operate. But what of physicians? When, as a medical registrar, I was involved in the Belfast City Hospital's Patient Access Project, the group looking at surgical through-put easily identified the theatre session as the focus of their work (Figure 1). For acute medicine the group took a little longer, but we recognised that, for physicians, the consultant ward round was where we needed to look (Figure 2). In fact, the ward round is as core to the business of inpatient medicine as the theatre session is to the practice of surgery. However they are seldom treated with similar respect. Let us for a moment compare the two.

First, let us think about the operating theatre list. Before the list can start it is recognised that certain core staff must be present: the patient, the surgeon, the anaesthetist, the theatre sister, the assistant surgeon, operating department orderlies. In addition there must be the patient - suitably prepared and consented, along with all relevant notes and results. All this is in the safe and controlled environment of the operating theatre. Once the operation starts the surgeon's concentration must not be interrupted. The importance of maintaining theatre safety is highlighted in the WHO safer surgery checklist[1].

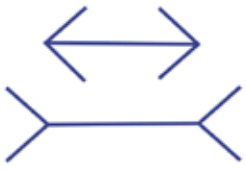
How about the medical post-take ward round? Again, for the round to be effective certain core staff should be present. Ideally, the consultant, the trainee from the night shift who has seen the patients, and the trainee who will be providing ongoing care that day, also a member of the nursing team caring for the patient, along with appropriate members of the allied health care professions. Of course there should be the patient, along with the case notes and all relevant results (Figure 3). This is the ideal but how often does that work out in practice? I am sure I am not alone in finding that the night team melt away under pressure of EWTD, the daytime F2 is bleeped off to the take-in, no nurse is available, notes have gone astray and we leave the familiar surrounding of our own ward to see the outliers in ENT only to find that the patient has gone for a CT scan.

I fear I must seem as if I am complaining about the inconvenience of it all. I am not. Let us reflect on what the ward round is. It is a series of clinical encounters with patients. For Edmund Pellegrino, the clinical encounter is the core of medical practice. It can be viewed as a series of three questions: What is the problem?, What are the possible solutions? and What is the best solution for this patient?[2] It is our difficulties with the first of these questions that I would like to explore further; the difficulties with diagnostic reasoning.

There is ample evidence that patients come to harm through medical practice. The seminal report *To Err is Human* estimated that 44000 - 98000 Americans die each year through medical error[3]. In the Harvard Medical Practice Study[4] diagnostic errors accounted for 17% of all adverse events. These are not small numbers of patients. Our newspaper headlines tell a similar story: "Father's heart attack missed at A&E...NHS compensation to miss diagnosed patients rises to £98 million...One in six NHS patients misdiagnosed." Behind each story and each statistic is an individual patient who has been let down by the system.

How can we improve our diagnostic reasoning? Let us begin by thinking about thinking itself. We are highly trained professionals, we like to think we can think but we can be caught out. Below are some mind games to try for yourself.

1. Which Line is Longer



2. How many Fs?

FINISHED FILES ARE THE RESULT OF
MANY YEARS OF SCIENTIFIC STUDY
COMBINED WITH THE EXPERIENCE OF
MANY YEARS.

Consultant Physician in Acute Medicine, Belfast Health & Social Care Trust
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Correspondence to Michael Trimble

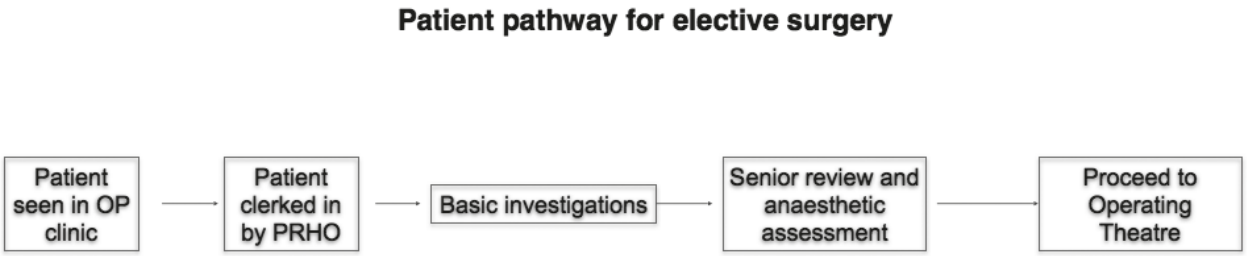

Fig 1.

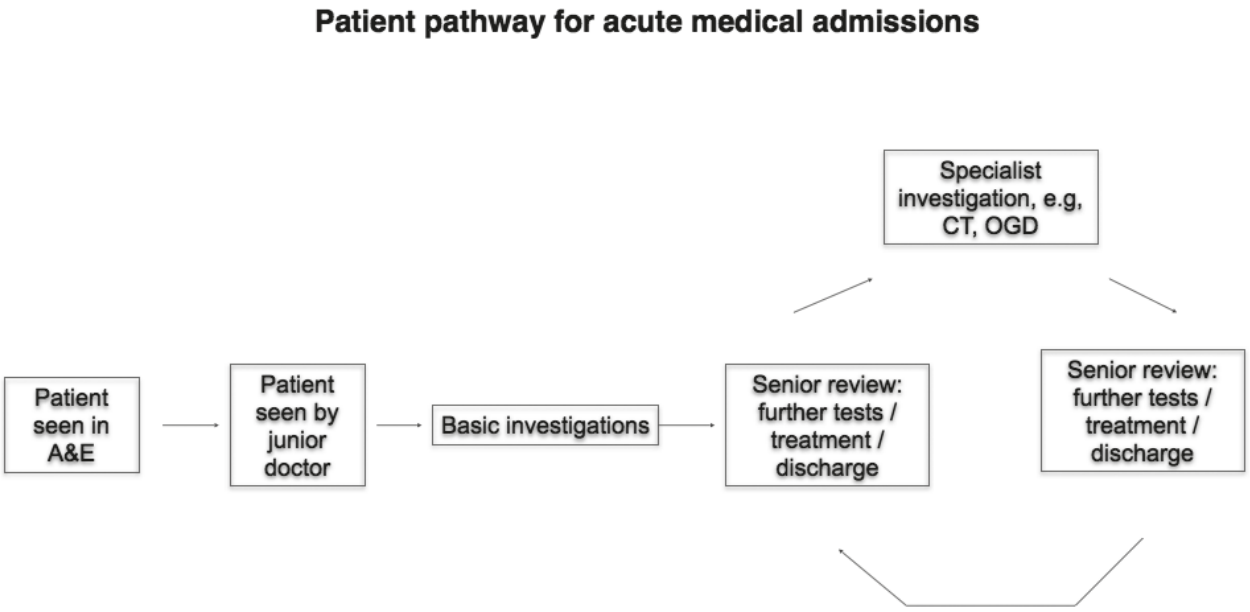

Fig 2.

3. A female student who is a shy poetry lover is likely to being studying

a) Chinese literature
b) MBA?

4. A bat and ball cost £1.10

The bat costs £1.00 more than the ball.
How much does the ball cost?

Based on Kahneman D. Thinking fast and slow. London: Penguin Books; 2011

I think most readers will have seen the parallel line test before and will have answered that they are the same length (Assuming, of course, I have not "cheated" and made them unequal!). When counting Fs, most will count three on their first go - there are in fact six. The shy, poetry loving student is far more likely to be studying for an MBA as, regardless of her own characteristics, MBA courses are much more common. The ball costs 5 pence.

HOW ABOUT A CLINICAL TEST?

In the case of a 55 year old lady presenting with shoulder pain and is found to have hypercalcaemia with an elevated ESR and CRP is the diagnosis more likely to be multiple myeloma or a malignancy with bony metastases **or** supraspinatus tendonitis with co-incidental primary hyperparathyroidism and an occult splenic abcess?

If you subscribe to Occam's Razor (*"Entia non sunt multiplicanda praeter necessitatem"* -Entities must not be multiplied beyond necessity)[5] you will have favoured the former, whereas the latter may prove Hickam's Dictam. ("Patients can have as many diseases as they damn well please".)[6]

We all use many different strategies in clinical decision making. Canadian Emergency Physician Pat Croskerry has done much work in this area and lists the following common approaches:

- Pattern Recognition
- Rule out-worst case scenarios (ROWS)
- The Casablanca strategy
- Heuristics / CDR (Cognitive disposition to respond)
- Hypothetico-deductive method[7]

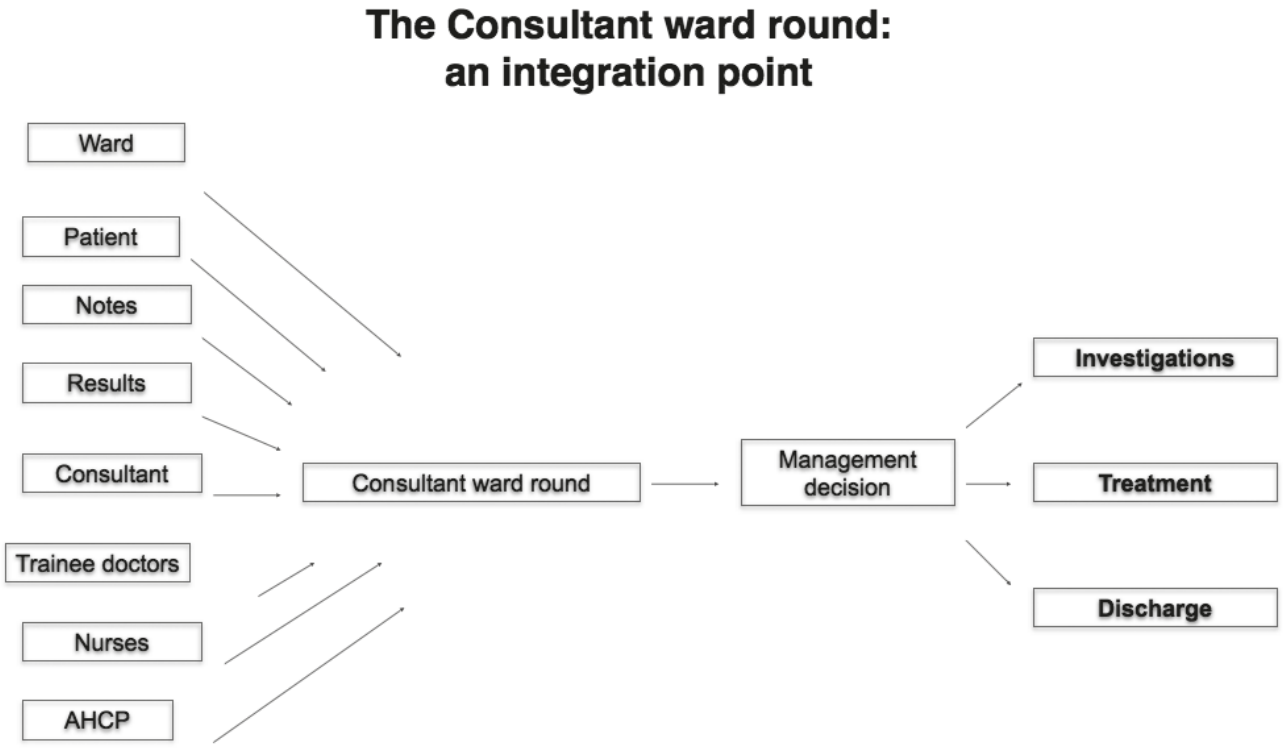

Fig 3.

Pattern recognition is easy - as you read the first lines of a history you start to look for patterns: headache with neck stiffness and photophobia- already the options are starting to line up. Add thunderclap onset (or fever) and our pattern is complete. But what of the cases where the pattern is incomplete - possibly because we have not observed all findings - or the pattern is unfamiliar. Pattern recognition depends also on practice - for an experienced clinician the complex case may seem to fit a pattern also. Here lies the peril of the expert: It is worth noting that in the counting Fs exercise above it is the accomplished reader who is likely to get caught out rather than the plodding, more cautious novice. We rely on patterns at our peril.

The Rule Out Worst Case Scenario is at least focused on risk management but can often fall short. The diagnosis of acute chest pain includes many serious differentials (myocardial infarction, pulmonary embolus, aortic dissection) and how far down our list of worst case scenarios we need to go will depend on the individual case. But we often need to be think beyond the immediate threat to reach a diagnosis. An extreme example is the discharge diagnosis of "troponin negative chest pain". All we (and the patient) know is that the criteria for an acute coronary syndrome have not been met. The cause of the symptoms are unexplained.

As you may have guessed, the Casablanca strategy is to "round up the usual suspects" [8]: The lazy use of a standard battery of tests for a given symptom without any application of analysis.

Heuristics are mental short cuts which can aid rapid decision making. However they are often accompanied with biases based on our CDRs (cognitive disposition to respond).

Some examples are listed in Table 1.

The hypothetico-deductive method is based on the scientific method and consists of the following steps: hypothesis generation, hypothesis evaluation, hypothesis refinement, and hypothesis verification. Error can occur at every stage.We can use the wrong information to generate a faulty hypothesis, we can fail to process information as we refine the hypothesis and we can seek to prove our own best guess rather than rigorously test our thinking.

In fact the thinking process used by doctors is not truly deduction. Rather it is better described as abduction[9]. Abduction involves the following steps:

- Hypothesis formation / invention
- The possible differential diagnoses are established from the observed data
- Testing against a knowledge base
- The supporting data is evaluated - this may involve testing of multiple hypotheses
- Reflection / explanation
- Does the whole story hang together as a logical coherent and sufficient explanation for the findings?

It is more akin to the work of the detective rather than the scientist. Remember that Sir Arthur Conan Doyle's creation

Table 1

Examples of cognitive biases, based on Croskerry [12]

Anchoring: lock into salient features too early
Availability: judge things more likely if they readily come to mind
Base rate neglect: ignore true prevalence of disease, inflating or neglecting its base rate. Or deliberately inflate likelihood in ROWs strategy.
Confirmation bias: looking for evidence to support initial diagnosis
Diagnosis momentum: once a label is attached, it becomes increasingly sticky
Framing effect: 95% survival versus 1 in 20 likelihood of dying
Fundamental attribution error: blaming patient for their diseases
Gambler's fallacy: influence of preceding events
Omission bias: sins of omission seem less bad, "first do no harm"
Order effects: in receiving information "beginning... middle... end"
Outcome bias: favours diagnoses with better outcome
Overconfidence bias: act on hunch, incomplete information, opinion instead of evidence
Posterior probability error: just because you have migraine, doesn't mean you can't have a sub-arachnoid bleed... cf Gambler's fallacy
Premature closure: accepting a diagnosis before it has been verified, "When the diagnosis is made, the thinking stops."
Representative restraint: representative heuristic leads to atypical patterns being missed
Search satisfying: calling of the search early may miss co-pathology
Sutton's Law: "Where the money is!" (After Willie Sutton, New York bank robber)
Sunk costs: time and energy - and ego
Triage: "geography is destiny" or "to a man with an endoscope everything looks like a GI bleed"
Unpacking principle: rather failure to unpack initial information
Vertical line failure: silo thinking instead of lateral thought

of Sherlock Holmes is based on Joseph Bell who taught him at Edinburgh Medical School - and in turn Sherlock Holmes is the inspiration for the fictional Dr Gregory House. House's thoughts written on his white board may have more similarity with the police incident room wall chart than our ward round notes.

Picking up a theme from Sherlock Holmes, reflection takes time. In the books Holmes speaks of his mental attic, in BBC's contemporary *Sherlock* he retreats to his "mind palace." Given that current RCP guidance suggests only 15 minutes per patient on our post take ward rounds, what are the implications for clinical reasoning?

Thinking Fast and Slow by Daniel Kahneman[10] has popularised the concept of the two systems approach to judgement and choice. System 1 is fast automatic, used frequently, emotional, stereotypic and operates subconsciously. System 2 is slow, effortful, used infrequently, logical, calculating and requires conscious thought. Strangely, the decision which system to use rests with System 1. Hence, when we are under pressure, we default to System 1 thinking. We have already mentioned use of heuristics as mental short cuts, and the attendant biases which may affect their usefulness, and it is upon these heuristics that System 1 depends. The dual system model is also applicable to medical decision making[11].

How can we improve our clinical reasoning? Firstly, we need to have insight into the problem, to be aware of how we think (so called meta-cognition). Then, as we make decisions, we need to reflect on the decision making process, to be aware of biases and rushed System 1 errors. We can aim to develop our own clinical reasoning from the unreflective to that of the accomplished thinker[12]. We can use cognitive forcing strategies, such as, structured review of data and diagnostic checklist. We can use resources to decrease dependence on memory. We can make ourselves accountable to the rest of the team for our thinking processes. Thinking "out loud" on our ward rounds will allow others to follow our train of thought - and permit challenge when our reasoning is flawed. Training by simulation is useful. We must also take account of the impact of our mood and our environment. Rushed decisions made by stressed or fatigued individuals are likely to be poor quality decisions.

This takes us back to the ward round, with its poor structure, often chaotic environment and frequent time pressures. I conclude with a question: would the surgical team operate in the circumstances in which we conduct ward rounds? Should we not be doing all we can to ensure that the decision making process is sound? It falls to us to try, along with our colleagues in nursing, to give the ward round the respect that is its due.

REFERENCES.

1. World Alliance for Patient SafetyWHO surgical safety checklist and implementation manual. Geneva: World Health Organisation; 2008. Available online from: http://www.who.int/patientsafety/safesurgery/ss_checklist/en/. [Last accessed December 2014].
2. Pellegrino ED, Thomasma DC. *A philosophical basis of medical practice.* Oxford: Oxford University Press;1981. p. 118.
3. Kolm LT, Corrigan JM, Donaldson MS, Committee on Quality of Health Care in Medicine. *To err is human: building a safer health system.* Washington: National Academic Press; 1992

4. Brennan TA, Leape LL, Laird N, Lawthers AG, Localio AR, Barnes BA, *et al.* The nature of adverse events in hospitalized patients. Results of the Harvard Medical Practice Study II. *N Engl J Med.* 1991;**324(6)**:377-84

5. Kaushik A. Occam's razor. William of Ockham, philosopher, c. 1285–1349. In: Avinash Kaushik's blog "Occam's Razor" 2006-2014. Available online from: http://www.kaushik.net/avinash/occams-razor-what/. [Last accessed December 2014].

6. Hilliard AA, Weinberger SE, Tierney LM Jr, Midthun DE, Saint S. Occam's razor versus Saint's triad. *N Engl J Med.* 2004; **350(6)**: 599-603.

7. Croskerry, P. Achieving quality in clinical decision making: cognitive strategies and detection of bias. *Acad Emerg Med*. 2002;**9(11)**:1184-204

8. Croskerry P. Commentary: lowly interns, more is merrier and the Casablanca Strategy. *Acad Med.* 2011; **86(1)**:8-10

9. Montgomery K, *How doctors think: clinical judgement and the practice of medicine.* New York: Oxford University Press; 2006. p.47

10. Kahneman D. *Thinking fast and slow.* London: Penguin Books; 2011

11. Croskerry, P. Clinical cognition and diagnostic error: application of the dual process model of reasoning. *Adv in Health Sci Educ.* 2009;**14(Suppl 1)**:27-35

12. Croskerry P, Nimmo GR. Better clinical decision making and reducing diagnostic error. *J R Coll Physicians Edinb.* 2011;**41(2)**:155-62

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Review

From Hippocrates to the Francis Report - Reflections on empathy

Jennifer M. Weir, Michael D. Aicken, Margaret E. Cupples, Keith Steele

Accepted 4th October 2014

INTRODUCTION

A year has now passed since the Francis Inquiry published its recommendations, after examining the causes of the failings in care at Mid Staffordshire NHS Foundation Trust[1]. A key message concerned the need to nurture a "common culture of caring, commitment and compassion". This is not a new concept – in the fifth century BC, Hippocrates wrote to the effect that where there is love of humanity, there is also love for the art of medicine[2]. So across the millennia, despite the increasing, and undoubtedly often life-saving, scientific and technological advances which would have been utterly inconceivable to Hippocrates, the basic message remains constant – the importance of empathy within the human interaction between a doctor and a patient.

THE IMPORTANCE OF EMPATHY

Empathy has long been considered to be a fundamental requirement within a patient-doctor relationship. High empathy levels within a consultation have been shown to reduce levels of patient dissatisfaction and consequently also reduce the likelihood of litigation against the doctor[3]. It has been shown that heightened empathy leads to more effective history taking, better physical examination skills[4] and increased scores in clinical competence[5]. Empathy also promotes adherence to treatment plans and improved efficiency of consultation time[6]. High empathy levels in practitioners have even been associated with a reduced severity and duration of the common cold[7], reduction in inflammatory markers[7] and improved control of blood sugar and cholesterol levels in diabetics[8]. It seems logical to assume that patients are more likely to follow a doctor's advice and adhere to treatment if a trusting relationship has been established.

As well as empathy benefiting the patient it also enriches the doctor's day-to-day experience. Several physician job-satisfaction surveys have shown that doctors value very highly their opportunity to empathize with their patients[9]. It can be argued therefore that the ability to show empathy sincerely is an essential skill for increasing not only the quality of a patient's general health but also the longevity of the physician's mental health.

Conversely, the antonym of empathy is arguably narcissism. In Greek mythology Narcissus was the son of a god, renowned for his beauty and condemned to fall in love with his own reflection. Vigilante defines narcissism as interpreting challenges as rejections, overvaluing one's own performance, inflexibility, preoccupation with oneself, attention seeking, being unwilling to learn and blaming one's own failure on others[10]. This trait was considered to closely match descriptions of students whom medical staff had identified as having concerning or "problematic" behaviour[11].

So given all of the above, it seems clear that the "ideal" doctor should exhibit high levels of empathy towards their patients and low levels of narcissistic behaviour.

Fig 1. "Mountain Landscape with Narcissus" by Jacob Pynas (after 1650). Reproduced with permission of the National Gallery, London.

MEDICAL SCHOOL SELECTION

The General Medical Council's (GMC) publication "Tomorrow's doctors"[12] states that the process of selection of medical students must take account of personal attributes as well as academic achievements and the *capacity* to achieve the outcomes required as outlined in Good Medical Practice[13].

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In other words the ideal doctor will be proficient in both scientific and humanistic aspects of medical practice. Future doctors undoubtedly need to have strong academic ability; this must be married with other competencies – so-called non-cognitive skills including communication, problem solving, empathy and ethical reasoning.

Fig 2. "The Doctor" by Luke Fildes (1891). Reproduced with permission of the Tate Gallery, London.

A driving force behind the development of alternative methods for selecting medical students is that the increasingly high academic achievements of medical school applicants make it difficult to discriminate between candidates on the basis of measurements of cognitive skills alone. Until recently, previous academic achievement, such as school leaving examinations (A-levels in the UK), was considered the best predictor of success in University[14,15]. In 2006 the UK Clinical Aptitude Test (UKCAT)[16] was introduced in the UK in an attempt to level out the playing field for those whose school achievement might not have reached its potential due to inadequacies within the school system or other factors outside of their control. By testing potential rather than achievement the UKCAT attempts to remove the 'class' advantage possessed by those fortunate enough to have received their education in a higher-ranking school. However, neither achievement nor aptitude tests assess non-cognitive skills. It has also been demonstrated in several studies that performance in the UKCAT is only weakly correlated with future performance at medical school[17,18]. To assess non-cognitive skills additional methods are clearly required.

ASSESSMENT OF NON-COGNITIVE SKILLS

Evidence consistently suggests that the panel interview, traditionally used to assess an applicant's interpersonal skills, lacks reliability and validity[19]. Multiple Mini Interviews (MMIs), which were first developed at McMaster University in Canada[20], have been shown to be significantly more reliable and acceptable compared to interview panels. MMIs afford the possibility of integrating a test for empathy with any combination of other non-cognitive skills.

MMIs are based on the Objective Structured Clinical Examinations (OSCEs) which are widely accepted as a tool for undergraduate assessment. While their content differs from OSCEs some fundamentals are similar. OSCEs and MMIs consist of a series of short "stations" in each of which an applicant faces a different task and a different assessor. Sometimes the candidate will be expected to interact with a role-player whilst being observed by the assessor; on other occasions they will answer questions or discuss topics with an assessor one-to-one. Multiple Mini Interviews involve assessment by several different assessors in short interviews, each aimed at assessing a particular non-cognitive skill or combination of these. A principle used in the development of MMI stations is that questions should not require any medical knowledge and should not have a single correct answer so that the examiner could potentially make a counter argument for whichever stance the candidate takes.

The MMI process at QUB comprises 9 stations lasting 5 minutes each. Eva[20] showed that increasing the number of assessors per station (much like in a panel interview) did not improve the reliability but increasing the number of stations with an independent different assessor each time did, with an apparent plateau after 9 stations. The overarching reason for the MMI format is to take advantage of the 'wisdom of crowds'[21], a theory which states that in most circumstances, by taking the average opinion of a large number of independent individuals we can obtain an answer or prediction which is better than the opinions of a few ("under the right circumstances, groups are remarkably intelligent, and are often smarter than the smartest people in them").

Queens University Belfast (QUB) is one of several UK medical schools to have developed Multiple Mini Interviews (MMIs) as a means of testing these attributes and the top scoring circa 75% of applicants who fulfil the necessary criteria (score based on academic results: GCSE, A-level, primary degree) and UKCAT score) are now invited to MMI[22]. MMIs are then used to differentiate between candidates of high academic prowess in an effort to select candidates who not only have the necessary cognitive abilities but who also excel in non-cognitive ability. Empathy is one of the skills tested; the MMIs at Queen's University Belfast also purport to test problem solving, ethical reasoning and communication skills, whilst other Universities test for a slight variation of these attributes. Lievens and Conway[23] have already shown that in an assessment scenario it is difficult to discriminate reliably between different skills across interview stations or exercises. Instead, what should be expected is that candidates will perform well or otherwise within an exercise as a whole.

Our own ongoing research at QUB[24] and at Dundee University has reflected this Although this means that MMIs cannot in their current format be used to examine specifically for empathy they do afford the ability to test candidates for a complex combination of non-cognitive attributes "all-at-once" much like a real-life work environment. What is more, following on from Eva's work showing the predictive validity of MMIs in McMaster University Canada[25], work in Dundee medical school shows that MMIs can predict performance

in 1st and 2nd year medical school examinations better than either UKCAT or A-levels[26]. A similar study is currently underway at QUB.

A concern that applicants who have received pre-interview coaching will be at an unfair advantage has been quashed by the findings of a study in West Sydney[27], in which half of the applicants received coaching prior to the MMIs. The performance of the coached group was actually significantly lower than that of the non-coached group. Another frequently raised concern regards the security of examination information. Prior knowledge or even prior experience of sitting the exact same station does not however confer an advantage in MMIs[28].

DOES EMPATHY DECLINE DURING MEDICAL SCHOOL?

"*Students undergo a conversion in the third year of medical school - not pre-clinical to clinical, but pre-cynical to cynical*."

(Quote attributed to Professor Abraham Verghese, Professor for the Theory and Practice of Medicine at Stanford University Medical School and author of the best-selling novel "Cutting for Stone": http://www.whoquotes.com/abraham-verghese-quotes/)

A considerable amount of effort and resources are expended on the search for the individuals with not only the highest academic, scientific potential but those who show the most potential for compassion and perhaps "idealism". Unfortunately a search of the literature reveals some rather alarming findings. Could it be that students who start out as empathetic individuals then lose their ability to connect emotionally with their patients as they progress through their medical student career?

A number of studies report a decline in empathy as students progress through medical school. These studies all use the Jefferson Scale of Physician Empathy (JSPE) which includes 20 items each answered on a 7-point Likert-type scale (Strongly agree=7, Strongly Disagree=1) in order to assess empathy and other related attributes such as enthusiasm, idealism and humanitarianism[29]. Chen et al's study at Boston Medical School found that empathy scores decreased significantly in the third year (students' first exposure to clinical medicine)[30]. Hojat et al also demonstrated a significant decline in empathy scores from the first to the third year with student follow-up showing that these scores remained low until graduation[31,32].

On the other hand studies from Japan[33] and South Korea[34,35] again using the JSPE found the opposite – that empathy increased during training. Hong[35] acknowledges that cultural differences have an effect and that initial scores were lower in the Korean study. It is suggested that ideally global studies should be carried out.

Colliver et al[36] reviewed 11 studies and overall found only a weak decline in empathy during medical school was shown and questioned the validity of the JSPE score which relies on self-reporting and pointed out that studies have low and varying response rates. It is not clear if measurements reflect patients' perspectives or the effectiveness of the care being delivered.

Although the above findings demonstrate that a consensus has not been reached in the literature, it would seem that it is not acceptable to take the development of empathy during medical studies for granted.

CAN EMPATHY BE TAUGHT?

Different strategies for teaching and enhancing empathy have been examined[37]. Some interesting ideas include shadowing patients, pseudo-hospitalization, studying literature and the arts and role playing, as well as the tried-and-tested Balint method[38].

Shapiro et al found that medical students who undertook an 8-hour course involving the reading and discussing of poetry and short stories scored significantly higher empathy scores after the course[39]. DasGupta and Charron present an exercise for teaching empathy which involves a group discussion of a real-life scenario from different view-points and re-writing it in different styles[40]. Some universities eg Weill Cornell have an optional programme - Humanities and Medicine - which aims to increase students' understanding of the patient experience through literature, art and music.

A recent study[41] described 2 groups of students; one group watched 22 brief video clips of patient encounters from three mainstream movies with empathetic themes and the control group watched a medical history documentary film. The JSPE was administered before and after viewing. Ten weeks later half of the experimental group participated in a presentation on the importance of empathy in patient care, the other half plus the control group watched a further medical documentary. A significant increase in the JSPE was seen in the experimental group. The subgroup which was exposed to the reinforcement lecture showed a sustained increase in score, in the other subgroup the increase dissipated. There was no change in the control group at any point.

There is a weight of evidence therefore that empathy is something which can be learned and reinforced by targeted empathy programmes, some of which are simply constructed, as in the above example and which could be theoretically incorporated into the medical school curriculum without excessive consumption of time or resources.

What do students themselves think? An interesting qualitative paper from Nottingham University involved interviewing students from the fourth and fifth years[42]. Opinions were varied but the predominant theme which emerged was that students felt that empathy is an innate characteristic which can be taught and enhanced.

Is the choice of future medical career influenced by levels of empathy? Several studies[43,44] have looked at this and demonstrated that students interested in "people-oriented"

specialties demonstrate higher levels of empathy than those who prefer more technology-oriented specialties.

In conclusion, the message which would appear to recur in the literature time and time again is that empathy is a fundamental component of the doctor-patient relationship. Not only should universities be assessing the innate capacity for empathy and related traits in applicants to medical school, but the development of empathetic skills in future doctors should be continued during their formative years at medical school. Further research is needed on how best to incorporate human values into medical school selection and the curriculum in order to bring about reform in medical education, with the ultimate aim being the formation of technically proficient young doctors who will also empathize with their patients and serve their interests with integrity and respect.

REFERENCES

1. Francis R. Report of the Mid Staffordshire NHS Foundation Trust Public Inquiry. London: HMSO. 2013. Available online from: http://www.midstaffspublicinquiry.com/report. [Last accessed December 2014].
2. Jones WH. Introduction to the oath. In: Jones WHS, translator. *Hippocrates*. Volume **I**. Cambridge, MA: Harvard University Press,1923: 296.
3. Levinson W. Physician-patient communication. A key to malpractice prevention. *JAMA*. 1994;**272(20)**:1619-20.
4. Collier J, Willis MS, Robbs RS, Cohen DS, Schwartz MH. Assessment of empathy in a standardized-patient examination. *Teach Learn Med.* 1998;**10(1)**:8-11.
5. Hojat M, Gonnella JS, Mangione S, Nasca TJ, Veloski JJ, Erdmann JB, et al. Empathy in medical students as related to academic performance, clinical competence and gender. *Med Educ.* 2002;**36(6)**:522-7.
6. Nightingale SD, Yarnold PR, Greenberg MS. Sympathy, empathy, and physician resource utilization. *J Gen Intern Med.* 1991;**6**:420-3.
7. Rakel D, Barrett B, Zhang Z, Hoeft T, Chewning B, Marchand L, *et al.* Perception of empathy in the therapeutic encounter: effects on the common cold. *Patient Educ Couns.* 2011;**85(3)**:390-7.
8. Hojat M, Louis DZ, Markham FW, Wender R, Rabinowitz C, Gonnella JS. Physicians' empathy and clinical outcomes for diabetic patients. *Acad Med.* 2011;**86(3)**:359-64.
9. Konrad TR, Williams ES, Linzer M, McMurray J, Pathman DE, Gerrity M, *et al*. Measuring physician job satisfaction in a changing workplace and a challenging environment. *Med Care.* 1999;**37(11)**:1174-82.
10. Vigilante FW. Students' narcissism and academic performance. *Soc Casework.* 1983;**64(10)**:602-8.
11. Munro D, Bore M, Powis P. Personality factors in professional ethical behaviour: studies of empathy and narcissism. *Aus J Psychol.* 2005;**57(1)**:49-60.
12. Tomorrow's doctors:outcomes and standards for undergraduate medical education. Manchester: General Medical Council; 2009. Available online from: http://www.gmc-uk.org/Tomorrow_s_Doctors_0414.pdf_48905759.pdf. [Last accessed December 2014].
13. Good Medical Practice. Manchester: General Medical Council; 2013. Available online from: http://www.gmc-uk.org/guidance/good_medical_practice.asp. [Last accessed December 2014].
14. James D, Chilvers C. Academic and non-academic predictors of success on the Nottingham undergraduate medical course 1970-1995. *Med Educ.* 2001;**35(11)**:1056-64.
15. 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(7516)**:555-9.
16. UK Clinical aptitude test. (UKCAT). What is UKCAT? Nottingham: University of Nottingham, Queen's Medical Centre; 2014. Available online from:http://www.ukcat.ac.uk/. [Last accessed December 2014].
17. Lynch B, Mackenzie R, Dowell J, Cleland J, Prescott G. Does the UKCAT predict Year 1 performance in medical school? *Med Educ.* 2009;**43(12)**:1203-9.
18. Yates J, James D. The UK Clinical Aptitude Test and clinical course performance at Nottingham: a prospective cohort study. *BMC Med Educ.* 2013;**13**:32-6920-13-32.
19. Kreiter CD, Yin P, Solow C, Brennan RL. Investigating the reliability of the medical school admissions interview. *Adv Health Sci Educ Theory Pract.* 2004;**9(2)**:147-59.
20. Eva KW, Rosenfeld J, Reiter HI, Norman GR. An admissions OSCE: the multiple mini-interview. *Med Educ.* 2004;**38(3)**:314-26.
21. Surowiecki J. The wisdom of crowds: why the many are smarter than the few and how collective wisdom shapes business, economies, societies and nations. New York: Anchor; 2005.
22. Steele K. New selection procedures for entry to Medicine at QUB. Report on the 2012 Admissions process. *Ulster Med J.* 2013;**82(3)**:157-9.
23. Lievens F, Conway JM. Dimension and exercise variance in assessment center scores: a large-scale evaluation of multitrait-multimethod studies. *J Appl Psychol.* 2001;**86(6)**:1202-22.
24. Aicken M. Developing an evidence-based multiple mini interview process to assess non-cognitive skills in medical school admissions to Quenn's University, Belfast. 2013.
25. Rosenfeld JM, Reiter HI, Trinh K, Eva KW. A cost efficiency comparison between the multiple mini-interview and traditional admissions interviews. *Adv Health Sci Educ Theory Pract*. 2008;**13(1)**:43-58.
26. Husbands A, Dowell J. Predictive validity of the Dundee multiple mini-interview. *Med Educ*. 2013;**47(7)**:717-25.
27. Griffin B, Harding DW, Wilson IG, Yeomans ND. Does practice make perfect? The effect of coaching and retesting on selection tests used for admission to an Australian medical school. *Med J Aust*. 2008;**189(5)**:270-3.
28. Reiter HI, Salvatori P, Rosenfeld J, Trinh K, Eva KW. The effect of defined violations of test security on admissions outcomes using multiple mini-interviews. *Med Educ.* 2006;**40(1)**:36-42.
29. Hojat M. Empathy in patient care:antecedents, development, measurement and outcomes. : Springer; 2006.
30. Chen D, Lew R, Hershman W, Orlander J. A cross-sectional measurement of medical student empathy. *J Gen Int Med.* 2007;**22(10)**:1434-8.
31. Hojat M, Mangione S, Nasca TJ, Rattner S, Erdmann JB, Gonnella JS, et al. An empirical study of decline in empathy in medical school. *Med Educ.* 2004;**38(9)**:934-41.
32. Hojat M, Vergare MJ, Maxwell K, Brainard G, Herrine SK, Isenberg GA, et al. The devil is in the third year: a longitudinal study of erosion of empathy in medical school. *Acad Med.* 2009;**84(9)**:1182-91.
33. Kataoka HU, Koide N, Ochi K, Hojat M, Gonnella JS. Measurement of empathy among Japanese medical students: psychometrics and score differences by gender and level of medical education. *Acad Med.* 2009;**84(9)**:1192-97.
34. Lee B, Bahn G, Lee W, Park J, Yoon T, Baek S. The relationship between empathy and medical education system, grades and personality in medical college students and medical school students. *Korean J Med Educ.* 2009;**21(2)**:117-29.
35. Hong M, Lee WH, Park JH, Yoon TY, Moon DS, Lee SM, et al. Changes of empathy in medical college and medical school students: 1-year follow up study. *BMC Med Educ*. 2012;**12**:122.

36. Colliver JA, Conlee MJ, Verhulst SJ, Dorsey JK. Reports of the decline of empathy during medical education are greatly exaggerated: a reexamination of the research. *Acad Med.* 2010;**85(4)**:588-93.

37. Hojat M. Ten approaches for enhancing empathy in health and human services cultures. *J Health Hum Serv Adm.* 2009;**31(4)**:412-50.

38. Balint M. The doctor, his patient and illness. New York: International Universities Press; 1957.

39. Shapiro J, Kasman D, Shafer A. Words and wards: a model of reflective writing and its uses in medical education. *J Med Humanit.* 2006;**27(4)**:231-44.

40. DasGupta S, Charon R. Personal illness narratives: using reflective writing to teach empathy. *Acad Med.* 2004;**79(4)**:351-6.

41. Hojat M, Axelrod D, Spandorfer J, Mangione S. Enhancing and sustaining empathy in medical students. *Med Teach.* 2013;**35(12)**:996-1001.

42. Tavakol S, Dennick R, Tavakol M. Medical students' understanding of empathy: a phenomenological study. *Med Educ.* 2012;**46(3)**:306-16.

43. Newton BW, Savidge MA, Barber L, Cleveland E, Clardy J, Beeman G, *et al*. Differences in medical students' empathy. *Acad Med. 2*000;**75(12)**:1215.

44. Newton BW, Barber L, Clardy J, Cleveland E, O'Sullivan P. Is there hardening of the heart during medical school? *Acad Med.* 2008 Mar;**83(3)**:244-9.

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Review

Non-Pharmacological Management of Chronic Obstructive Pulmonary Disease

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INTRODUCTION:

Chronic Obstructive Pulmonary Disease (COPD) is the most common lung disease in the world[1]. It accounts for the highest rate of hospital admissions among major chronic illnesses in Canada and[1] is currently the fourth leading cause of death in the world[2]. By 2020, it is expected to be the third leading cause of death in the world[3]. Given its overwhelming prevalence in society, it carries with it a significant economic, social and personal burden. The key to decreasing the burden of COPD is modification of environmental exposures, including domestic, industrial, vehicular and personal tobacco exposure. Risk factor modification, including smoking cessation may be more powerful than aggressive testing strategies. Currently, the focus of treatment is appropriate bronchodilator therapy; however, non-pharmacological management must not be forgotten. Much like bronchodilator therapy, non-pharmacological therapy provides symptomatic improvement and better quality of life. In fact, some of the non-pharmacologic strategies, such as smoking cessation and long term oxygen, can prolong life expectancy, a feat that pharmacological therapies have yet to achieve.

COPD is characterized by incompletely reversible airflow limitation[4] and is often associated with a smoking history and increasing age. Because of its insidious onset and the non-specific nature of its symptoms (cough, slow and progressive dyspnea), the effects of COPD are not often noticed until years after the disease has begun. This often leads to the diagnosis of COPD in the advanced stages, limiting interventions and treatment options[5].

It has been shown by Tantucci et al that the most rapid decline in lung function occurs early in the disease course, particularly GOLD Stages II and III[6]. Thus, early diagnosis and intervention is essential to try and prevent rapid decline in FEV1. Aggressive testing strategies, smoking cessation efforts, and initiation of treatments may be beneficial during these early stages[7-10]. Because patients do not often perceive symptoms of early or worsening disease, or they attribute them to deconditioning and increasing age, primary care providers need to screen those at risk for COPD and be sure to ask patients about their symptoms at routine visits[11].

Smoking is the leading risk factor for the development of COPD[5] and is a key component on history that should trigger further questioning to elucidate symptoms suggestive of this disease. The GOLD Strategy suggests that COPD should be suspected in anyone over the age of forty, who has dyspnea, chronic cough or sputum production with appropriate risk factors. Risk factors include a family history of COPD, tobacco exposure, exposure to cooking or home heating fuels or occupational dusts/chemicals[2] (Table 1).

TABLE 1:

Key indicators that increase the pre-test probability of COPD

Indicators:	Description:
Dyspnea	• Progressive • Worse with exercise • Persistent
Chronic Cough	• May be intermittent and may be non-productive
Chronic Sputum	• Any pattern of sputum production
Exposures	• Tobacco smoke • Exposure to home cooking or home heating fuels • Occupational dusts/chemicals

Once a patient has been identified as having symptoms and risk factors suggestive of COPD, formal diagnosis is of the utmost importance. The gold standard for the diagnosis of COPD is based on spirometry. Given that COPD is characterized by airflow limitation that is not fully reversible, spirometry will demonstrate a post-bronchodilator FEV1/FVC of <0.7. The severity of COPD is largely based on FEV1 and differs according to different guidelines (GOLD vs ATS) (Table 2) However, given the heterogeneity of symptoms for

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a given FEV1, GOLD has developed groups A, B, C, D which help categorize severity based on multiple factors, including FEV1, number of exacerbations and level of symptoms based on MRC dyspnea scale or CAT score[2].

Table 2:

Spirometric Classification of COPD

	GOLD	ATS
Mild	FEV1 ≥ 80%	FEV1 ≥ 70%
Moderate	FEV1 50% - 79%	FEV1 60-69%
Moderately Severe	-	FEV1 50-59%
Severe	FEV1 30-49%	FEV1 35-49%
Very Severe	FEV1 <30%	FEV1 <35%

Once COPD has been diagnosed, the focus must switch to decreasing the rate of decline in lung function including modification of risk factors and management of symptoms. These goals are achieved by both pharmacological and non-pharmacological therapy. The mainstay of pharmacological therapy is bronchodilators, while non-pharmacological methods include smoking cessation, pulmonary rehabilitation, immunizations and long term oxygen among others. While physicians are good at initiation of bronchodilator therapy, non-pharmacologic management is often forgotten despite these modalities providing symptomatic improvement and mortality benefits. This article will focus on non-pharmacological interventions and their beneficial impact on those with COPD.

SMOKING CESSATION

Smoking is known to be the largest risk factor to contribute to the development of COPD in susceptible hosts. Therefore, smoking cessation is of the utmost importance in halting the progression of lung function decline and should be implemented as soon as a diagnosis is made, particularly when COPD is diagnosed in the early stages. This is one of the few interventions that have been shown to have a mortality benefit. The Lung Health Study demonstrated that participants with mild to moderate COPD who stopped smoking experienced an improvement in FEV1 in the year after quitting and had a subsequent rate of decline in FEV1 that was half the rate of decline among continued smokers. This was comparable to never smokers[12]. In addition, smoking cessation, regardless of severity of lung disease, has been shown to have a mortality benefit[13], secondary to the reduction in cardiovascular and lung cancer mortality[14].

While complete cessation and abstinence have shown a decreased rate of decline in FEV1, reduction in the amount of cigarettes smoked per day or intermittent quitting did not achieve the same rate of decline in FEV1 achieved in those with complete and sustained cessation, unless the percent reduction was very marked (>85%)[14]. This re-emphasizes the need for complete and sustained cessation.

The benefits of smoking cessation are clear, however, the rates of success among current smokers in maintaining a smoke-free lifestyle are still low. A large proportion of moderate to severe COPD patients continue to smoke, ranging from 30.4% to 43.0%[15-17] despite having to live with the symptoms and limitations of COPD. The difficulty in smoking cessation is attributed to nicotine, which is the addictive drug in tobacco. Nicotine leads to the release of dopamine which is a key mediator of pleasure and reward and the foundation for the addiction[18]. In addition to nicotine itself, smoking is situational and occurs socially. Therefore, both the nicotine dependence and conditioned behaviours must be overcome to successfully quit smoking.

When dealing with smoking cessation, it is best to think of it in itself as a chronic disease. The goal is abstinence and the reality is that there will be relapses along the way and patients will often have several attempts before successfully quitting. Seventy-five percent of Americans wish to quit, yet only 3% achieve prolonged abstinence in a given year[18]. In order to improve the success rate, pharmacological therapy is often required. There are many different modalities to facilitate and maintain smoking cessation. We briefly review each modality here:

Communication: At each visit, a physician should ask the patient about their smoking habits, their willingness or desire to quit and advise smokers to stop. Information on both the pharmacological and non-pharmacological options for smoking cessation should be provided to patients[19]. It has been demonstrated that patients advised to quit by a physician had more attempts and were more successful at smoking cessation[19]. Patients with spirometric evidence of COPD who had these results communicated to them, they have a higher rate of smoking cessation when compared to smokers who do not have COPD[20,21]. Therefore, at each visit, the physician should communicate the risks of smoking, benefits of cessation and modalities available to facilitate quitting.

Nicotine Replacement Therapy (NRT): NRT has a 2 fold increase in smoking cessation rates when compared to placebo[18]. The goal of NRT is to provide the patient with the addictive nicotine without using the harmful tobacco, facilitating avoidance from cigarettes. There are many formulations, including gum, lozenge, transdermal patch, inhaler and a nasal spray. The transdermal patch is the preferred method, as it has the most reliable and steady delivery of nicotine. The oral forms have variable absorption depending on how quickly or long one chews, if saliva is swallowed quickly and if acidic beverages are consumed in close proximity to the use of the oral NRTs[23]. Side effects of all forms include insomnia and disturbing dreams. For the transdermal patch, this can be overcome by wearing the patch during the day and removing it at bedtime, however, this may lead to a stronger craving for a cigarette in the morning as the blood nicotine levels will be low. The nicotine inhaler, despite providing less systemic absorption of nicotine, is beneficial for those with conditioned behaviours leading

Table 3:

Smoking Cessation Therapies

	Benefits vs Placebo	Optimal Dose	Side Effects	Combination vs Single Agent Therpay
Nicotine Replacement Therapy (NRT)	2 fold increase in smoking cessation compared to placebo	Depends on amount of cigarettes smoked/ day at quit date	Insomnia, disturbing dreams, nasal irritation(for nicotine nasal sprays)	Combination long and short acting NRT more successful than single agent
Bupropion	2 fold increase in smoking cessation compared to placebo	150mg po bid x 7-12weeks	Insomnia, lowers seizure threshold, suicidal thoughts/ actions	Bupropion + NRT more successful than either agent alone
Varenicline	2-4 fold increase in smoking cessation compared to placebo	1mg po bid x 12 weeks	Insomnia, depression, suicidal thoughts/ actions, disturbing dreams, GI side effects	Conflicting data on superiority of varenicline + NRT vs varenicline alone
E-cigarettes	Unclear at present time, further studies required	N/A	Unregulated	N/A

to smoking. Nicotine nasal sprays have the most rapid absorption however have side effects of nasal irritation. Combination of short and long acting nicotine replacement is the preferred method, allowing for a steady baseline level of nicotine with the transdermal patch and rapid peaks with the short acting formulations. Combination NRT is associated with higher abstinence rates than single NRT formulations, with a smoking cessation rate of 31.5% for combination NRT compared to 17.6% for single agent NRT [24].

a) Bupropion: Bupropion is an antidepressant that has been shown to nearly double quit rates when compared to placebo (19.1% vs 10.6%)[24] and results are similar when specifically looked at in the COPD population (16% bupropion vs 9% placebo)[22]. The dose of choice is 150mg po bid and bupropion exerts its effects by potentiating dopaminergic and noradrenergic signaling. This helps to reduce craving and attenuate withdrawal symptoms[25]. Insomnia is the greatest side effect. Bupropion also lowers the seizure threshold and is therefore contraindicated in patients with seizure history or increased risk for seizure activity. The combination of bupropion plus NRT is more effective than either agent alone.

b) Varenicline: Varenicline is one of the more effective smoking cessation agents, with an abstinence rate of 27.6% vs 10.6% for placebo, 19.1% for bupropion and 17.6% for single agent NRT[24]. This drug reduces withdrawal symptoms as it is a partial agonist of the nicotinic receptor. It also reduces the rewarding and reinforcement effects of nicotine. Side effects associated with its use include gastrointestinal intolerance, insomnia, visual disturbances and this drug carries a black box warning given its possibility to cause neuropsychiatric symptoms including depressed mood, suicidal thoughts or actions[18].

c) Electronic Nicotine Delivery Systems "E-cigarettes": Electronic cigarettes (e-cigarettes) are battery-powered devices that deliver nicotine in an aerosolized form[26]. They come in a variety of brands and flavours. Companies claim that e-cigarettes are less harmful than conventional cigarettes, can be used where one cannot smoke and that they are an effective quitting aid[27]. These claims and the ease of acquisition through online internet sites, has led to increased popularity of e-cigarettes among cigarette smokers that are attempting to quit. E-cigarettes, however, are largely unregulated and are of unknown safety[28]. Their role in smoking cessation has not yet been determined. There are only a few studies looking at the e-cigarette in smoking cessation. These studies have suggested there may be a role for their use in smoking cessation, however, they are small studies and have methodological issues. In a few randomized controlled trials, no statistical difference was found in smoking cessation rates between e-cigarettes, nicotine patch and placebo e-cigarette group[29]. In the cross sectional analysis by Brown et al, e-cigarette users were more likely to report abstinence than those who used NRT bought over the counter or no aid at all[30]. The controversy on the use of e-cigarettes is evident even between various respiratory societies. While the Forum on International Respiratory Societies (FIRS) has recently published a position statement stating that e-cigarettes should be restricted or banned until more information about their safety is available[31], Public Health England (PHE), while acknowledging potential harms and the need for further data, state that the opportunity to utilize this technology into current smoking cessation paradigms should not be missed[32]. Therefore, while there may be role for e-cigarettes in smoking cessation, larger randomized controlled trials are needed to confirm these results. At

the present time, it is recommended to use FDA approved pharmacotherapy as first-line treatment.

IMMUNIZATION

It is known that in patients with COPD, exacerbations lead to a more rapid decline in lung function, increased morbidity and mortality. In addition, because of the limited number of therapies available to treat exacerbations, prevention is important. Vaccinations are one way to reduce exacerbations. It has been demonstrated that inactivated influenza vaccines in COPD patients resulted in a significant reduction in the total number of exacerbations per vaccinated subject compared with those who received placebo[33]. Wongsurakiat et al described an absolute 21.3% reduction in the incidence of acute respiratory illness following influenza vaccination[34].

Pneumococcal vaccination is currently recommended in the NICE guidelines to be given in addition to annual influenza vaccination in people with COPD[35]. However, the evidence supporting the use of the pneumococcal vaccine is not as robust as for influenza. The studies completed were retrospective and included elderly persons with any form of chronic lung disease, not just COPD. In this population, Nichol et al found a reduction in the number of hospitalizations for pneumonia, fewer deaths and lower health care costs in those who had received the pneumococcal vaccine[36]. Those who had received both pneumococcal and influenza vaccines had further reduction in hospitalization rates and death rates compared to those who had only received one of the two vaccinations[36].

PULMONARY REHABILITATION:

Maintaining physical activity and muscle strength is important for every patient suffering from COPD. Physical activity can be achieved through enrollment in an organized program, such as pulmonary rehabilitation (PR). Pulmonary Rehabilitation is described as 'an evidence-based, multidisciplinary and comprehensive intervention for patients with COPD that is designed to reduce symptoms, optimize functional status, increase patient participation and reduce healthcare costs through stabilizing or reversing systemic manifestations of the disease'[37]. It is a proven effective modality in the treatment of COPD and is part of COPD management guidelines.

Ideal candidates for PR are both males and females with moderate, severe or very severe COPD[38]. It should be offered to those patients with COPD who remain symptomatic despite bronchodilator therapy and should be implemented within one month following an acute exacerbation[38]. Exacerbations are associated with a decline in quality of life, premature death and an increased readmission rate[39]. Post an exacerbation; patients are less active leading to further decline in endurance and muscle mass. When compared to usual care post an exacerbation, PR demonstrated a significant reduction in hospital readmission rates and death in addition to increased exercise tolerance and symptomatic improvement [39].

In addition to its proven benefit post an exacerbation, PR has beneficial outcomes in many other important patient domains, such as dyspnea, exercise performance, disability and quality of life. Despite these positive outcomes, the effect on FEV1 has been mixed. Recently, however, the FIRST study by Incorvaia et al demonstrated that in patients with COPD on standard pharmacotherapy, pulmonary rehabilitation led to an improvement in FEV1 over a three year period whereas controls had a decline[40].

These benefits are achieved through a program focused on both aerobic and resistance training. This combination of therapy is more effective than either therapy alone[38] and targets the peripheral muscle dysfunction that is prevalent in patients with COPD. Weakness is attributed to a vicious cycle of dyspnea and fatigue leading to a more sedentatry lifestyle.

Despite the clear benefits of PR in many patient related domains, PR is often an under-utilized resource. There are many obstacles preventing its implementation to the large number of COPD patients who are candidates for it. Some of these include under-recognition of its value, lack of knowledge on who would be an ideal candidate, lack of availability and patient factors such as mobility. For those with COPD where hospital based PR is not possible for lack of availability, transportation or time commitment issues, a structured program is not always required to notice the benefits of exercise. Home exercise programs, or programs through the local gym can provide the aerobic and muscle strengthening benefits where PR is not available or feasible. The NICE guidelines concluded that PR is effective in all settings including hospital inpatient, hospital outpatient, the community and home[41]. As such, a home or community based program overseen by a multidisciplinary and multiprofessional team is an option for those where hospital programs are not available or not possible.

Therefore, as supported by the NICE guidelines, PR is effective in management of patients with COPD in both the acute setting (post exacerbation) and in patients with symptomatic stable disease. Both hospital based and home or community programs are effective and should be utilized based on their availability and patient convenience.

NON-INVASIVE VENTILATION (NIV):

a) Acute NIV:

Non-Invasive positive pressure ventilation (NIPPV) is a proven modality to decrease morbidity, improve survival and decrease the need for mechanical ventilation in COPD patients who develop acute respiratory failure. Its benefit has been proven in various settings, including the ICU, ward and emergency department in patients with moderate to severe respiratory acidosis[41]. Length of hospital stay is reduced and fewer complications, such ventilator acquired pneumona, prolonged weaning and other nosocomial infections are encountered when NIV is used in the appropriate population during an exacerbation[42].

NIV is also effective in facilitating extubation in patients mechanically ventilated for an acute exacerbation. Patients extubated to NIV had fewer re-intubations, fewer tracheostomies, shorter ICU stays, improved ICU survival and fewer complications including nosocomial pneumonia[43]. Because of these positive results, NIV should be considered in patients that require mechanical ventilation for respiratory failure particularly in those who have failed traditional weaning.

b) Chronic NIV:

The use of chronic NIV in patients with COPD is more controversial. The results are varied with respect to patient related outcomes. Struik et al have recently completed a randomized control trial examining the use of NIV in COPD patients with prolonged hypercapnea post NIV use for acute respiratory failure. The results of this study demonstrated no improvement in survival, number of respiratory readmissions, exacerbations, lung function, health related quality of life, mood state or daily activity levels of dyspnea in the NIV group versus standard therapy. This was despite having improvements in daytime PaCO2 and nocturnal transcutaneous PCO2 measurements in the NIV group[44]. Despite this lack of convincing evidence for its use, there are some clear situations where chronic NIV proves beneficial. One of these situations is in the patient with combination of COPD and obstructive sleep apnea (OSA). Patients with combined COPD and OSA who are not treated with appropriate NIV, like continuous positive airway pressure (CPAP) for example, experience higher rates of hospitalizations and mortality when admitted with a COPD exacerbation[45]. The use of CPAP for combined OSA and COPD also reduces pulmonary hypertension rates and nocturnal hypoxemia[46].

LONG TERM OXYGEN THERAPY (LTOT):

According to the British Thoracic Society (BTS), long term oxygen therapy is recommended for patients with a PaO2 ≤7.3kPa or a PaO2 between 7.3kPa and 8kPa with signs of peripheral edema, polycythemia (hematocrit >55%) or pulmonary hypertension. In this population, long term oxygen therapy is one of the few interventions that prolong life expectancy[47]. It also reduces pulmonary hypertension and hematocrit[47]. Continuous oxygen therapy, worn for 24h/d is superior to nocturnal oxygen in those with severe hypoxemia (PaO2 ≤7.3kPa or a PaO2 of ≤8kPa cor-pulmonale)[48]. Situational oxygen is also recommended for those who desaturate with exertion or have hypoxemia at night.

AMBULATORY OXYGEN THERAPY

For patients on LTOT who are motivated to use oxygen outside the home, ambulatory oxygen should be prescribed. Ambulatory oxygen is also indicated for those patients not on LTOT but who have exercise arterial desaturation[49]. In this population, arterial oxygen desaturation is defined as a fall in SaO2 of 4% to a value <90%. In addition to desaturation, these patients must also demonstrate improvement in exercise capacity and/or dyspnea with oxygen. The goal is to maintain oxygen saturation >90% during exercise.

SHORT-BURST OXYGEN THERAPY

Short burst oxygen therapy refers to the intermittent use of supplemental oxygen at home for intervals in the range of 10-20min to relieve symptoms of dyspnea. According the the NICE guidelines, short-burst oxygen therapy should only be considered for episodes of severe breathlessness in patients with COPD not relieved by other treatments[49]. This mode of oxygen delivery should only continue to be prescribed if there is improvement in breathlessness with its use.

EXTRACORPOREAL MEMBRANE OXYGENATION (ECMO):

ECMO in the form of an extracorporeal CO2 remover (ECCO2R) is a new modality being used to treat COPD exacerbations to prevent the need for mechanical ventilation and the associated morbidity associated with intubation. As demonstrated above, non-invasive ventilation is superior to mechanical ventilation in terms of mortality, complications and hospital length of stay. However, 15-26% of patients with an acute exacerbation of COPD fails non-invasive ventilation and requires transition to mechanical ventilation. These patients have a higher mortality than those initially treated with mechanical ventilation[50]. There are no current guidelines on the use of ECMO for COPD exacerbations as its use in this indication is new. Studies have shown that the Novalung could prevent intubation in 90% of patients with a trend to decreasing hospital length of stay[50]. Another device, the Hemolung, had similar findings. These studies were small and not randomized; however, there is a trend to decrease mechanical ventilation and mortality. It is likely that in the

TABLE 4:

Physiological indications for long-term oxygen therapy (LTOT) BTS Guidelines

Pa,O_2 kPa	*Sa*,O_2 %	LTOT indication	Qualifying condition
≤7.3	≤88	Absolute	None
7.3-8	89	Relative with qualifier	"P" pulmonale, polycythemia >55% History of oedema Exercise desaturation
≥8	≥90	None except with qualifier	Sleep desaturation not corrected by CPAP Lung disease with severe dyspnoea responding to O_2

future we will see this modality being used more in centers that have access to it.

LUNG VOLUME REDUCTION SURGERY (LVRS) AND ENDOBRONCHIAL PROCEDURES:

LVRS is an effective treatment option in patients with heterogeneous upper zone emphysema and reduced exercise tolerance[51]. According to the National Emphysema Treatment Trial (NETT) trial, LVRS has shown to be superior to medical treatment. LVRS has improved maximal ventilation rate and tidal volume and has lower BORG dyspnea scores[52]. However, surgery carries a high risk of morbidity, particularly in patients with severe COPD, who often have additional co-morbidities. Thus, newer, non-surgical, less invasive strategies have been developed to potentially offer benefit to those patients who would not be candidates for LVRS. These non-surgical procedures are referred to as bronchoscopic lung volume reduction.

The most common bronchoscopic lung volume reduction devices include: endobronchial valves, foam sealant, metallic coils, airway bypass stents and vapor thermal ablation. Lung volume reduction coils (LVRC) are being used in patients with severe emphysema and hyperinflation. In a small randomized study, patients allocated to the LVRC versus usual care had higher SGRQ scores than those allocated to usual care[53]. Endobronchial valves, another bronchoscopic lung volume reduction procedure, functions by allowing air out of the treated area, but not to re-enter it, eliminating the affected emphysematous regions from ventilation and eventually leading to lobar atelectasis[54]. The Endobronchial Valve for Emphysema Palliation Trial (VENT) demonstrated modest improvement in FEV1, distance walked in 6 minutes, dyspnea and quality of life; however, there were increased complications such as pneumonia and pneumothoax when compared to usual medical care[55].

There appears to be some promise in the bronchoscopic lung volume reduction devices for patients who are not candidates for surgery. NICE guidelines recognize that there may be a subgroup of patients that may benefit from this procedure; however, at this time these procedures are experimental and only available in highly specialized centres. Further research is in progress to determine which patients would be ideal candidates and further data is required before the procedures are accepted as general practice.

LUNG TRANSPLANT:

Lung transplant is offered to people with untreatable, end-stage lung disease with a limited life expectancy. COPD is one such lung disease and is currently the most common indication for a double lung transplant[55]. According to the International Society for Heart and Lung Transplantation, the disease specific criteria for referral of patients with COPD include an FEV1 ≤ 30% while having maximized both pharmacological and non-pharmacological therapy, including bronchodilators, home oxygen, smoking cessation and pulmonary rehabilitation. In addition, they should have a BODE index exceeding 5[56]. Other criteria for transplantation include patients with a BODE index of 7-10 plus a history of hospitalization for exacerbation associated with acute hypercapnia, pulmonary hypertension or cor pulmonale or an FEV1 of less than 20% with either a DLCO of less than 20% or a homogeneous distribution of emphysema[56].

The survival benefit for patients with COPD receiving a transplant is not as robust as for transplant in other respiratory conditions, such as idiopathic pulmonary fibrosis, cystic fibrosis and primary pulmonary hypertension[57]. The benefits from lung transplant in this population are improved respiratory function, endurance and quality of life as opposed to prolonging of life[57].

There are many factors that must be taken into consideration when referring a patient for lung transplant. Each transplant centre has different criteria for when to refer and different contraindications. (Table 5) If a patient seems like an appropriate candidate and is willing, a referral to a transplant centre should be made.

END OF LIFE (EOL)CARE:

COPD accounts for 48% of all deaths in England between 2007 and 2009 and is the main cause of chronic lung disease deaths[35]. Patients with COPD typically experience the last few months to years of their life marked by progressive dyspnea, functional decline and social isolation[58]. Their quality of life has been compared to those with lung cancer[59]. As with any non-curable chronic illness, goals of care and end of life discussions must occur. The discussion should focus on education of the disease course and management of end of life issues, such as symptom control and advanced health care directives. The prognosis of COPD is often difficult to predict as the disease is marked by progressive decline in lung function with increasing symptoms. There are episodes of acute illness and associated co-morbid conditions. Because prognosis is difficult to predict, it is often unclear as to when to begin end of life care discussions and palliative symptom management. These discussions should definitely occur when the FEV1 is <30%, abnormal blood gases are present or when cor-pulmonale with pulmonary hypertension develops[60] as these patients are found to have the poorest prognosis. The End of Life Strategy detailed in the NICE guidelines suggests an integrated multidisciplinary approach involving spiritual care, social care, supports and information to patients, carers and families. These services should occur as end of life approaches[35].

The major symptoms experienced by end-stage COPD patients include dyspnea, pain, fatigue and insomnia[60]. Opiods, both regular dosed and breakthrough is the mainstay of treatment for dyspnea. Benzodiazepenes can be used as adjuncts to opioids to control severe dyspnea. Insomnia is often improved simply through dysnpea control[60]. Initial discussions and management should be undertaken by the primary physician managing the patients COPD, however, a referral to a palliative care physician is warranted as

TABLE 5:

Contraindication to Lung Transplant from 2006 ISHLT Guidelines

Absolute and relative contraindications for lung transplantation

Absolute contraindications:

- Malignancy in the last 2 years, with the exception of cutaneous squamous and basal cell tumors
- Untreatable advanced dysfunction of another major organ system
- Noncurable chronic extrapulmonary infection, including chronic active HBV, HCV and HIV
- Significant chest wall or spinal deformity
- Documented nonadherence or inability to follow through with medical therapy or office follow-up, or both
- Untreatable psychiatric or psychologic condition associated with the inability to cooperate or comply with medical therapy
- Absence of a consistent or reliable social support system
- Substance addiction that is either active or within the last 6 months

Relative contraindications:

- Age older than 65 years
- Critical or unstable clinical condition (e.g., shock, mechanical ventilation or ECMO)
- Severely limited functional status with poor rehabilitation potential
- Colonization with highly resistant or highly virulent bacteria, fungi or mycobacteria
- Severe obesity defined as a BMI exceeding 30 kg/m^2
- Chronic mechanical ventilation
- Unstable extrapulmonary medical conditions that have not resulted in end-stage organ damage

symptoms progress or if not effectively managed by conventional modalities.

PRIMARY VS SECONDARY CARE:

The management of COPD requires a multidisciplinary approach and a good working relationship between primary care and respirology subspecialists when involved. As outlined above, the non-pharmacological management of a COPD patient is multifaceted. Most therapies can be initiated or supported by both primary care and subspecialist physicians such as immunizations and smoking cessation. Table 6 outlines when primary care physicians should consider referral to a respirologist to aid in the diagnosis and management of the patient with COPD[35].

TABLE 6:

NICE Guidelines: When Respirology Consultation is Appropriate

- Diagnostic Uncertainty
- Suspected severe COPD
- Patient wants a second opinion
- Onset of cor pulmonale
- Assessment for oxygen therapy
- Bullous lung disease
- A rapid decline in FEV1
- Assessment for pulmonary rehabilitation
- Assessment for lung volume reduction surgery
- Assessment for lung transplantation
- Onset of symptoms under 40years of age or a family history of alpha-1 antitrypsin deficiency
- Frequent infections
- Hemoptysis

CONCLUSION:

COPD is the most prevalent lung disease in the world and has major personal, social and economic implications. By 2020, it is anticipated to become the third leading cause of death in the world. This paper describes the non-pharmacological modalities available for patients with this disease. Several of these are very low-cost yet effective interventions while others are very sophisticated and, as yet, not clearly evidence-based. However, both clinicians and commissioners will derive useful information from this paper for the provision of comprehensive, cross-sectional, multidisciplinary and multiprofessional care for this large and diverse group of patients.

CONFLICTS OF INTEREST:

Katherine A. Safka : None Declared

R. Andrew McIvor : has been an investigator and has received honoraria for attending advisory boards and providing educational events for pharmaceutical companies including Almiral, AstraZeneca, Boehringer-Ingelheim, Merck, Novartis and Pfizer

REFERENCES:

1. Mittmann, N. Et al. The cost of moderate and severe COPD exacerbations to the Canadian healthcare system. *Respir Med*. 2008;**102(3)**:413-21.
2. Global strategy for the diagnosis, management, and prevention of chronic obstructive pulmonary disease: Executive summary 2013. Bethesda: Global Initiative for Chronic Obstructive Lung Disease (GOLD); 2014. Available online from: http://www.goldcopd.org/guidelines-global-strategy-for-diagnosis-management.html [Last accessed December 2014).
3. Sood A, Petersen H, Blanchette CM, Picchi MA, Belinsky SA, Tesfaigzi Y. Wood smoke exposure and gene promoter methylation are associated with increased risk for COPD in smokers. *Am J Respir Crit Care Med*. 2010;**182(9)**: 1098-104.

4. Burgel PR, Paillasseur JL, Roche, N. Identification of clinical phenotypes using cluster analyses in COPD patients with multiple comorbidities. *BioMed Res Int*.2014;**2014**:420134.

5. Csikesz NG, Gartman, EJ. New developments in the assessment of COPD: early diagnosis is key. *Int J Chron Obstruct Pulmon Dis*. 2014;**9**:277-86.

6. Tantucci C, Modina D. Lung function decline in COPD. *Int J Chron Obstruct Pulmon Dis*. 2012;**7**:95-9.

7. Anthonisen NR, Connett JE, Kiley JP, Altose MD, Bailey WC, Buist AS, *et al*. Effects of smoking intervention and the use of inhaled anticholinergic bronchodilator on the rate of decline of FEV1. The Lung Health Study. *JAMA*. 1994;**272(19)**:1497-505.

8. Decramer M, Cooper CB. Treatment of COPD: the sooner the better? *Thorax*. 2010;**65(9)**:837-41.

9. Decramer M, Miravitlles M, Price D, Roman-Rodriguez M, Lior C, Welte T, *et al*. New horizons in the early stage COPD – improving knowledge, detection and treatment. *Respir Med*. 2011;**105(11)**:1576-87.

10. Fletcher C, Peto R. The natural history of chronic airflow obstruction. *Br Med J*. 1977;**1(6077)**:1645-8.

11. Mosenifar Z. Differentiating COPD from asthma in clinical practice. *Postgrad Med*. 2009;**121(3)**: 105-12.

12. Scanlon PD, Connett JE, Waller LA, Altose MD, Bailey WC, Buist AS, *et al*. Smoking cessation and lung function in mild-to-moderate chronic obstructive pulmonary disease. The Lung Health Study. *Am J Respir Crit Care Med*. 2000;**161(2 pt 2)**:381-92.

13. Pelkonen M, Tukiainen H, Tervahauta M, Notkoala IL, Kivela SL, Salorinne Y, *et al*. Pulmonary function, smoking cessation and 30 year mortality in middle aged Finnish men. *Thorax*. 2000;**55(9)**:746-50.

14. Tashkin DP, Murray RP. Smoking cessation in chronic obstructive pulmonary disease. *Respir Med*. 2009;**103(7)**:963-74.

15. Calverley PM, Anderson JA, Celli B, et al. Salmeterol and fluticasone propionate and survival in chronic obstructive pulmonary disease. *N Engl J Med*. 2007;**356(8)**:775-89.

16. Tashkin DP, Celli B, Decramer M, et al. Regional patterns in the characteristics of patients recruited into a long-term global clinical trial in COPD (UPLIFT). *Am J Respir Crit Care Med*. 2005;**2**:A412.

17. Wedzicha JA, Calverley PM, Seemungal TA, Hagan G, Ansari Z, Stockley RA, INSPIRE investigators. The prevention of chronic obstructive pulmonary disease exacerbations by salmeterol/fluticasone propionate or tiotropium bromide. *Am J Respir Crit Care Med*. 2008;**177(1)**:19-26.

18. Rennard Sl, Daughton DM. Smoking cessation. *Clin Chest Med*. 2014;**35(1)**:165-76.

19. Fiore MC, Jaen CR, Baker TB, et al. Treating tobacco use and dependence: 2008 update. Clinical practice guidelines. Rockville, MD US Department of Health and Human Services, Public Health Service; 2008.

20. Bednarek M, Gorecka D, Wielgomas J, Czajkowska-Malinowska M, Regula J, Mieszko-Filipczyk G, *et al*. Smokers with airway obstruction are more likely to quit smoking. *Thorax*. 2006;**61(10)**:869-73.

21. Stratelis G, Molstad S, Jakobsson P, Zetterstrom O. The impact of repeated spirometry and smoking cessation advice on smokers with mild COPD. *Scand J Prim Health Care*. 2006;**24(3)**:133-9.

22. Wagena EJ, van der Meer RM, Ostelo RJWG, Jacobs JE, van Schayck CP. The efficacy of smoking cessation strategies in people with chronic obstructive pulmonary disease: results from a systematic review. *Resp Med*. 2004;**98(9)**:805-15.

23. Jiloha RC. Pharmacotherapy of smoking cessation. *Indian J Psychiatry*. 2014;**56(1)**:87-95.

24. Cahill K, Stevens S, Lancaster T. Pharmacological treatments for smoking cessation. *JAMA*. 2014;**311(2)**:193-4.

25. Lerman C, Shields PG, Wileyto EP, Audrain J, Hawk LH, Pinto A, *et al*. Effects of dopamine transporter and receptor polymorphisms on smoking cessation in a bupropion clinical trial. *Health Psychol*. 2003;**22(5)**:541-8.

26. Pepper JK, Emery SL, Ribisl KM, Southwell BG, Brewer NT. Effects of advertisements on smokers' interest in trying e-cigarettes: the roles of product comparison and visual cues. *Tob Control*. 2014;23(Suppl 3):iii31-iii36.

27. Zhu SH, Sun JY, Bonnevie E, Cummins SE, Gamst A, Yin L, Lee M. Four hundred and sixty brands of e-cigarettes and counting: implications for product regulation. *Tob Control*. 2014;**23(Suppl 3)**:iii2-iii9.

28. Harrell PT, Simmons VN, Correa JB, Padhya TA, et al. Electronic nicotine delivery systems ("e-cigarettes"): review of safety and smoking cessation efficacy. *Otolaryngol Head Neck Surg*. 2014;**151(3)**:381-93

29. Nowak D, Jorres RA, Ruther T. E-Cigarettes – prevention, pulmonary heatlh, and addiction. *Dtsch Arztebf Int*. 2014;**111(20)**:349-55.

30. Brown J, Beard E, Kotz D, Michie S, West R. Real-world effectiveness of e-cigarettes when used to aid smoking cessation: a cross-sectional population study. *Addiction*. 2014;**109(9)**:1531-40.

31. Schraufnagel DE, Blasi F, Drummond MB, Lam DC, Latif E, Rosen MJ, *et al*. Electronic cigarettes: a position statement of the forum of international respiratory societies. *Am J Respir Crit Care Med*. 2014;**90(6)**:611-8.

32. Britton J and Bogdanovica I. Electronic cigarettes: A report commissioned by Public Health England. London: Public Health England; 2014. Available online from: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/311887/Ecigarettes_report.pdf [Last accessed December 2014].

33. Poole P, Chacko EE, Wood-Baker R, Cates CJ. Influenza vaccine for patients with chronic obstructive pulmonary disease (Review). *Cochrane Database Syst Rev*. 2006; **Issue 1**: CD002733.

34. Wongsurakiat P, Maranetra KN, Wasi C, Kositanont U, Dejsomritrutai W, Charoenratanakul S. Acute respiratory illness in patients with COPD and the effectiveness of influenza vaccination: a randomized controlled study. *Chest*. 2004;**125(6)**:2011-20.

35. NICE guidelines. Chronic obstructive pulmonary disease: Management of chronic obstructive pulmonary disease in adults in primary and secondary care (partial update). London: NICE National Institute for Health and Care Excellence; 2010.

36. Nichol KL, Baken L, Wuorenma J, Nelson A. The heath and economic benefits associated with pneumococcal vaccination of elderly persons with chronic lung disease. *Arch Intern Med*. 1999;**159(20)**:2437-42.

37. Nici L, ZuWallak R, Wouters E, Donner CF. On pulmonary rehabilitation and the flight of the bumblebee: the ATS/ERS Statement on pulmonary rehabilitation. *Eur Respir J*. 2006;28(3):461-2.

38. Marciniuk DD, Brooks D, Butcher S, Debigare R, Dechman G, Ford G, *et al*. Optimizing pulmonary rehabilitation in chronic obstructive pulmonary disease – practical issues: a Canadian Thoracic Society Clinical Practice Guideline. *Can Respir J*. 2010;**17(4)**:159-68.

39. Puhan M, Scharplatz M, Troosters T, Walters EH, Steurer J. Pulmonary rehabilitation following exacerbations of chronic obstructive pulmonary disease. *Cochrane Database Syst Rev*. 2009; **21(1)**: CD005305.

40. Incorvaia C, Russo A, Foresi A, Berra D, Elia R, Passalacqua G, *et al*. Effects of pulmonary rehabilitation on lung function in chronic obstructive pulmonary disease: the FIRST study. *Eur J Phys Rehabil Med*. 2014;**50(4)**:419-26.

41. NICE guidelines. Chronic obstructive pulmonary disease: Management of chronic obstructive pulmonary disease in adults in primary and secondary care (partial update) London: National Institute for Health and Care Excellence; 2010.

42. Ambrosino N, Vagheggini G. Non-invasive ventilation in exacerbations of COPD. *Int J Chron Obstruct Pulmon Dis*. 2007;**2(4)**:471-6.

43. Conti G, Antonelli M, Navalesi P, Rocco M, Bufi M, Spadetta G, Meduri GU. Noninvasive vs. conventional mechanical ventilation in patients with chronic obstructive pulmonary disease after failure of medical treatment in the ward: a randomized trial. *Intensive Care Med*. 2002;**28(12)**:1701-7.

44. Girault C, Daudenthun I, Chevron V, Tamion F, Leroy J, Bonmarchand G. Noninvasive ventilation as a systematic extubation and weaning technique in acute-on-chronic respiratory failure: a prospective, randomized controlled study. *Am J Respir Crit Care Med*. 1999;**160(1)**:86-92.

45. Struik FM, Sprooten RT, Kerstiens HA, Bladder G, Zinjen M, Asin J, *et al*. Nocturnal non-invasive ventilation in COPD patients with prolonged hypercapnia after ventilatory support for acute respiratory failure: a randomised, controlled, parallel-group study. *Thorax*. 2014;**69(9)**:826-34.

46. Marin JM, Soriano JB, Carrizo SJ, Boldova A, Celli BR. Outcomes in patients with chronic obstructive pulmonary disease and obstructive sleep apnea: the overlap syndrome. *Am J Respir Crit Care Med*. 2010;**182(3)**:325-31.

47. McNicholas WT, Verbraecken J, Marin JM. Sleep disorders in COPD: the forgotten dimension. *Eur Respir Rev*. 2013;**22(129)**:365-75.

48. Stoller JK, Panos RJ, Krachman S, Doherty DE, Make B and the Long-term Oxygen Treatment Trial Research Group. Oxygen therapy for patients with COPD: current evidence and the long-term oxygen treatment trial. *Chest*. 2010;**138(1)**:179-87.

49. Nocturnal Oxygen Therapy Trial Group. Continuous or nocturnal oxygen therapy in hypoxemic chronic obstructive lung disease: a clinical trial. *Ann Intern Med*. 1980;**93(3)**:391-8.

50. British Thoracic Society (BTS) Working Group on Home Oxygen Services. Clinical component for the home oxygen service in England and Wales. Jan 2006. Available online from: https://www.brit-thoracic.org.uk/document-library/clinical-information/oxygen/home-oxygen-guideline-(adults)/bts-home-oxygen-in-adults-clinical-component/ [Last accessed December 2014].

51. Lund LW, Federspiel WJ. Removing extra CO2 in COPD patients. *Curr Respir Care Rep*. 2013;**2**:131-138.

52. Murphy PB, Zoumot Z, Polkey MI. Noninvasive ventilation and lung volume reduction. *Clin Chest Med*. 2014;**35(1)**:251-69.

53. Criner GJ, Belt P, Sternberg AL, Mosenifar Z, Make BJ, Utz JP, Sciurba F; National Empysema Treatment Trial Research Group. Effects of lung volume reduction surgery on gas exchange and breathing pattern during maximum exercise. *Chest*. 2009;**135(5)**:1268-79.

54. Shah PL, Zoumot Z, Singh S, Bicknell SR, Ross ET, Quiring J, Hopkinson NS, Kemp SV, RESET trial Study Group. Endobronchial coils for the treatment of severe emphysema with hyperinflation (RESET): a randomised controlled trial. *Lancet Respir Med*. 2013;**1(3)**:233-40.

55. Cohen E. Bronchoscopic treatment of end-stage chronic obstructive pulmonary disease. *Curr Opin Anaesthesiol*. 2014;**27(1)**:36-43.

56. Herth FJ, Noppen M, Valipour A, Leroy S, Vergnon JM, Ficker JH, Egan JJ, Gasparini S, Agusti C, Holmes-Higgin D, Ernst A; International VENT Study Group. Efficacy predictors of lung volume reduction with Zephyr valves in a European cohort. *Eur Respir J*. 2012;**39(6)**:1334-42.

57. Orens JB, Estenne M, Arcasoy S, Conte JV, Corris P, Egan JJ, *et al*. International Guidelines for the selection of lung transplant candidates: 2006 update – a consensus report from the Pulmonary Scientific Council of the International Society for Heart and Lung Transplantation. (Consensus Document). *J Heart Lung Transplant*. 2006;**25(7)**:745-55.

58. Aziz F, Penupolu S, Xu X, He J. Lung transplant in end-staged chronic obstructive pulmonary disease (COPD) patients: a concise review. *J Thorac Dis*. 2010;**2(2)**:111-6.

59. NICE guidelines. Chronic obstructive pulmonary disease: Management of chronic obstructive pulmonary disease in adults in primary and secondary care (partial update) London: National Institute for Health and Care Excellence; 2010.

60. Spathis A, Booth S. End of life care in chronic obstructive pulmonary disease: in search of a good death. *Int J Chron Obstruct Pulmon Dis*. 2008;**3(1)**:11-29.

61. Gore JM, Brophy CJ, Greenstone MA. How well do we care for patients with end stage chronic obstructive pulmonary disease (COPD)? A comparison of palliative care and quality of life in COPD and lung cancer. *Thorax*. 2000;**55(12)**:1000-6.

62. Dean MM. End-of-life care for COPD patients. *Prim Care Respir J*. 2008;**17(1)**:46-50.

63. NICE guidelines. Chronic obstructive pulmonary disease: Management of chronic obstructive pulmonary disease in adults in primary and secondary care (partial update) London: National Institute for Health and Care Excellence; 2010.

64. NICE guidelines. Chronic obstructive pulmonary disease: Management of chronic obstructive pulmonary disease in adults in primary and secondary care (partial update) London: National Institute for Health and Care Excellence; 2010.

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Paper

Domiciliary Non-Invasive Ventilation in the Elderly. Effective, Tolerated and Justified.

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ABSTRACT

Aim: To determine if the long terms effects of non-invasive home mechanical ventilation (NIHMV) in the elderly are as beneficial as in younger subjects for a dedicated non-invasive ventilation unit in a tertiary referral hospital within the UK.

Patients and Methods: The study population included 256 patients who were successfully established on NIHMV between May 2009 and August 2013. Patients were divided into three groups according to age: group 1 (n=103) ≥75; group 2 (n=81) 65 -74; and group 3 (n=72) < 65 years of age. Initial assessments, both prior to starting NIHMV and at 12 month follow up were determined which included establishing the primary cause of respiratory insufficiency, measurement of arterial blood gas parameters, spirometry, overnight oximetry, and sniff nasal inspiratory pressure (SNIP) in those patients with neuromuscular disease. The number of hospital admissions in the year prior to starting NIHMV, and in the subsequent year, along with the number of days spent as an inpatient were ascertained as a measure of burden to local health care resources. Compliance with NIV at follow up, facilitated by recorded data within the ventilator software, was established along with an assessment of any reported side effects.

Results: Group 3 had the most profound abnormalities in lung function and blood gas parameters at initial assessment with a trend towards a higher number of acute admissions. In absolute terms, there was a greater decline in the number of admissions for subjects in group 2 after being established on NIHMV. Although more subjects in group 3 had chest wall deformities, COPD or bronchiectasis, this group had the lowest number of subjects with neuromuscular disease. Improvements in gas exchange were most pronounced for group 3 subjects despite no significant differences in the selected ventilator settings across the 3 groups. For neuromuscular patients, when measured, SNIP pressures were lowest in group 3.

Conclusion: NIHMV was effective and tolerated for all three age groups. There was an improvement in measured patient centred endpoints across all three age groups, all of whom benefited equally.

Keywords: Non-invasive ventilation, respiratory failure, elderly

INTRODUCTION

A more diverse patient group now benefit from non-invasive ventilation (NIV) for acute hypercapnic respiratory failure (AHRF) since its conception over two decades ago,[1] and its role in this context is simply beyond reproof. Initially this form of supportive therapy was reserved almost exclusively for subjects with acute exacerbations of chronic obstructive pulmonary disease (COPD), and avoidance of tracheal intubation was achieved for many of these subjects.[1] The recent BTS NIV audit highlighted just how much progress has been achieved. Impressively, across 130 hospitals and including 2490 patients, intubations were as low at 2.7%, and NIV was deemed to be effective in an overwhelming 69% of patients.[2] Recent studies confirm and extend these observations, demonstrating benefits in other respiratory conditions such as restrictive lung disease [3, 4] and a variety of neuromuscular conditions.[3-5] However, it is not clear if this progress in the acute setting has also translated to those subjects requiring domiciliary NIV, particularly for elderly subjects, and there has been a paucity of data available in more recent times to address this question.

With the development of more sophisticated interfaces, themselves serving to provide a more acceptable, safer and comfortable ventilator support, in conjunction with a broader repertoire of positive-pressure support systems, the patient population which now benefit from NIV has vastly expanded.[6] Furthermore, dedicated non-invasive ventilation units which provide this care have developed over the last decade, now accepting patients with more significant blood gas abnormalities, and yet still maintaining outstanding patient outcomes. As a result, in our institution, admissions to

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intensive care for respiratory failure have not only diminished, but NIV units have facilitated a more timely discharge from the critical care environment.[7] Many of these subjects are subsequently commenced on non-invasive home mechanical ventilation (NIHMV) in an effort to reduce subsequent hospital admissions, maintain quality of life, relieve chronic hypoventilation related symptoms, all of which ultimately serve to mitigate health care utilisation.

According to consensus guidelines, age, in and of itself, does not feature as a variable which should be considered as to whether commencing domiciliary NIV is appropriate.[5, 8] It has recently been reported that NIV is effective and safe in an elderly patient population, many of whom had multiple co-morbidities, including significant cognitive impairment and acute delirium, at least in the context of acute presentations with respiratory insufficiency.[9] However, when long term domiciliary ventilation in individuals over 75 years is considered, early reports did not report particularly favourable outcomes. This was primarily on the basis of a higher risk of neuropsychological impairment and difficulties adapting to the overall burden on NIHMV when compared to younger individuals.[10]A subsequent study, although only including six patients over the age of 75, when evaluating similar endpoints, demonstrated more positive findings.[11]

Despite extensive published literature, and with the exception of only two Spanish studies which demonstrated efficacy of NIHMV in the elderly, the appropriateness of NIHMV in patients over 75 years has not been particularly thoroughly assessed in comparison to published research on the merit of acute NIV.[12-13] Furthermore, with recent progress in the use of NIV in more general terms, it would be of interest if this is also reflected in the older age group, and in the long term domiciliary setting. We therefore aimed to ascertain how successful NIHMV is in the elderly, and across a breadth of underlying pathology, by evaluating endpoints which are of relevance to individual patients along with measures of health care utilisation. We hypothesised that, in line with overall progress in the use of NIV, elderly patients also benefit to the same degree as younger subjects, and that our efforts should not be curtailed on the basis of age alone when considering this form of supportive therapy in the long term.

METHODS

Patients and assessments

Two hundred and fifty six patients who were successfully initiated on domiciliary ventilation between May 2009 and August 2013 were included. Data was retrieved in a retrospective fashion using electronic records of clinic letters and case note retrieval. The underlying cause of respiratory insufficiency, arterial blood gas (ABG) measurements, overnight oximetry to ascertain if there was evidence of nocturnal hypoventilation, spirometry according to the criteria of the European Respiratory Society, and sniff nasal inspiratory pressure (SNIP) for those individuals with neuromuscular disease were all recorded. For overnight oximetry, if oxygen saturations were below 90% for more than 30% of the reading, this was considered to be significant hypoventilation according to local practice. A prediction of the patient's height was established in those subjects with kyphoscoliosis by substituting height for arm span.

Follow up after 12 months included repeat ABG parameters, repeat spirometry, adverse effects of NIV and on occasion repeat SNIP pressures for those subjects with neuromuscular disease. Compliance and tolerance to NIV was determined, primarily by "interrogating" of the NIV machine in order to establish the average numbers of hours used per night. Ventilator parameters, including inspiratory (IPAP) and expiratory (EPAP) pressures, mode of ventilation and difficulties with mask leak, if present at all, were documented. The number of hospital admissions, including the total number of days spent in hospital, in both the year before and in the subsequent year after starting NIV was available using internal electronic system databases.

Statistical analysis

Statistical analysis was performed using SPSS version 17.0 (SPSS inc., Chicago, IL, USA). Data are presented as mean values ± SD. Comparisons between groups were performed byANOVA with Bonferoni's multiple comparison test after confirming normality of the data by the D'Agostino-Pearson test. A p value of less than 0.05 was considered significant.

RESULTS

The relevant baseline patient characteristics are outlined in table 1 and underlying cause of respiratory insufficiency in table 2. In many cases, there were several potential causes of respiratory impairment, and judgement was made on a case by case basis as to the main culprit. In those patients whereby it was impossible to know with sufficient certainty which disease process was most relevant, the aetiology of the respiratory insufficiency was deemed to be multifactorial. Changes in the various endpoints after 12 months NIHMV is outlined in table 3.

TABLE 1:

Patient characteristics at initial presentation.

	Group 1 < 65 years	Group 2 65 -74 years	Group 3 ≥75 years
Number	103	81	72
Age (yrs)	44 ± 9.9	69 ± 2.1*	78 ± 1.5*ǂ
Male/Female	79/24	53/28	49/23
FEV_1, Absolute (mls)	680 ± 15	590 ± 12*	560 ± 10*ǂ
FEV_1, % predicted	43 ± 9	44 ± 6	36 ± 4 *ǂ
FVC, % predicted	44 ± 6*ǂ	46 ± 9	39 ± 8 *ǂ
PaO_2 (kPa)	8.2 ± 1.8	7.3 ± 0.2	7.2 ± 0.9
$PaCO_2$ (kPa)	8.4 ± 1.6	7.2 ± 0.9	9.7 ± 1.8
HCO_3-mmol/L	29 ± 1.4	28 ± 1.0	32 ± 2.6
Average compliance (hrs)	6.5 ± 1.6	6.4 ± 1.7	4.1 ± 0.9*ǂ
Admissions pre-NIHMV/year	4.1 ± 0.6	4.4± 1.2	4.6± 0.9
Admissions post-NIHMV/year	2.9 ± 0.6	1.3± 1.4	2.7 ± 1.7
Hospital I/P days pre-NIHMV/year	25.1 ± 3.2	26.9 ± 7.7	29.2 ± 5.7
Hospital I/P days post-NIHMV/year	17.7 ± 2.6	13.7 ± 1.9	16.2 ± 3.2
Intolerant of NIHMV	0	4 (5%)	4 (6%)
Death	0	5 (6%)	4 (6%)

* Statistically different from group 1
ǂ Statistically different from group 2

Four (6%) patients in group 3, 4 (6%) in group 2, and no subjects in group 1 were intolerant of NIHMV, all of whom returned their ventilator. Satisfactory compliance, arbitrarily defined as 4 hours NIV per night, was satisfactory across all three groups, although the average number of hours used was lowest in group 3. Over this period of time, there were no deaths in group 1, whereas there were 5 (6%) in group 2 and 4 (5%) in group 3. The number of hospital admissions, including number of inpatient days, was reduced in all three groups, with most benefit for subjects in group 2. Overnight oximetry was only assessed in those subjects deemed borderline for requiring NIV on the basis of blood gas parameters. All subjects included in table 1 met requirements for NIV on the basis of either evidence of nocturnal hypoventilation, or more commonly, measured hypercarbia at initial assessment when clinically stable. SNIP measurements, when measured for neuromuscular patients, were significantly lower for group 3 (26 ± 2 cmH_2O) than for both group 1 (32 ± 3 cmH_2O) and for group 2 (34 ± 6 cmH_2O). There were no statistical differences in SNIP pressures between the latter two groups. On reviewing case notes, side effects were reported to similar degrees across the groups (data not shown).

Table 2:

Underlying cause of respiratory insufficiency.

	Group 1 < 65 years	Group 2 65 -74 years	Group 3 ≥75 years
Neuromuscular disease	25 (24%)	23 (28%)	9 (13%)*ł
Obesity-hypoventilation ± OSA	11 (11%)	13 (16%)	10 (14%)
Obesity-hypoventilation ± OSA & COPD ± Bronchiectasis	34 (33%)	33 (41%)*	34 (47%)*ł
Chest wall deformity / Previous Polio / Kyphoscoliosis	18 (17%)	10 (12%)*	4 (6%)*ł
Multi-factorial	15 (15%)	2 (2%)*	15 (21%)*ł

* Statistically different from group 1
ł Statistically different from group 2

Table 3:

Improvement in gas exchange after 12 months.

	Group 1 < 65 years	Group 2 65 -74 years	Group 3 ≥75 years
Rise in PaO_2 (kPa)	1.0 ± 0.2	1.6 ± 0.5 *	1.7 ± 0.9 *
Reduction in $PaCO_2$ (kPa)	1.7 ± 0.4	1.6 ± 0.8	2.3 ± 0.6 *ł

* Statistically different from group 1
ł Statistically different from group 2

DISCUSSION

NIHMV in the elderly is effective, tolerated, and with equally favourable outcomes when compared to younger subjects. NIHMV provided sustained improvement in gas exchange, reduced overall burden on health care resources, mitigated nocturnal hypoventilation, and with minimal adverse side effects reported. Overall tolerance and compliance to NIHMV was acceptable, and although 4 (6%) patients in the elderly group abandoned NIHMV, this was similar to those subjects in group 2. In those who were unable to tolerate NIV, the machine itself was returned.

Physiological parameters, social support, patient motivation, co-morbidities, and the projected natural history of the disease process itself all need to be taken into consideration when considering the appropriateness of embarking on long term NIHMV for individual patients. Obviously all of these elements are intimately related to each other, and it is not possible to dissect out any single variable in order to meaningfully conclude whether it, in isolation, should influence the decision whether to start NIHMV or not. With increasing age of patients who are now treated for respiratory failure, these decisions have now become increasingly more complex.

There were significant differences in the three groups with regard to the underlying cause of respiratory insufficiency, with a higher proportion of patients with neuromuscular disease, COPD or bronchiectasis in group 3. In contrast, there were few patients with chest wall deformities in group 3. It is difficult to interpret the clinical significance of these findings, but we feel it unlikely that such observations made any significant impact on our final conclusion. Despite this, it was of interest that those subjects in group 3, many of whom had COPD, had such a favourable response to NIHMV, particularly in the knowledge that it remains controversial if subjects with COPD alone benefit from NIHMV. This is currently being addressed in a large multicentre study, the HOT HMV study in COPD (UK Clinical Research Network Study ID:8059).

It is quite concerning that the absolute numbers of patients who fall into the obesity hypoventilation/OSA category across all groups is so much higher than previous reports.[13] Our data substantiates the notion there is an alarming epidemic of obesity, and highlights its impact on healthcare utilisation, particularly for ventilation services. This observation, and the benefits of NIHMV for obese subjects, has been shown to improve quality of life.[14]

Overall improvement in gas exchange was greatest in group 3 in the context of minimal differences in the ventilator settings adopted (data not shown). Despite this observation, this finding did not translate into improved survival, or a disproportionate reduction in hospital admissions. However, this is perhaps not particularly surprising as subjects in group 3 had the lowest lung function parameters at baseline. Other outcomes in this group, such as hospital inpatient days and side effects, were similar to similar to those in group 1, itself a most positive finding. Keeping in mind the morphological and physiological respiratory changes that occur with advancing age, such as a decrease in alveolar air, loss of pulmonary capillaries and increased dead space, along with a greater likelihood of having unrelated respiratory co-morbidities, renders these outcomes overall to be very encouraging.

Age itself alone is clearly a poor marker of potential response of NIHMV. For the optimist we conclude that NIHMV improves gas exchange and reduces hospital admissions for elderly people. For the pessimist, we report that for the elderly group, who potentially should benefit disproportionately more from NIHMV when baseline variables are considered,

the improvements, relatively speaking, seem to be somewhat blunted. However, when all aspects are considered, we should all agree that the decision making process as to the appropriateness of long term NIV, as complex as it may be, should not inadvertently lean towards excluding the elderly, as these individuals can potentially benefit to the same degree as their younger counterparts.

REFERENCES

1. Meduri GU, Conoscenti CC, Menashe P, Nair S. Noninvasive face mask ventilation in patients with acute respiratory failure. *Chest.* 1989; **95(4):** 865-870.
2. British Thoracic Society. NIV Audit 2012. Available online from: https://www.brit-thoracic.org.uk/document-library/audit-and-quality-improvement/audit-reports/bts-adult-niv-audit-report-2012/2012. [Last accessed December 2014.]
3. Yokoyama T, Kondoh Y, Taniguchi H, Kataoka K, Kato K, Nishiyama O *et al.* Noninvasive ventilation in acute exacerbation of idiopathic pulmonary fibrosis. *Intern Med.* 2010; **49(15):** 1509-1514.
4. Tomii K, Tachikawa R, Chin K, Murase K, Handa T, Mishima M *et al.* Role of non-invasive ventilation in managing life-threatening acute exacerbation of interstitial pneumonia. *Intern Med.* 2010; **49(14):** 1341-7.
5. British Thoracic Society Standards of Care Committee. Non-invasive ventilation in acute respiratory failure. *Thorax.* 2002; **57(3):** 192-211.
6. Sferrazza Papa GF, Di Marco F, Akoumianaki E, Brochard L. Recent advances in interfaces for non-invasive ventilation: from bench studies to practical issues. *Minerva Anestesiol.* 2012; **78(10):** 1146-53.
7. Dave C, Turner A, Thomas A, Beauchamp B, Chakraborty B, Ali A, *et al.* Utility of respiratory ward-based NIV in acidotic hypercapnic respiratory failure. *Respirology.* 2014; **19(8):** 1241-7.
8. Clinical indications for noninvasive positive pressure ventilation in chronic respiratory failure due to restrictive lung disease, COPD, and nocturnal hypoventilation--a consensus conference report. *Chest.* 1999; **116(2):** 521-34.
9. Laudisio A, Scarlata S, Pedone C, Cortese L, Zito A, Antonelli Incalzi R. Noninvasive ventilation in older adults admitted to a pneumogeriatric unit. *J Am Geriatr Soc.* 2014; **62(6):** 1195-7.
10. Chevrolet JC, Fitting JW, Knoblauch A, Domenighetti G. [Home mechanical ventilation in Switzerland in 1990. Future developments]. *Schweiz Med Wochenschr.* 1991; **121(11):** 368-77.
11. Janssens JP, Cicotti E, Fitting JW, Rochat T. Non-invasive home ventilation in patients over 75 years of age: tolerance, compliance, and impact on quality of life. *Respir Med.* 1998; **92(12):** 1311-20.
12. Crespo A, Munoz X, Torres F, Marti S, Ferrer J, Morell F. Noninvasive home mechanical ventilation in elderly patients. *Gerontology.* 2010; **56(2):** 150-6.
13. Farrero E, Prats E, Manresa F, Escarrabill J. Outcome of non-invasive domiciliary ventilation in elderly patients. *Respir Med.* 2007; **101(6):** 1068-73.
14. Crummy F, Piper AJ, Naughton MT. Obesity and the lung: 2. Obesity and sleep-disordered breathing. *Thorax.* 2008; **63(8):** 738-46.

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Paper

Parathyroid Glands response to Low Vitamin D levels in Healthy Adults: A Cross-Sectional Study

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Abstract

Objective: To assess the correlation of serum parathyroid hormone (PTH) and vitamin D (25-OHD) levels based on different assays for measuring 25-OHD in healthy Saudi Arabians living along the east coast.

Patients and Methods: A cross-sectional study was conducted in 200 patients (150 women and 50 men aged between 18-69 years) between January 2011 and December 2012, attending outpatient clinic at King Fahd Hospital of the University, Al Khobar. The first 200 patients seen without vitamin D supplementation at clinic were enrolled in the study. Serum calcium, phosphorous, alkaline phosphatase, parathormone, and 25-OHD tests were performed.

25-OHD was assessed using:

1. chemiluminescence immunoassay (CLIA)
2. radioimmunoassay (RIA) using Wallac 1470 Gamma Counter
3. HPLC –LC.MS (high performance liquid chromatography-liquid chromatography with mass spectrometry.

The data was collected, entered into a database and analysed using SPSS, Inc., version 14.

Results: The mean age was 45.8±15.8 (18-74) years, and calcium level was 2.27±0.15 mmol/l. (range 2.125 to 2.62 mmol/l). Alkaline phosphatase was 88.91±35.94 (34-302) IU, parathormone 6.7±3.06 (1.35-21.2) (1.3-6.8 pmol/l). Of the participants, 188 were either vitamin D insufficient or deficient as measured by CLIA 11.85±6.14 (2-29.6), and 91 (48.4%) of them had secondary hyperparathyroidism 9.48±4.55 pc/l. Those with normal CLIA-measured 25-OHD levels had normal PTH levels. Of those with insufficiency, 4/21 (19%) had raised PTH levels; and of those with deficiency, 81/166 (48.79%) had raised levels, whereas with HPLC-LC.MS, 156 were shown to be insufficient and 97 deficient (with PTH level of 7.41±4.2). Thirteen of 41 patients (31.7%) with insufficiency were shown, by HPLC-LC.MS, to have raised PTH. All patients with vitamin D deficiency as diagnosed by HPLC-LC.MS had secondary hyperparathyroidism.

Conclusions: The above results suggest that the method of measurement strongly influences vitamin D levels and that previous reports suggesting no association between vitamin D deficiency and secondary hyperparathyroidism should be viewed with caution.

INTRODUCTION:

Hyperparathyroidism is a disease entity that occurs due to increased secretion of parathyroid hormone (PTH) from parathyroid glands and causes hypercalcemia.[1] Secondary hyperparathyroidism is a response to low calcium levels related to hypovitaminosis D. It is well established that there is an inverse relationship between serum 25-hydroxyvitamin D (25-OHD) and serum PTH.[2,3] The levels of 25-OHD that lead to a rise in serum PTH are still a matter of debate.[4-6] Reports suggest that not all who are vitamin D insufficient have increased PTH levels.[7-9] It has been suggested that the variability of PTH levels in hypovitaminosis D may be due to concomitant magnesium deficiency.[9] Patel et al.[10] suggested that glomerular filtration rate is the single most important factor in maintaining PTH levels. Gunnarsson et al.,[11] while supporting the kidney function hypothesis, felt that body mass index may play a role in women by blunting the level of PTH and added that in men, insulin-like growth factor 1, smoking, and testosterone levels may do the same.

A diagnosis of secondary hyperparathyroidism will therefore depend on measurement of an insufficient or deficient amount of 25-OHD in association with a rise of PTH. The World Health Organization (WHO) described a serum level of 25-OHD of 20 ng/ml or 50 nmol/l as deficiency[12] and a level of 30 ng/ml (75 nmol/l) as normal because at this level, PTH drops down to normal levels.[13,14] At present, it is believed

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TABLE I:

Demographic characteristics of the patients

Variables	**Total (n=200)**	
	Male	***Female***
Sex	50 (25)	150 (75)
Age (years)	48.1±17.0 (14-76)	44.8±15.7 (3-80)
Calcium mmol/L	2.287±0.21	2.4±0.065
PO4mg/dl	3.7±0.6 (2.6-4.9)	4.0±2.9 (1.8-39.0)
Parathromone (pmol/L)	7.9±3.5 (3.2-19.8)	6.6±4.2 (1.4-43.9)
25-OHD (ng/mL)	13.3±7.2 (2.0-34.6)	14.0±14.0 (3.3-150.0)
Chemiluminescent immunoassays (ng/mL)	9.2±0.7 (8.3-13.1)	9.6±6.3 (7.9-86.0)
HPLC-D3 (ng/mL)	12.4±4.0 (6.0-25.0)	24.7±14.5 (12.0-150.0)

Values are presented as Mean ± SD or n (%); Range in Parenthesis

that below 30 ng/ml of 25-OHD, the level of PTH should start rising.[15-16]

A review of literature did not reveal any studies correlating PTH levels to the accuracy of 25-OHD levels by different assays; hence, our objective was to determine whether any correlation existed between the true levels of 25-OHD and PTH levels by means of three different assays.

PATIENTS AND METHODS:

A cross-sectional study was conducted in 200 patients (150 women and 50 men) between January 2011 and December 2012, aged between 18-69 years, attending the outpatient clinics at King Fahd Hospital of the University, Al Khobar, Saudi Arabia. The first 200 patients seen who were not taking vitamin D supplementation were included in the study.

TABLE II:

25-OHD levels with ≤20 ng/ml as deficiency, 21-29 as insufficiency and normal level as ≥30ng/ml.

Vitamin D Levels	Normal		Insufficiency		Deficiency	
	PTH levels		PTH levels		PTH levels	
	Normal	Raised	Normal	Raised	Normal	Raised
CLIA	12	0	18	4	80	86
RIA	18	0	6	22	52	102
HPLC	44	0	13	28	0	115

An earlier study had shown that there was wide variation between the three assays tested. -using a 30 ng/ml cut-off, 6%, 9%, and 22% had normal levels of 25-OHD in CLIA, RIA, and HPLC LC-MS, respectively, and showed different levels of hyperparathyroidism.[17] Patients' weight, height and results of renal and liver function tests were extracted from the medical charts. Serum calcium, phosphorous, alkaline phosphatase, PTH, and 25-OHD tests were performed. 25-OHD was assessed using chemiluminescence immunoassay (CLIA), radioimmunoassay using Wallac 1470 Gamma Counter, and HPLC-LC.MS (high performance liquid chromatography-liquid chromatography with mass spectrometry). The data were analysed using the Statistical Package for the Social Sciences (SPSS), version 14.0, Chicago, Illinois. Data is presented as a mean ± standard deviation (SD). Mean serum 25-hydroxyvitamin D values with 95% confidence intervals (CI) for each assay were calculated, and a p value of <0.05 was considered significant. Each was then compared with parathyroid hormone levels and labelled as normal, insufficient, and deficient in 25-OHD as determined by each assay using linear regression analyses for the relationship between age, sex, CLIA, RIA, HPLC-LS.MS and PTH levels and the correlation between PTH and CLIA, RIA, and HPLC-LS.MC.

RESULTS:

The mean age was 45.8±15.8 (18-74) years, and calcium level was 2.27±0.15 mmol/l. (range 2.125 to 2.62 mmol/l). Alkaline phosphatase was 88.91±35.94 (34-302) IU, PTH 6.7±3.06 (1.35-21.2) (1.3-6.8 pmol/l). Table 1 gives the demographic data of all the patients. Table 2 gives the comparison of 25-OHD between the three assays. Of the participants, 188 were either insufficient or deficient as shown by CLIA 11.85±6.14 (2-29.6), and 91 (48.4%) of them had secondary hyperparathyroidism 9.48±4.55 pc/l, whereas with HPLC-LC. MS, 156 were either insufficient or deficient, 97 with PTH level of 7.41±4.2. In patientswith insufficiency as shown by HPLC-LC-MS, 13/41 (31.7%) had raised parathyroid hormone.

All patients with vitamin D deficiency as diagnosed by HPLC-LC.MS had secondary hyperparathyroidism. Linear regression analyses for the relationship between the age, sex, BMI, creatinine level, and alkaline phosphatase, CLIA, RIA, and LC. MS against PTH levels are given in Table 3. It is clear from Table 3 illustrating linear regression that the beta coefficient of the regression of PTH on RIA is significant at beta=0.160, t=2.341, $p<0.05$ and HPLC-LC.MS beta=-0.228,

Table III:

Linear regression analyses for the relationship between the age, sex, BMI, Creatinine level and Alkaline Phosphatase, CLIA, RIA and HPLC-LC.MS against the Parathromone.

	Unstandardized Coefficients		R-square	F-value	t	P-value
	B	Std. Error				
(Constant)	7.965	1.767			4.509	.000
AGE	.018	.017			1.052	.294
SEX	-.022	.699			-.031	.975
BMI	.013	.015				
Creatinine level	.011	.010				
Alkaline Phosphatase	.011	008	0.151	5.551	1.361	.175
Chemiluminescent immunoassays	-.050	.050			-.995	.321
Radioimmunoassay	.160	.068			2.341	**.020**
High-pressure liquid chromatography-D3	-.228	.061			-3.714	**.000**

Dependent Variable: PARATHROMONE

t=-3.714, p<0.001 with r square of 0.151, and that there is a significant association between PTH and RIA and HPLC-LC. MS.

We further performed Pearson correlation analysis, showing the relationship between the variables, and the table depicts that PTH has a significant negative relationship with RIA (r = -0.247, p <0.001), HPLC-LC.MS (r=-0.322, p<0.001) and that RIA has a positively significant relationship with HPLC-LC.MS (r=0.946, p<0.001). Hence, there is a significant relationship between PTH and RIA, HPLC-LC.MS (Table 4).

Table IV:

Correlation between Parathormone and CLIA, RIA, HPLC-LC.MS.

		CLIA	RIA	HPLC
PARATHROMONE	r-value	-.054	**-.247**	**-.322**
	P-value	.451	.000	.000
CLIA	r-value	1	.045	.032
	P-value		.523	.654
RIA	r-value		1	**.946**
	P-value			.000
HPLC	r-value			1
	P-value			

DISCUSSION

Our study shows that there is a definite association between hyperparathyroidism and 25-OHD levels, but the assay chosen will influence the level of 25-OHD and hence classification of a patient as vitamin D deficient or insufficient. All patients with normal 25-OHD as assessed by all three assays, CLIA, RIA, and HPLC-LC.MS, had normal PTH levels. In patients with deficiency, PTH was raised in 51.8%, 66.23%, and 100% as assessed by CLIA, RIA, and HPLC-LC.MS, respectively.

Our study further supports others which indicate the inverse relationship of 25-OHD and PTH,[2,3,18,19] even though Kilicarslan, Cenoliaslan, and Gezgen[20] reported that in their study, that over 75% of the vitamin D-deficient patients had normal levels of PTH. In another study of a small number of patients by Elsammak et al.[21] PTH did not correlate with serum vitamin D level in either of the genders.

Studies have reported different influencing factors that raise PTH level and are not related directly to the level of 25-OHD. Moreover, Vučeljić et al[22] found that a raised PTH level is not seen in all patients with 25-OHD deficiency. In their study, only 25.3% with 25-OHD deficiency had raised PTH. On the other hand, Arabi et al[23] stated that the negative relationship between 25-OHD and PTH is modulated by age but not gender. Secondly, reports from the Middle Eastern countries indicate that an inverse relationship exists between vitamin D and PTH levels in all age groups.[24,25] In this study, we have noticed that the relationship between PTH and 25-OHD existed in all age groups and that gender does play a role. Our male population had significantly higher PTH levels when compared to the female population (7.9±3.5 versus 6.6±4.2 P<0.039), while the 25-OHD level was 13.3±7.2 versus 14.0±14.0 ng/ml (P<0.723), respectively.

Ardawi et al[26] in their study found that the inverse relationship between 25-OHD and PTH was not influenced by the level of 25-OHD and could not pinpoint the levels of 25-OHD at which PTH levels will plateau. From the studies cited above, it appears that various factors play a role in raising the PTH, but we believe that one important factor that increases PTH is a level of 25-OHD below 20ng/ml. The inconsistency of other reports of the relationship of PTH and 25-OHD may be due to the inaccuracy of the assay used in the assessment.

Our study has limitations as a small cohort group, and differences in the gender comparison were unequal; secondly, we also need to compare results from different PTH assays,

as well. The strength of our study is that we have tried for the first time to check the vitamin D levels with three different assays and simultaneously correlate PTH levels with different assays. The results of this study, we believe, should give a direction for future studies to correlate PTH levels with 25-OHD with a properly calibrated assay.

In conclusion, we found that serum PTH levels are normal with all 25-OHD assays of ≥30ng/ml, while issues lie in the accurate measurement of insufficiency and deficiency of 25-OHD. With HPLC-LC.MS, the gold standard to assess 25-OHD, all deficient patients had a raised PTH, while other assays showed normal PTH.

REFERENCES:

1. Fraser WD. Hyperparathyroidism. *Lancet.* 2009; 374(9684): 145–58.
2. Dawson-Hughes B, Harris SS, Dallal GE. Plasma calcidiol, season, and serum parathyroid hormone concentrations in healthy elderly men and women. *Am J Clin Nutr*. 1997;**65(1)**:67-71.
3. Chapuy MC, Preziosi P, Maamer M, Arnaud S, Galan P, Hercberg S, *et al.* Prevalence of vitamin D insufficiency in an adult normal population. *Osteoporosis Int*. 1997;**7(5)**:439-43.
4. McCabe MP, Smyth MP, Richardson DR. Current concept review: vitamin D and stress fractures. *Foot Ankle Int.* 2012; **33(6)**: 526–33.
5. Shakinba M, Tefagh S, Nafei Z. The optimal dose of vitamin D in growing girls during academic years: a randomized trial. *Turk J Med Sci.* 2011; **41(1)**: 33–7.
6. Bischoff-Ferrari H. Vitamin D: what is an adequate vitamin D level and how much supplementation is necessary? *Best Pract Res Clin Rheumatol.* 2009; **23(6)**: 789–95.
7. Sai AJ, Walters RW, Fang X, Gallagher JC. Relationship between parathyroid, vitamin D and bone health. *J Clin Endocrinol Metab.* 2011; **96(3)**:E436-46.
8. Sahota O, Gaynor K, Harwood RH, Hosking DJ. Hypovitaminosis D and 'functional hypoparathyroidism' – the NoNoF (Nottingham Neck of Femur) study. *Age Ageing.* 2001; **30(6)**: 467–72.
9. Sahota O, Mundey MK, San P, Godber IM, Hosking DJ. Vitamin D insufficiency and the blunted PTH response in established osteoporosis: the role of magnesium deficiency. *Osteoporos Int*. 2006; **17(7)**: 1013–21.
10. Patel S, Hyer S, Barron J. Glomerular filtration rate is a major determinant of the relationship between 25-hydroxyvitamin D and parathyroid hormone. *Calcif Tissue Int.* 2007; **80(4)**: 221–6.
11. Gunnarsson O, Indridason OS, Franzson L, Sigurdsson G. Factors associated with elevated or blunted PTH response in vitamin D insufficient adults. *J Int Med.* 2009; **265(4)**: 488–95
12. WHO Scientific Group on the Prevention and Management of Osteoporosis. Prevention and management of osteoporosis: report of a WHO scientific group. Technical report series; 921. Geneva: World Health Organization; 2003.
13. Dawson-Hughes B, Heaney RP, Holick MF, Lips P, Meunier PJ, Vieth R. Estimates of optimal vitamin status. *Osteoporos Int.* 2005;1**6(7)**:713–6
14. Holick MF. Vitamin D deficiency. *N Engl J Med.* 2007;357(3):266–81
15. Wallace AM, Gibson S, de la Hunty A, Lamberg- Allardt C, Ashwell M. Measurement of 25-hydroxyvitamin D in the clinical laboratory: current procedures, performance characteristics and limitations. *Steroids.* 2010; **75(7)**: 477–88.
16. Ross AC, Taylor CL, Yaktue AL, Valle HB. Committee to review dietary reference takes for vitamin d and calcium. DRI Dietary reference intakes for calcium and vitamin D. Washington, DC: The National Academies Press; 2011. .
17. Sadat-Ali M, Al-Elq AM, Al-Turki HA, Al-Shaikh EH, Al-Ali AK, Al-Othman AA. assessment of low vitamin D among Saudi Arabians. Did we overshoot the runway?. *Saudi Med J.* 2014;**35(10)**:1243-9.
18. Adami S, Viapiana O, Gatti D, Idolazzi L, Rossini M. Relationship between serum parathyroid hormone, vitamin D sufficiency, age, and calcium intake. *Bone.* 2008 ;**42(2)**:267-70
19. Willett AM. Vitamin D status and its relationship with parathyroid hormone and bone mineral status in older adolescents. *Proc Nutr Soc.* 2005; **64(2)**:193–203
20. Kilicarslan A, Aslan AC, Gezgen G. The role of vitamin D deficiency in parathyroid hormone levels. *Turk J Med Sci.* 2013; **43(3)**: 368-72
21. Elsammak MY,. Al-Wosaibi AA, Al-Howeish A , Alsaeed J. Vitamin d deficiency in Saudi Arabs. *Horm Metab Res.* 2010; **42(5)**:364-8
22. Vučeljić M, Ilić-Stojanović O, Lazović M, Grajić M. Vitamin D and parathyroid hormone in relation to bone mineral density in postmenopausal women. *Vojnosanit Pregl.* 2012; **69(3)**: 243–8.
23. Arabi A, Baddoura R, El-Rassi R, El-Hajj Fuleihan G. Age but not gender modulates the relationship between PTH and vitamin D. *Bone.* 2010; **47(2)**: 408–2
24. Saadi HF, Nagelkerke N, Benedict S, Qazaq HS, Zilahi E, Mohamadiyeh MK, *et al.* Predictors and relationships of serum 25 hydroxyvitamin D concentration with bone turnover markers, bone mineral density, and vitamin D receptor genotype in Emirati women. *Bone.* 2006;**39(5)**:1136-43.
25. Hosseinpanah F, Rambod M, Hossein-Nejad A, et al. Association between vitamin D and bone mineral density in Iranian postmenopausal women. *J Bone Miner Metab.* 2008; **26(1)**:86-92.
26. Ardawi MS, Sibiany AM, Bakhsh TM, Qari MH, Maimani AA .High prevalence of vitamin D deficiency among healthy Saudi Arabian men: relationship to bone mineral density, parathyroid hormone, bone turnover markers, and lifestyle factors. *Osteoporos Int.* 2012; **23(2)**:675-86.

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Education

A novel approach to improve undergraduate surgical teaching

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Abstract

Background: Undergraduate surgery is at an important crossroads. Many departments report significant difficulties delivering effective teaching. Our student feedback indicated a dated surgical curriculum lacking structure, quality and uniformity. We report on a new "blended" approach employing a combination of professional DVDs, case based discussions, online material and traditional bedside teaching designed to provide structure, standardization, and equality of learning .

Methods: Year 4 students who had undertaken the new course and year 5 students who had participated in the traditional teaching programme were compared. Students completed a 20 item questionnaire about their experiences of the surgical teaching programme.

Results: One hundred and seventy-one year 4 (70%) and148 year 5 students (66%) responded. Domains relating to "Overall Satisfaction with the course", "Approval of innovative teaching methods and interactivity" and "Satisfaction with the clarity of course information" showed improvements when comparing the new and old programmes. However bedside teaching was not rated as highly in the new programme ($p<0.05$).

Conclusion: This blended approach has resulted in improved student understanding and engagement. The apparent compromise of bedside teaching may be a reflection of higher expectations. We believe that a similar blended approach has the potential to re-invigorate surgical teaching elsewhere.

INTRODUCTION

Surgical teaching in UK medical schools is at a crossroads. Formerly a stalwart in the undergraduate curriculum, "teaching" departments of surgery have seen a steady decline, while at the same time a number of challenges have conspired against the traditional partnership between academia and the National Health Service, which proved so effective in the past, in delivering surgical education to undergraduate students[1, 2].

The first of these challenges has been the increasing trend towards sub-specialisation with both its impact on appropriate "case-mix" for students and on the sometimes (misplaced) lack of confidence specialists may have in teaching general surgical topics. Many younger consultants are now super-specialised [3, 4] and are less comfortable in teaching medical students on surgical topics outside their particular field of expertise[5].

A second challenge has been the "New Consultant Contract", one consequence of which has been a lack of job plan recognition of teaching commitments and corresponding inadequate remuneration in contracts. This, in some cases, has led to previously enthusiastic teachers withdrawing their support for undergraduate surgical teaching because they feel they are undervalued and their contributions largely unrecognised[6].

A further challenge has been the significant increase in the number of students. Over the last decade, our institution has seen a doubling of student numbers with enrolments now approaching 280 students per annum. This has created problems in the delivery of traditional bedside teaching with tutors finding it more difficult to facilitate up to 10 students around the bedside.

These challenges are compounded by the knock on effect of the European Working Time Directive's impact on surgical trainees' availability to teach[7].

The challenges evident on the national stage mirrored the concerns we were having locally. Feedback revealed a wide variation in the student experience with regard to surgical teaching. In some units teaching was highly regarded but in others students felt abandoned.

Will surgical teaching largely become a postgraduate topic? We believe that surgery has an important wider role to play in the undergraduate curriculum. In this paper we explore one route that departments of surgery could follow to promote a re-invigoration of undergraduate surgical teaching.

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The intervention described and evaluated in this paper involved three main strands:

1. The development of a set of teaching and learning materials designed to address the reluctance of some specialists to get involved in general surgical teaching.
2. The re-engagement of NHS colleagues through involvement in the development process above and to thereby help "standardise" the delivery of teaching at multiple sites.
3. The delivery of a blended learning approach, allied to bedside teaching, incorporating multi-media, elearning, pre-prepared materials for case based discussion and tutor notes.

The principle aim was to incorporate, at the centre of the programme, the generic principles enshrined within the GMC's "*Tomorrow Doctors*"[8, 9]. A new curriculum would need to impart skills, knowledge and professional attitudes in a competency based framework and would incorporate "patient safety" as a core element[10].

Initially key stakeholders within the university and NHS teaching hospitals were consulted. After extensive consultation it was finally agreed to institute a new 6 week structured and uniform "blended"[11, 12, 13] teaching programme.

A blended learning programme was developed. This consisted of (a) online preparatory materials (b) topic specific video expert lectures (c) case based discussion materials and (d) follow up bedside teaching.

Fig 1. Phase 3 Students participating in the new Surgical Teaching Programme (with permission)

This new six-week programme was delivered on a daily basis in each of the 10 sites receiving year 3 students; each student receiving 2 hours/ per day of facilitated teaching by an experienced surgeon. The first hour was spent working through a "Tutorial Package" consisting of a DVD based lecture (Figure 1) and case based discussion, on chosen surgical topics, and the second receiving traditional bedside teaching. "Tutorial Packages" were developed with the assistance of regional NHS experts, from across all 10 sites in Northern Ireland, in collaboration with the University. The professionally produced DVDs were of a high standard. The surgical section of the medical education online "Portal" was developed in tandem with the face to face tutorial materials to provide students with learning outcomes, pre-tutorial reading information and revision material. The topics chosen were selected to provide the students with a broad overview of common surgical disorders and exposure to the key principles of surgery. (Table 1) The project took 9 months to complete with production only costs amounting to approximately £20,000.

Table 1:

List of Phase 3 topics covered in DVD/ Case Based Discussion "Tutorial Packages"

Tutorial	**Title**
1	The Acute Abdomen
2	Acute Appendicitis
3	Fluids and Electrolytes
4	Hernia
5	Pre-operative assessment
6	Gallstones
7	Shock
8	Colorectal Carcinoma
9	Abdominal Aortic Aneurysm
10	Pain Control
11	Jaundice
12	Post-operative complications
13	Inflammatory Bowel Disease
14	Haematemesis and Melaena
15	Varicose Veins
16	Blood Transfusion
17	Infection Control
18	Malnutrition and Nutrition Support
19	Benign and Malignant Thyroid Dis.
20	Peripheral Arterial Disease
21	Pancreatitis
22	Breast Cancer
23	Intestinal Obstruction
24	Sepsis
25	Diverticular Disease
26	Perianal Conditions
27	Patient Safety
28	Level of Care and Monitoring
29	Hypercalcaemia and Parathyroid

To gauge the impact on students of these changes we conducted a study aimed to answer the question "What are the attitudes of undergraduate medical students to a new blended video and web assisted undergraduate surgical teaching when compared to the attitudes of students who underwent surgical teaching using traditional teaching methods?"

Phase 3 Surgery Attachment Questionnaire Date Sept 2011

Age_____ Male/Female Undergrad/ Mature Student (please circle)

Did you take an intercalated break last year (Phase 4 students only) Yes/ No

Did you take an intercalated break in the last 2 years (Phase 5 students only Yes/ No

Please circle most appropriate response

		1 Strongly disagree	*2 Disagree*	*3 No opinion*	*4 Agree*	*Strongly agree*
1.	The learning objectives were unclear	1	2	3	4	5
2.	Before attending tutorials I knew what to read up on	1	2	3	4	5
3.	The website material was not easily accessible	1	2	3	4	5
4.	Website material was of a high standard	1	2	3	4	5
5.	The tutorials often did not commence on time as scheduled	1	2	3	4	5
6.	The facilitator was generally present throughout the tutorials	1	2	3	4	5
7.	The facilitator was normally a senior surgeon	1	2	3	4	5
8.	The facilitator was often unprepared to take the tutorial	1	2	3	4	5
9.	The tutorials were well thought out and structured	1	2	3	4	5
10.	The facilitator made use of “up to date” audiovisual aids	1	2	3	4	5
11.	Case based discussion were regularly used during tutorials	1	2	3	4	5
12.	The case based discussion was very interactive	1	2	3	4	5
13.	The facilitators were often unhelpful	1	2	3	4	5
14.	The tutorials were often cancelled or there were “no-shows”	1	2	3	4	5
15.	The tutorials helped in preparation for P3 assessment exam	1	2	3	4	5
16.	Patient safety issues were emphasized during the course	1	2	3	4	5
17.	The tutorials were too advanced	1	2	3	4	5
18.	I was generally very unsatisfied with the course	1	2	3	4	5
19.	I have utilized knowledge gained in subsequent attachments	1	2	3	4	5
20.	Taught bedside teaching was an integral part of the attachment	1	2	3	4	5

Any comments/ suggestions for improvement

Fig 2. Likert Scale Questionnaire

METHODS

Assessment of the effect of change of teaching delivery of this programme involved a Student Information Sheet, Consent Form and a "Likert Scale" paper questionnaire (Figure 2). These were circulated to year 4 students who had undergone and completed the new programme and year 5 students who had participated in the previous teaching programme as a control group. The study was granted University ethical approval, was voluntary and the results anonymised. Results were analysed using independent sample t-test (SPSS).

A statistical power calculation required recruitment of 100 students into both new and traditional teaching groups respectively in order to have 80% power to determine a true mean difference between populations in attitudinal (Likert) scale of 0.4 as statistically significant, assuming a two-tailed test and a significance level of 5%.

Raw data were entered using Microsoft Excel (©Microsoft 2007). Data interpretation was performed using SPSS (©IBM Corporation 2011). Factor analysis (principle components with varimax rotation[14] was undertaken to attempt to identify underlying domains in the questionnaire; i.e. statistical evidence to identify whether responses to multiple questions showed evidence of association or "thematic relationships". The items within the domains were orientated so that a high score represented a positive viewpoint and a low score a negative viewpoint.

For each domain mean scores were projected onto a scale where 100= the best possible outcome and 0=the worst possible outcome. This is analogous to the treatment of Quality of Life Analysis's (QOL) eg. SF36[15]. Domain scores were then analysed by "unpaired" or "independent samples" t Tests.

A value of $P<0.05$ was considered significant.

RESULTS

One hundred and seventy-one of 246 Year 4 students (70%) and 148 of 240 year 5 students (66%) agreed to voluntarily participate in the study. Of the Year 4 students 9 had taken an intercalated degree the previous year and were, therefore, included in the year 5 group. These 9 students had completed their surgical attachments prior to the introduction of the new teaching programme.

There were 65 male (38%) and 106 female (62%) students in the year 4 group (n=171). Eleven of 171 students were graduates (6%).

There were 51 male (34%) and 97 females (66%) in the year 5 group (n=148). Three of 148 students were graduate students (2%).

With respect to demographics, there were neither age nor gender differences in the way students responded to the questionnaire.

Factor analysis (principle components with varimax rotation) was undertaken in an attempt to identify underlying domains in the questionnaire; i.e. statistical evidence to detect whether responses to multiple questions showed evidence of association or "thematic relationships". This was successful in identifying 3 separate domains containing 8, 5 and 4 items respectively; i.e. Seventeen of the 20 questions provided significant results. These three domains related to "Overall

TABLE 2:

Key Domains identified by factor analysis (P<0.001)

Domain 1: Overall course satisfaction	5. The tutorials often did not commence on time as scheduled 6. The facilitator was generally present throughout the tutorials 7. The facilitator was normally a senior surgeon 8. The facilitator was often unprepared to take the tutorial 9. The tutorials were well thought out and structured 13. The facilitators were often unhelpful 14. The tutorials were often cancelled or there were "no-shows" 18. I was generally very unsatisfied with the course
Domain 2: Approval of innovative teaching methods and interactivity	10. The facilitator made use of "up to date" audiovisual aids 11. Case based discussions were regularly used during tutorials 12. The case based discussion was very interactive 15. The tutorials helped in preparation for Phase 3 assessment examination 16. Patient safety issues were emphasized during the course
Domain 3: Satisfaction with the clarity of course information	1. The learning objectives were unclear 2. Before attending tutorials I knew what to read up on 3. The website material was not easily accessible 4. Website material was of a high standard

satisfaction with the course", "Approval of innovative teaching methods and interactivity" and "Satisfaction with the clarity of course information". Students who participated in the new course positively rated all 3 domains as significantly improved when compared to students who had completed the older surgical teaching course ($p<0.001$) (Table 2). Each domain provided reliability coefficients of better than 0.6 (Table 3).

Table 3:

Summary Table of Means and Confidence Intervals relating to Domains 1-3

Domain	Old Teaching Method	New teaching Method	Difference +/- 95% Confidence Intervals
1. Overall course satisfaction	53.0	68.6	15.6 (11.2-20.1)
2. Approval of innovative teaching methods and interactivity	51.0	69.0	18.0 (13.9-22.0)
3. Satisfaction with the clarity of course information	59.4	75.0	15.6 (12.1-19.1)

Students in the new programme did not view "taught bedside teaching as an integral part of their attachment" as favourably as their predecessors in the old programme ($P<0.003$) (Table 4).

Table 4:

Question 20: Cross tabulation of responses:

	SD	D	NO	A	SA	Total
Count "Old Method" As %	12 7.6%	22 14%	14 8.9%	64 40.8%	45 28.7%	157 100%
Count "New Method" As %	24 14.8%	36 22.2%	19 11.7%	44 27.2%	39 24.1%	162 100%
Total Count As %	36 11.3%	58 18.2%	33 10.3%	108 33.9%	84 26.3%	319 100%

Key to abbreviations above:

SD Strongly disagree
D Disagree
NO No Opinion
A Agree
SA Strongly agree

When asked whether they had "utilized knowledge gained in subsequent attachments", there appears to be a linear trend (Table 5) showing that students are probably more likely to use knowledge gained during the new surgical teaching method in subsequent attachments compared to students who participated in the old teaching programme ($P=0.097$).

Table 5:

Cross tabulation showing response to question:

Number 19. " I have utilized knowledge gained in subsequent attachments"

	SD	D	NO	A	SA	Total
Count "Old Method" As %	1 .6%	12 7.6%	35 22.3%	97 61.8%	12 7.6%	157 100%
Count "New Method" As %	2 1.2%	5 3.1%	40 24.7%	87 53.7%	28 17.3%	162 100%
Total Count As %	3 .9%	17 5.3%	75 23.5%	184 57.7%	40 12.5%	319 100%

Key to abbreviations above:

SD Strongly disagree
D Disagree
NO No Opinion
A Agree
SA Strongly agree

DISCUSSION

In 2003, in a leading article entitled "Surgery in the UK Undergraduate Curriculum", in the journal, Surgery Professor Irving Taylor, chairman of the Education and Professional Development Committee of the Society of Academic and Research Surgery, , quoted the erstwhile Education Secretary, Charles Clarke with "The days of great research accompanied by shoddy teaching are gone"[16, 17]. However Taylor commented that, in contrast to what was required to improve surgical teaching, there was, in fact, a reduction in the ability of many traditional "surgical firms", to provide an appropriate environment and resource (staff) to maintain a pre-eminent position as a provider of undergraduate medical education[1, 2]. We believe that the interventions described in this paper have the potential of putting surgery on a road to rediscover the key contribution that surgery can make in the education of medical students.

The primary quantitative study findings are encouraging, providing evidence that the introduction of a regional "blended" learning environment using new web and DVD/ video assisted undergraduate surgical teaching programme was viewed positively by students participating in this programme.

That a blended learning model of undergraduate surgical teaching has met with the approval of students concurs well with the positive findings of other studies in urology, respiratory care and primary care teaching[13, 11, 12].

> In addition to good student feedback, the creation of the surgery teaching DVDs has helped to secure "buy in" from NHS colleagues across Northern Ireland.

However, the evaluation also highlighted that our new "DVD/ Case Based Discussion" Tutorial Packages may have had a deleterious effect on bedside teaching. This is an area we are actively monitoring to ensure that bedside teaching has not been pushed to one side. However from discussion with facilitators we believe this may simply be the result of increased student expectation as a result of the new course.

The main limitations of this study are that it is questionnaire based and focused on one medical school. However this method was well suited to the purpose of demonstrating the impact of a new approach to surgical teaching. The response rates where high in both cohorts (70% and 66% respectively) and statistically significant differerences between the two cohorts were demonstrated. The problems associated with surgical teaching are common across the UK and there is no reason to believe that similar approaches in other school would not also lead to the greater engagement of students and staff outlined in this paper.

Hill assessed the complementary value of traditional bedside teaching and structured clinical teaching in introductory surgical studies. He concluded that both teaching strategies should be regarded as of equal value in the context of teaching surgery to undergraduate medical students[18] and we have endeavoured to reinforce this to both students and teachers; as have other groups[19, 20, 21, 22].

Subsequent to the findings from this study it has been emphasised to those "stakeholders" charged with delivery of teaching that continued emphasis on accompanying bedside teaching is to be encouraged. Novel methods to increase staff participation, include giving feedback to faculty[23], presenting relevant literature and communicating to staff the need to prepare patients for visits may be useful[24]. In our institution we hold face to face meetings with our site coordinators at least once per semester. Furthermore teachers, who regularly teach clinical skills at the bedside, comment that they personally benefit in that their own clinical skills improve[25]. However the teaching sessions are now lengthened, and have an increased intensity with a greater time commitment from faculty, something which is not always appreciated by health service management.

We aim to revise the DVD series on a 5 yearly basis.

Future work will involve longitudinal studies to determine how these new methods of teaching prepare students for Foundation years and beyond, and whether they help generate enthusiasm in some for a future career in surgery. Using these blended teaching modalities, with its online, DVD and around the bedside teaching, should help strengthen the perception of the surgeon as a role model as a teacher and clinician

To our knowledge the "roll out" of a regional blended web and video enhanced structured and uniform undergraduate surgical teaching programme has not been attempted elsewhere in any other geographical locality within the United Kingdom and Ireland.

We suggest our method of blended DVD, online and bedside teaching may benefit students and teachers alike (and in due course our patients) and for this reason others may wish to consider adopting our approach. The blended teaching programme has standardised the curriculum and removed ad-hoc teaching. Initial analysis is positive however the programme requires to be kept under ongoing review.

REFERENCES

1. Agha RA, Papanikitas A, Baum M, Benjamin IS. The teaching of surgery in the undergraduate curriculum. Part II--Importance and recommendations for change. *Int J Surg.* 2005;**3(2)**:151-7.
2. Agha RA, Papanikitas A, Baum M, Benjamin IS. The teaching of surgery in the undergraduate curriculum--reforms and results. *Int J Surg*. 2005;**3(1)**:87-92.
3. Coleman JJ, Esposito TJ, Rozycki GS, Feliciano DV. Early subspecialization and perceived competence in surgical training: are residents ready? *J Amer Coll Surg*. 2013;**216(4)**:764-71.
4. Grant SB, Dixon JL, Glass NE, Sakran JV. Early surgical subspecialization: a new paradigm? Part I. *Bull Am Coll Surg*. 2013;**98(8)**:38-42.
5. Albritton W, Bates J, Brazeau M, Busing N, Clarke J, Kendel D, *et al.* Generalism versus subspecialization: changes necessary in medical education. *Can J Rural Med.* 2006;**11(2)**:126-8.
6. Cookson JB. More on the consultant contract. . . . And what about the teaching role of consultants? *BMJ*. 2002;**325(7363)**:545.
7. Morris-Stiff GJ, Sarasin S, Edwards P, Lewis WG, Lewis MH. The European Working Time Directive: One for all and all for one? *Surgery.* 2005; **137(3)**:293-7.
8. Vallance A, Higham J. A toolkit to meet Tomorrow's Doctors standards. *Med Educ.* 2011;**45(5)**:508.
9. Roberts T. Tomorrow's curriculum for tomorrow's doctors. *Med Teach*. 2011;**33(7)**:517.
10. Busemann A, Busemann C, Traeger T, Festge OA, Neu J, Heidecke CD. [Curriculum "patient safety" for undergraduate medical students at the department of surgery, University of Greifswald]. *Zentralb Chir*. 2013;**138(6)**:657-62. German.
11. Lewin LO, Singh M, Bateman BL, Glover PB. Improving education in primary care: development of an online curriculum using the blended learning model. *BMC Med Educ.* 2009;**9**:33.
12. Strickland S. The effectiveness of blended learning environments for the delivery of respiratory care education. *J Allied Health.* 2009;3**8(1)**:E11-6.
13. Horstmann M, Renninger M, Hennenlotter J, Horstmann CC, Stenzl A. Blended E-learning in a Web-based virtual hospital: a useful tool for undergraduate education in urology. *Educ Health (Abington)*. 2009;**22(2)**:269.
14. Nordmann JP, Mesbah M, Berdeaux G. Scoring of visual field measured through Humphrey perimetry: principal component varimax rotation followed by validated cluster analysis. *Invest Ophthalmol Visual Sci.* 2005;**46(9)**:3169-76.

15. Garratt AM, Ruta DA, Abdalla MI, Buckingham JK, Russell IT. The SF36 health survey questionnaire: an outcome measure suitable for routine use within the NHS? *BMJ.* 1993;**306(6890)**:1440-4.

16. Taylor I. Surgery in the UK Undergraduate Curriculum. *Surgery(Oxford).* 2003;**21(5)**:i-ii.

17. Taylor I, Johnston ID. Surgery in the undergraduate curriculum--a statement by the Association of Professors of Surgery. *Br J Surg*. 1990;**77(7)**:822-3.

18. Hill DA, Lord RS. Complementary value of traditional bedside teaching and structured clinical teaching in introductory surgical studies. *Med Educ.* 1991; **25(6)**:471-4.

19. Williams KN, Ramani S, Fraser B, Orlander JD. Improving bedside teaching: findings from a focus group study of learners. *Acad Med.* 2008 Mar;**83(3)**:257-64.

20. Ramani S, Orlander JD, Strunin L, Barber TW. Whither bedside teaching? A focus-group study of clinical teachers. *Acad Med.* 2003;**78(4)**:384-90.

21. Janicik RW, Fletcher KE. Teaching at the bedside: a new model. *Med Teach*. 2003;**25(2)**:127-30.

22. Mel-B KA. What is happening to bedside clinical teaching? *Med Educ.* 2002;**36(12)**:1185-8.

23. Beckman TJ. Lessons learned from a peer review of bedside teaching. *Acad Med.* 2004; **79(4)**:343-6.

24. Mooradian NL, Caruso JW, Kane GK. Increasing the time faculty spend at the bedside during teaching rounds. *Acad Med.* 2001;**76(2)**:200.

25. Wenrich MD, Jackson MB, Ajam KS, Wolfhagen IH, Ramsey PG, Scherpbier AJ. Teachers as learners: the effect of bedside teaching on the clinical skills of clinician-teachers. Acad Med. 2011;**86(7)**:846-52.

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Education

Teaching Medical Students, what do Consultants think?

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Abstract

Background: The approach to and delivery of medical student education has undergone significant change within the last decade. There has been a shift away from didactic lectures to small group tutorials, facilitated by clinicians. Anecdotally there is an impression that enthusiasm for teaching is waning. The aim of this qualitative study is to assess the current attitudes of consultants, across all specialities, to teaching medical students in small group settings.

Methods: A Likert scale questionnaire, relating to teaching medical students in small group tutorials, was distributed via email to all consultants working in one region. Questions considered the categories: attitudes to teaching, financial considerations, time constraints and attitudes to students.

Results: 367 responses were received. 72% of responders were actively involved in teaching. 72% of respondents indicated that medical students should be taught by consultants and 80% felt that teaching medical students was enjoyable. 60% felt they were not financially remunerated for teaching and 50% indicated teaching was not included in job plans; despite this a significant proportion of these respondents remain involved in teaching (68%). Non-teachers were more likely to indicate that teaching was not paid for (p=0.003). 78% indicated consultants do not have adequate time to teach medical students. 82% felt that medical students appreciate consultant led teaching but only 55% felt students had an appropriate level of enthusiasm for learning.

Conclusion: Consultants in this Deanery are actively involved in medical student teaching and enjoy it. Consultants perceive that they are not adequately financially rewarded but for the most part this is not a deterrent. Time constraints are an issue and there is a desire to have teaching included in job plans to counteract this. Most consultants are complimentary about student attitudes but there is a perception that medical students need to contribute more to their own learning.

Keywords: Medical Students, Consultant-led teaching, Attitudes.

BACKGROUND

The approach to and delivery of medical student education has undergone significant change within the last decade[1]. The current educational process is different to that experienced by senior consultants. There has been a shift away from didactic lectures to small group tutorials, led by clinicians. Cognitive theory, student perceptions, performance measures and advice contained within the General Medical Council document "*Tomorrows Doctors"* have instigated this change[2,3,4,5]. Increases in medical student numbers require more clinicians to be involved. Anecdotally there is an impression that enthusiasm for teaching amongst consultants is waning. Conflicting demands on time, lack of recognition and attitudes of students have been identified by consultants as barriers to teaching [6,7,8]. The aim of this study is to assess the current attitudes of consultants, across all specialities, to teaching medical students in small group settings.

METHODS

A questionnaire was distributed via email to all consultants working in Northern Ireland. All specialities were represented. Twenty relevant statements were uploaded to *SurveyMonkey*[9]. Attitudes were assessed utilising a Likert rating scale, with opinion graded from 1 (strongly disagree) to 5 (strongly agree), (see figure 1). Direct questions were included to ascertain respondent demographics and participation in teaching. Free text comments were invited to describe reasons for not teaching, and any additional comments.

The statements used were generated following a round table discussion with 9 consultant surgeons and 10 trainees, of varying grades from foundation year two to registrar. Their opinions on current teaching practices and problems they had experienced were used to formulate the statements in this survey. It was specified that the study related only to

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Attitudes to teaching
Medical students should be taught by consultants
It is more appropriate for junior doctors (SHO or registrar grade) to teach medical students
It is the professional duty of a doctor to teach medical students
Teaching medical students is enjoyable
Financial Considerations
Consultants are financially remunerated for teaching medical students
Consultants who teach regularly should receive a higher salary than those who choose not to
Your trust encourages medical student teaching
Teaching medical students is included in consultant job plans
Teaching medical students is an act of good will
Time Constraints
Consultants have adequate time to teach medical students
Consultants should have dedicated time to teach medical students
Other clinical activities take priority over medical student teaching
Training and assessment of postgraduates has reduced time available for medical student teaching
Postgraduate training and assessment is more important than medical student teaching
Attitudes to Students
There are too many students in a typical group to provide effective teaching
Students appreciate consultant led teaching
In general students have an appropriate level of enthusiasm for learning
Students are reluctant to interact with consultants
Student participation makes teaching more enjoyable
Students should take more responsibility for their own learning

Figure 1. Statements presented in on-line questionnaire. Respondents asked to grade opinion strongly disagree, disagree, neither agree nor disagree, agree, strongly agree.

dedicated small group teaching sessions. The statements were categorised into:

- Attitudes to teaching
- Financial considerations
- Time constraints
- Attitudes towards students

Research Governance permission was granted by the South Eastern Trust Research and Ethics Committee. This institutional review board deemed ethical approval unnecessary. This research was carried out according to the declaration of Helsinki, there was no potential harm to participants and anonymity was guaranteed. Voluntary decision to participate following provision of explanation of study indicated informed consent. Approval from the Medical Director in each trust was obtained.

Responses from those who indicated they were actively involved in teaching were compared with those who were not teaching. Statistical analysis was carried out using Microsoft Excel 2010. Chi-squared test was used for comparison of relevant proportions. A P value of <0.05 was considered statistically significant.

RESULTS

Our survey was circulated to 1372 clinicians at consultant grade in Northern Ireland. There were 367 respondents (27%), with a 95% completion rate. All clinical specialities were represented. 250 respondents (72%) were actively involved in teaching medical students in small group settings. 99 respondents (28%) indicated they were not involved in this method of teaching (18 did not answer). From these, 89 free text responses were generated. 36% of the respondents chose to make further comment (131 free text comments received). Results were analysed within the four categories.

ATTITUDES TO TEACHING

A majority of respondents (72%) were of the opinion that medical students should be taught by consultants. More than half (52%) did not think that it was more appropriate for junior Doctors (SHO or Registrar grade) to teach. 329 respondents (90%) indicated that it was the professional duty of a doctor to teach medical students; 21 (6%) did not feel this was the case and 4% had no view. 80% of all respondents felt that teaching medical students was enjoyable.

On sub-group analysis comparing those actively involved in teaching to those who were not, responses followed the same pattern, however consultants not involved in teaching

were less likely to find teaching medical students enjoyable (p=0.0004), (see figure 2).

FINANCIAL CONSIDERATIONS

60% felt that consultants were not financially remunerated for teaching. 68% of those who indicated they were not being paid are still actively involved in teaching (144 out of 211). This had statistical significance when compared with non-teachers (67 out of 211, p=0.003). 49% felt that consultants who teach regularly should receive a higher salary than those who do not. Of interest, no significant difference was found between teachers and non-teachers in this regard (p=0.195). 50% felt their trust encouraged medical student teaching, with those who teach being more likely to agree with this statement (p=0.016). Half of consultants felt that teaching was not included in job plans, with only 35% indicating that it was. Whilst teachers were more likely to agree with this compared to non-teachers (p=0.032), 115 consultants still teach regularly without recognition in a job plan. 48% agreed with the statement that "*teaching was an act of good will*", 29% disagreed and 23% remained undecided.

TIME CONSTRAINTS

A majority of respondents (78%) indicated that consultants do not have adequate time to teach medical students. Those who do not teach were more likely to be of this opinion (p=0.011). 95% felt that consultants should have dedicated time for teaching. 69% felt that other clinical activities take priority over medical student teaching, only 11% did not feel this was the case. 55% felt that training and assessment of postgraduates had reduced time for teaching medical students, 16% disagreed with this and 29% neither agreed nor disagreed. Only 12% felt that postgraduate training and assessment was more important, with 57% indicating this was not the case.

ATTITUDES TOWARDS STUDENTS

29% felt there were too many students in a "typical" group to provide effective teaching. The definition of a "typical" group was left open to the readers' interpretation and experience. 82% felt that medical students appreciate consultant led teaching. 55% felt students had an appropriate level of enthusiasm for learning. Only 22% felt that students were reluctant to interact with consultants. 96% of consultants felt that student participation made teaching more enjoyable. Non-teachers were more likely to indicate there were too many students (p=0.023) and that students were reluctant to interact (p=0.011).

DISCUSSION

This study provides one of the largest samples of Consultant opinion relating to undergraduate Medical Student teaching to date. Furthermore, the study encompasses all clinical specialities within a region where students are under the auspices of one University. Self-selection bias may have been introduced towards those with an interest in teaching, although 29% of respondents stated they were not involved in teaching. A legitimate criticism is the use of closed ended statements as these can be interpreted differently by respondents. Unfortunately this is an unavoidable limitation of this methodology.

ATTITUDES TO TEACHING

Whilst anecdotally enthusiasm for teaching is declining, 80% of respondents indicated they viewed teaching medical students as an enjoyable experience. This is encouraging and confirms findings from previous studies.[7,8]

Guidance within the General Medical Council document "*Good Medical Practice 2013*" advises that as a profession Doctors "should be prepared to contribute to teaching and

Teachers agree or strongly agree (%)	Statement	Non-teachers agree or strongly agree (%)	P value
87.2	Teaching medical students is enjoyable	64.6	0.0004
23.6	Consultants are financially remunerated for teaching	9	0.003
56	Your trust encourages medical students teaching	36.3	0.016
38	Teaching medical students is included in consultant job plans	28.3	0.032
12.8	Consultants have adequate time to teach medical students	4	0.011
10	Postgraduate training and assessment is more important than medical student teaching	18.2	0.027
27.6	There are too many students in a typical group to provide effective teaching	31.3	0.023
26.8	Students are reluctant to interact with consultants	29.2	0.011

Figure 2. Comparison of responses of those who were actively involved in teaching (250 teachers) vs those who were not (99 non-teachers).

training doctors and students."[10] It is recognised that there is a vast amount of skills, expertise, experience and knowledge that can only be passed on in a clinical environment. It is therefore not surprising that the vast majority of respondents felt that Doctors, as professionals, should be involved in teaching.

Previous studies have shown that "near-peer" teaching can be comparable to that of consultants, with potential benefits for both students and postgraduates.[11] In this study a majority were of the opinion that students should be taught by consultants, rather than junior Doctors. There was, however, no suggestion that teaching should be exclusively by consultants. Free text comments in general indicated that it is beneficial for students to be taught by all grades, exemplified thus:

"*As to specific roles junior doctors should clearly teach more of the practical ward aspects … less of the areas where a specialist can deliver a better learning experience."*

FINANCIAL CONSIDERATIONS

Funding issues are often contentious. In Northern Ireland funding is provided to individual trusts via Supplement for Undergraduate Medical and Dental (SUMDE) payments. Although the trusts receive this money, 60% of clinicians feel they are not remunerated for teaching.

Since the introduction of the new Consultant contract in the UK, each Consultant session is accounted for, with teaching generally being included in supporting professional activities (SPA's) within a job plan. Specific inclusion of teaching in a job plan varies throughout the trusts in the region, as evidenced by the responses. It has been noted on a national scale that the consultant contract provides flexible use of SPA and as a consequence teaching and training is not necessarily prioritised.[12]

Round-table discussion suggested that lack of payment, or inclusion in a job plan, would discourage clinicians from teaching. Previous investigations into barriers to teaching have cited lack of recognition (financial and direct acknowledgment) as an issue.[7,8,13,14] Based on the responses in this study it is not possible to confirm that this is the case. A significant number of respondents who indicated they were not financially remunerated and felt teaching was not included in job plans are still actively involved in teaching.

TIME CONSTRAINTS

Previous literature has identified time constraints as a negative influence on teaching.[8,13,14] In this study, an overwhelming majority (two thirds of consultants) indicated they did not have adequate time to teach Medical Students. Unsurprisingly those who do not teach are more likely to be of this opinion. The majority of respondents stated that clinical activity takes priority over teaching. This is not easily avoidable when utilising the skills of clinicians as teachers. This finding is consistent with previous studies that indicate students find quality of teaching adversely affected by clinical duties; resulting in missed sessions, lateness and interruptions.[15]

Since the implementation of *Modernising Medical Careers* the input required from consultants for training and ongoing assessment of postgraduates is more arduous.[16] Interestingly, only 12% of respondents felt that postgraduates were more important than medical students.

The reasons for lack of time are likely to be multifactorial and vary depending on speciality. 95% of consultants felt that they should have dedicated time for teaching. GMC guidance contained within "*Tomorrows Doctors*" 2009 advises that "teachers and trainers should have dedicated time in their job plans (or training schedules) to deliver their educational responsibilities and undertake their own training and development."[17] It has been suggested elsewhere that those who choose to teach in a formal setting should be afforded protected teaching time, whilst others in a particular unit concentrate efforts elsewhere.[13]

ATTITUDES TOWARDS STUDENTS

There are currently 250-280 students per year enrolled in the Medical School at Queens University, Belfast. The UK Department of Health considers the ratio of clinician to student to be 1:10 for small group tutorials (and 1 in 6 for bedside teaching). In this study only one third considered the groups to be too large. Free text comments implied a problem with the number of tutorials required as a consequence of increasing student numbers:

"small group teaching is impossible with groups of 28 students unless 3-4 senior doctors are available"

Four fifths of consultants surveyed, felt the students appreciated consultant led teaching and virtually all respondents felt that student participation made teaching more enjoyable. It was not possible to ascertain whether student participation regularly occurs, or if these were aspirational comments only. In order to explore this further, respondents were asked if students were reluctant to interact with consultants. Traditionally there is a professional boundary between the two groups and in some cases consultants can be considered intimidating.[15] A minority however, felt that students were reluctant to interact. It is unlikely that students will behave identically with every consultant, as was succinctly put in free text comments

"consultants are not a homogenous group."

Informal complaints are often made about the enthusiasm and commitment of students.[7,14] Therefore respondents were asked if students had an appropriate level of enthusiasm for learning. Over half of those surveyed agreed that they do. Whilst what is "appropriate" is open to interpretation, this result reflects positively on medical students. Nonetheless free text comments were not fully supportive. 22 of 131 comments focussed on lack of enthusiasm, summarised by a statement reflecting a common thought process:

"Many groups of med students lack the curiosity that leads to enjoyable learning (and teaching). They appear to be exam led rather than led by curiosity and enthusiasm for active

learning. It was ever thus but my impression is that it is worse than previous."

To demonstrate the other extreme of opinion,

"...it is a privilege to be able to teach such enthusiastic young people."

It is likely that enthusiasm changes depending on the student, the teacher, the teaching environment or even the time of day. From the responses received the majority feel the level of enthusiasm is appropriate, however the opinions of those in disagreement were strong enough to evoke further comment. In general there appears to be a degree of polarisation with regard to this statement in particular.

Underpinning the changes to medical student education is the ethos that students should not be overloaded with information, but be encouraged to develop independent thought.[5] Self-directed learning is therefore an important part of any modern curriculum. Over two thirds of consultants felt students need to take more responsibility for their own learning. This opinion is exemplified by the following comment,

"Basic knowledge of ... medical students is so poor as is their attitude to their responsibility to contribute to their own learning that it is VERY difficult to advance the teaching beyond the most basic or remedial"

This perception (which is not an isolated opinion) is not ideal and may be an area that requires further investigation.

CONCLUSION

Consultants in this Deanery are actively involved in medical student teaching and enjoy it. They have a perception that they are not financially rewarded but for the most part this is not a deterrent. Time constraints are an issue and there is a desire to have teaching included in job plans to counteract this. Medical student numbers were not identified as an issue in the setting of small group tutorials. There is a perception that medical students need to contribute more to their own learning, nonetheless the majority of consultants are complimentary about student attitudes and recognise that interaction and appreciation contribute greatly to the enjoyment of both teacher and student.

The authors report no declarations of interest.

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REFERENCES

1. Lewington, K. Changes to medical student education over the past 20 years. *Student BMJ.* 2012;**20:e3504**.
2. Regehr G, Norman GR. Issues in cognitive psychology: implications for professional evaluation. *Acad Med.* 1996;**71:**988-1001
3. Lake DA. Student performance and perceptions of a lecture based course compared with the same course utilising group discussion. *Phys Ther.* 2001;**81(3)**:896-902
4. De Jong Z, van Nies JA, Peters SW, Vink S, Dekker FW, Scherpbier A. Interactive seminars or small group tutorials in preclinical medical education: results of a randomised controlled trial. *BMC Med Educ.* 2010;**10**:79
5. General Medical Council. Postgraduate Medical Education and Training Board. Tomorrows Doctors. London: General Medical Council; 2008. Available online from: http://www.gmc-uk.org/Educating_Tomorrows_Doctors_working_group_report_20080620_v1.pdf_30375087.pdf[Last accessed December 2014].
6. Parry J, Mathers J, Thomas H, Lilford R, Stevens A, Spugeon P. More students, less capacity? An assessment of the conflicting demands on academic medical staff. *Med Educ.* 2008;**42(12):**1155-65
7. Hendry RG, Kawai GK, Moody WE, Sheppard JE, Smith LCR, Richardson M, *et al.* Consultant attitudes to undertaking undergraduate teaching duties: perspectives from hospitals serving a large medical school. *Med Educ.* 2005;**39(11)**:1129-39
8. Peadon E, Caldwell PHY, Oldmeadow W. "I enjoy teaching but…" Paediatricians attitudes to teaching medical students and junior doctors. *J Paediatr Child Health.* 2010;**46(11):**647-52.
9. Create surveys, get answers. Palo Alto California, USA: SurveyMonkey Inc.. www.surveymonkey.com
10. General Medical Council. Good Medical Practice. Teaching, training and supporting. London: General Medical Council; 2013. Available online from: http://www.gmc-uk.org/guidance/good_medical_practice/teaching_training.asp [Last accessed December 2014]
11. Rashid M, Sobowale O, Gore D. A near-peer teaching program designed, developed and delivered exclusively by recent medical graduates for final year medical students sitting the final objective structured clinical examination (OSCE). *BMC Med Educ.* 2011;**11**:11
12. Temple J**.** Time for training. A review of the impact of EWTD on the quality of training: a review of the impact of the European Working Time Directive on the quality of training. London: Health Education England; 2010 Available online from: http://hee.nhs.uk/wp-content/uploads/sites/321/2012/08/Time-for-training-report.pdf. [Last accessed December 2014].
13. Gibson DR, Campbell RM. Promoting effective teaching and learning: hospital consultants identify their needs. *Med Educ.* 2000;**34(2)**:126-30
14. Seabrook M**.** Medical teachers' concerns about the clinical teaching context. *Med Educ.* 2003;**37(3):**213-22
15. Stark P. Teaching and learning in the clinical setting: a qualitative study of the perceptions of students and teachers. *Med Educ.* 2003;**37(11)**:975-82
16. Tsouroufli M, Payne H**.** Consultant medical trainers, modernising medical careers (MMC) and the European Time Directive (EWTD): tensions and challenges in a changing medical education context. *BMC Med Educ.* 2008;**8**:31
17. General Medical Council. Developing teachers and trainers in undergraduate medical education. Advice Supplementary to Tomorrows Doctors. London: General Medical Council; 2009. Available online from: http://www.gmc-uk.org/education/undergraduate/tomorrows_doctors_2009.asp. [Last accessed December 2014].

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Medical History

Historical Development of Pan-European Medical Training for English speaking students in the 16th to 19th Centuries

John F. Mayberry

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SUMMARY:

This essay summarises the development of a pan European approach to the education of English-speaking medical students over a period of four centuries. It demonstrates that the current interest in "English Parallel" courses across Central and Eastern Europe is not a new phenomenon. The essay investigates the role of push and pull factors in drawing people away from their country of origin to study medicine elsewhere. In addition it draws on the experience of examination candidates when faced with questions in a different language to their own.

The need and wish to travel and seek medical education at centres of excellence far from one's country of birth reaches well back into the origins of formal medical training. The driving forces have been a combination of the traditional "push" and "pull" factors that stimulate any migration. In the case of medicine, considerable attention has been given to "pull" factors where certain charismatic teachers were seen as magnets drawing students towards them. In practice "push" factors have also been of significance. In earlier centuries these included poor medical education locally, whereas in more recent times driving forces have included such restrictions on entry as gender.

During the medieval period degree-based courses started to emerge in centres at Paris, Oxford, Cambridge, Montpellier and Bologna. By the 15th Century, Bologna was the leading centre for medical training in Europe, although the number of graduates remained small.[1]Examples of distinguished medical practitioners who were highly mobile during this period include Andreas Vesalius. He began his training at Louvain in 1529, continued with it in Paris between 1533 and 1536 and finally graduated MD in 1537 from Padua[2]where he was appointed a lecturer in surgery.[3]William Harvey studied at Cambridge and graduated with an Arts degree in 1597. However, it was at Padua that he chose to study medicine under Fabricius. Having completed his studies, he returned to practice in London from 1602.[4] In the 1700s, Booerhaave was a significant magnet and helped attract 746 English speaking medical students to the faculty at Leiden.[5] However, other factors are likely to have also played a role. At that time, trade between Scotland and the Netherlands was important and many Scots fought in the Dutch army against the French.[6] These commercial and political links ensured that Dutch universities were attractive to Scots students and so influenced the development of medical education in Scotland.

Between the 1500s and the 1700s there were clear changes with Cahors and Rheims becoming much more popular destinations than the more traditional schools, such as that at Padua. As to which push and pull factors were influential in these decisions it is not now possible to say. However, what is clear is that there was a well-established tradition of English speaking students from the United Kingdom seeking medical training in Europe. This is a trend which is again to be seen

During the 1800s medical education was dominated by French universities. It was during this time that the science of physical signs and bedside diagnosis developed into clinical medicine.[8] The clinical method devised by the French followed Occam's Law and sought a single diagnosis. However, by the end of the nineteenth century the emergence of laboratory medicine in Germany and the growth of universities in Berlin and Gottingen displaced French education. Their influence was to spread to John Hopkins Medical School, USA and through Osler to England.[8] During this period the pull factors which drew medical students to Europe in earlier centuries seemed less powerful and this may reflect the growing national regulation of the training of doctors.

Push factors which led some students to seek formal qualifications outside of the UK were dominated by gender and financial issues. In 1812 James Barry received her MD from the University of Edinburgh. However, she had to conceal her feminine gender throughout her training and for the whole of her professional life.[9] A reluctance to allow women to obtain formal qualifications, despite having completed appropriate training programs was a clear "push" factor for Frances Morgan and Elizabeth Garrett. Frances Morgan obtained clinical training in Paris and Dusseldorf and qualified with an MD from the University of Zurich in 1870. Within a few months Elizabeth Garrett received an

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Table 1:

Numbers of English speaking Medical Students attending European Universities between 1550 and 1799

University	1550-99	1600-49	1650-99	1700 +	No date given	Total
Altdorf					16	16
Angers		6	5	2		13
Basel					18	18
Bologna	3	1	2		3	9
Bourges					3	3
Caen		5	9	1		15
Cahors		5	5	11		21
Ferrara	2				2	4
Franeker					30	30
Frankfurt/ Oder					20	20
Gőttingen					2	2
Groningen		2	2	2		6
Harderwyck			10	8		18
Heidelberg					25	25
Helmstadt	2	1			15	18
Herborn					5	5
Ingoldstadt					10	10
Kőnigsberg					15	15
Louvain					33	33
Montpellier	1	2	2	1		6
Orange		7	6	1	1	15
Padua		15	16	3		35
Paris		1				1
Pisa			2	2	1	5
Rheims		3	5	17		25
Sienna					1	1
Uppsala				1		1
Utrecht		1	2	5	11	19
Wittenberg					44	44

Data derived from: www.rcpe.ac.uk/library/history/english-students[13]

MD from the University of Paris, having undertaken her training in the UK. These were the first British women to receive formal recognition as doctors and both needed to do this in Europe. During the last two decades of the nineteenth century many women, especially from Central and Eastern Europe and Russia, went to Paris and took their MD.[10]These women are typical of many prospective medical students in

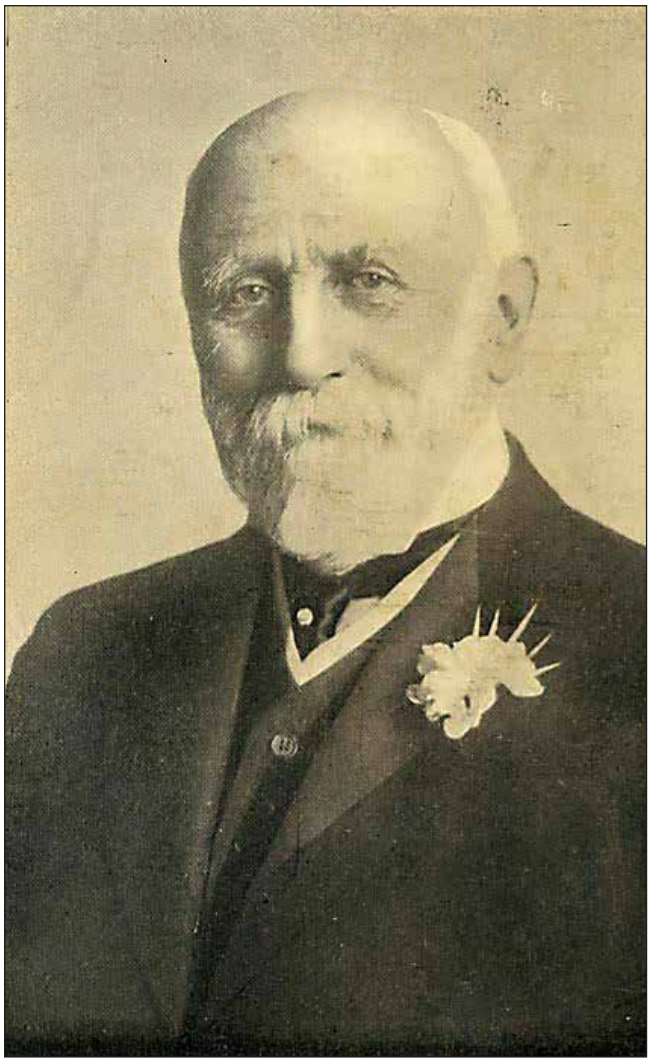

Fig 1. Arthur T. Schofield

their determination to overcome barriers of access to medical schools. A similar attitude was shown by Arthur Schofield. In the 1870s he entered medical school as a mature student with a young family and was consequently under pressure to complete his training:

> "I was quite unable to spend three years at any University, and yet,
>
> requiring an M.D. degree I took refuge at Brussels. Let no one dare to despise the Brussels M.D. I am quite sure the examination is harder than any in our country, and for the following reasons.
>
> In the first place, the examinations that usually cover three years are all concentrated in one awful fortnight, during which you are continually examined from morning to night by thirteen professors. In the second place, you are not admitted to the examination at all until you have at least two college qualifications; and lastly every year at that time at least fifty per cent were ploughed"[11]

In some ways the approach adopted by the Brussels examiners pre-figured the emergence of English Parallel programmes in

Central and Eastern Europe. Although questions were asked in French for Arthur Schofield they were:

"translated for me into English"[11]

His replies were then translated into French for assessment.

The nature of barriers to entry to medical school has varied over the centuries, but they have provided powerful "push" factors. In addition, the need to defend degrees from Brussels, Paris and Zurich was something that not only characterised the 1800s but can be seen in the blogs of students on English Parallel courses within the EU.[12] The expansion of the EU again provides an opportunity for medical students to have a broad international education, dipping into a range of training experiences. The Bologna Declaration and Erasmus programs make this realistic.

REFERENCES:

1. Wigelsworth JR. Science and technology in medieval European life. Slough, UK: Greenwood Press; 2006.
2. Dunn PM. Andreas Vesalius (1514 – 1564), Padua, and the fetal "shunts". *Arch Dis Child Fetal Neonat Ed.* 2003;**88(2)**: F157-9.
3. Sider S. Handbook to life in renaissance Europe. Baltimore: Oxford University Press USA; 2006.
4. Wear A. Medicine in early modern Europe. In: Conrad LI, Neve M, Nutton V, Porter R. Wear A, editors. The Western medical tradition 800BC – 1800 AD. Cambridge: Cambridge University Press; 1995. p. 330 – 1.
5. Calman KC. Medical education. past, present and future. Handing on Learning. Oxford: Churchill Livingstone; 2006.
6. Dingwall H. A history of Scottish medicine. themes and influences. Edinburgh: Edinburgh University Press; 2002.
7. Mayberry JF. The development of medical education in Eastern Europe during the 20th century and the emergence of 'English parallel' courses. *Scott Med J.* **58(1)**: 46–52
8. Newman C. The evolution of medical education in the nineteenth century. London: Oxford University Press; 1957.
9. Rae I. The strange story of Dr. James Barry: army surgeon, inspector general of hospitals, discovered on death to be a woman. London: Longmans, Green & Co; 1958.
10. Gelfand T. Paris Medical students: The medical thesis in the 19th century. In: 40th International congress of history of medicine. August/Aout 26-30, 2006. Budapest, Hungary; 2006. Doc. 67.
11. Schofield AT. Behind the brass plate: life's little stories. London: Sampson Low Marsden; 1928.
12. Mayberry JF. An analysis of blogs from medical students on "English Parallel" courses in Central and Eastern Europe. *Med Leg J.* **81(4)**: 171-6.13.
13. https://members.rcpe.ac.uk/students/index.php Accessed on 25th June 2014

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From the Archives:

The Ulster Medical Journal, April 1934, Volume 3, Number 2.

Dr John Purvis.

This edition opened with an editorial by acting editor, Dr Richard H Hunter, appealing for readers to support the Royal Medical Benevolent Fund Society of Ireland in assisting "medical brethren who have fallen on difficult times, and ... their widows and orphans, so often left without even the necessities of life". Dr Hunter referred to the great financial depression and how it has affected the medical fraternity.

The fund distributed grants of £2267 [approx. £140 400 today] to 69 widows, 17 orphans and 8 doctors in Northern Ireland in the previous year. Each county had its own individual treasurer, whose contact details were given.[1] The modern reader is liable to forget that in 1934, all doctors were essentially small businessmen – not all were successful.

Immediately after this was an obituary for one of the most successful, Sir William Whitla. Born in Monaghan in 1851, he came to Belfast as an apprentice to a leading firm of dispensing chemists and decided to read medicine. He qualified in 1877, when he obtained his MD with 1st class honours and a gold medal. He was appointed resident medical officer and superintendent of the Royal Hospital. His exceptional ability both as a physician and administrator soon became evident and he "quickly revolutionised the working of the whole institution".

After his term in the Royal, he went into practice in Belfast and soon established an extensive general practice. Prof Gordon invited him to assist at all his private operations and then he was appointed as Physician to the Royal hospital. This gave him an opportunity to demonstrate his ability as a clinical teacher, and he soon attracted a large clinical class.

His book," Materia Medica and Therapeutics" was a pronounced success and reflected his initial training as a dispensing chemist as well as his medical training. After the resignation of Prof. Seaton Reid, he was appointed Chair of Materia Medica in Queens College and produced a further remarkable book – "The Dictionary of Treatment". This textbook sold widely both in the UK and America. Many honorary degrees were conferred upon him. A further textbook, "A Dictionary of Medicine" soon followed.

The Medical Institute, the home of the Ulster Medical Society, contained a bronze plate with the following inscription: "This Building Was Erected, Equipped and Presented to the Ulster Medical Society by Sir William Whitla, MD". The cost of the building exceeded £6000 [approx. £570 000 today]. When people tried to thank him, he simply replied, "I owe it to the profession; they gave me the money for my book". He was appointed as Honorary Physician in Ireland to His Majesty the King. His health was not so good in later years and for almost 4 years, he was unable to leave his room. The obituary, written by A.B. Mitchell, ends "William Whitla has not lived in vain". [2]

After the obituary, came clinical papers. The first of these, "Some recent advances in the diagnosis and treatment of pulmonary tuberculosis", is of interest to the modern reader.[3]

If the patient fails to produce an adequate sputum specimen… "a laryngeal mirror inserted into the mouth without warning excites a spasmodic cough. … The method does not conduce to the popularity of the physician, but TB bacilli are often recovered from sputum adherent to the mirror".

Sanatoria and rest treatment were recommended along with "collapse therapy"; artificial pneumothorax, phrenic avulsion, adhesion cutting, apicolysis and thoracoplasty. In bilateral cases, the more affected lung should be collapsed and possibly a partial collapse of the better lung attempted. A heavily scarred lung would be unlikely to collapse fully and thoracoplasty was a better option.

Sanatorium stays could be up to 2 years.

The first drug to be mentioned is sanocrysin, "a double salt of gold and sodium" given intravenously. Side effects of albuminuria or diarrhoea could occur. If sanocrysin could not be used, tuberculin was used as a therapeutic agent to boost immunity. In some cases, tuberculin was said to be the equal of sanocrysin.

A review of developmental and generalized bone disease by R Maitland Beath from the RVH contained X-ray illustrations of various conditions such as the punched out cranial lesions of multiple myeloma. The quality of image reproduction in the Journal is excellent and comparable with modern textbooks.[4]

After a few short case reports and textbook reviews, the Journal listed minutes from various Northern Ireland medical associations such as BMA county branches and the UMS itself. Several of the lectures at UMS meetings appear as papers in subsequent issues of the Journal. Minutes of the Lisburn and District Medical Guild and Londonderry Medical Society are included. At the Derry meeting, speaker Dr FMB Allen condemned the "so universal and fashionable" use of glucose in the treatment of "every and any sick child". [5]

There were many more adverts in the journal than nowadays – many of these were non-medical (Figure 1). A Rover

Fig 1. A reproduction of p. 127 from the journal, a page of adverts for medical texts and journals. The author notes that the *British Journal of Surgery* was "under the control of a large and influential editorial committee".

"Speed Twenty" saloon car could be purchased from the Ulster Motorworks Ltd, Great Victoria St, Belfast from £495. Lilliput Laundry and Dye Works, Dunmurry near Belfast offered to clean your summer wardrobe. Robinson and Cleaver offered "ready for service" lounge suits for up to 130 shillings.

REFERENCES

1. Hunter RH. Editorial. *Ulst Med J.*1934;3(2): 83.
2. Mitchell AB. Sir William Whitla, MA, MD, DSc, LLD. *Ulst Med J.*1934; 3(2): 84, 87-88.
3. Clarke RB. Some recent advances in the diagnosis and treatment of pulmonary tuberculosis. *Ulst Med J.*1934; 3(2): 88-90. 93-95.
4. Beath RM. Developmental and generalized bone diseases. *Ulst Med J.*1934; 3(2): 111-125
5. Johnston JAL. Reports from societies: Londonderry Medical Society. *Ulst Med J.*1934; 3(2): 141-142).

Letters

FOLLICULAR LESIONS OF THE THYROID: A SURGICAL PERSPECTIVE

Editor,

The management of follicular thyroid lesions has long been a challenge for the surgeon due to the difficulty of differentiating pre-operatively between adenoma and carcinoma. Even with advances in ultrasonography, fine needle aspirate cytology, (FNAC), and immunohistochemistry we are still relying on post-operative pathological analysis for a definitive diagnosis. To date no single test or combination can accurately predict the presence or absence of vascular or capsular invasion in these lesions.[1]

The aim of this study was to investigate the accuracy of FNAC and its influence on the surgical management in this patient population. We collected data for confirmed follicular adenoma or carcinoma on tissue diagnosis over a 5 year period, 2008-2012, from the pathology laboratory of the Belfast City Hospital. We retrospectively analysed the pre-operative FNAC for predictive diagnostic accuracy.

From this 5 year data pool there were a total of 53 follicular thyroid lesions identified on final histology, (45 adenoma and 8 carcinoma). Of these 5 FNAC reports were not available or non-diagnostic, (3 adenoma and 2 carcinoma), giving a total of 48 complete data sets. The FNAC were divided into two categories, benign (Thy 2) and suspicious of malignancy, with all results that couldn't safely be considered benign being consigned to the latter (Thy 3,4&5). It should be noted that all lesions identified as being follicular in nature should be recorded as Thy3.

	Adenoma	Carcinoma	
Thy 0	1	2	FNAC - no report / not done
Thy 1	2	0	Non-diagnostic
Thy 2	9	0	Non-neoplastic
Thy 3	29	5	Neoplasm possible
Thy 4	2	1	Suspicious for malignancy
Thy 5	1	1	Malignant
Total	44	9	

Data from Thy0 and Thy1 were excluded from subsequent calculations due to lack of FNAC direction. Anything that could not be definitively said to be benign was grouped as suspicious of malignancy as from a surgical perspective all of these cases would be offered excision.

Data, excluding Thy3 category	All data
Sensitivity = 100%	Sensitivity = 100%
Specificity = 75%	Specificity = 22%
Positive predictive value = 40%	Positive predictive value = 18%
Negative predictive value = 100%	Negative predictive value = 100%

From the results we can see that the inclusion or exclusion of follicular lesions (Thy3 category) vastly alters the specificity, positive predictive value and overall diagnostic accuracy of the data. This is particularly relevant to the surgical workload as anyone with a follicular lesion will be offered, as a minimum, a thyroid lobectomy. If this proves to be malignant on histology, following discussion at the Multi-Disciplinary Meeting, some patients will then be offered a completion total thyroidectomy.[2] This increased workload is further compounded by the increasing number of asymptomatic or subclinical thyroid incidentalomas being diagnosed when imaging is performed for other reasons. The incidence of these lesions is high, with various ultrasound studies suggesting 10-67%.[3]

With growing waiting lists, the current economic climate and operating time being a restrictive commodity, better investigations need to be found to reduce the amount of unnecessary surgery being performed. Whilst this is true for all thyroid incidentalomas it is particularly so when it comes to follicular thyroid lesions.

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REFERENCES

1. Gharib H, Papini E, Paschke R, Duick DS, Valcavi R, Hegedus L, *et al*. American Association of Clinical Endocrinologists, Associazione Medici Endocrinologi, and European Thyroid Association medical guidelines for clinical practice for the diagnosis and management of thyroid nodules. *Endocr Pract*. 2010;**16(suppl 1)**:1–43.
2. Perros P, Colley S, Boelaert K, Evans C, Evans RM, Gerrard GE, Guidelines for the management of thyroid cancer. 3rd edition. British Thyroid Association. *Clin Endocrinol* [Internet] 2014 [cited 2014 Aug 28]; **81(suppl 1)**:1-122. Available online from: http://onlinelibrary.wiley.com/doi/10.1111/cen.12515/pdf
3. Aspinall SR, Ong SGS, Wilson MSJ, Lennard TWJ. How shall we manage the incidentally found thyroid nodule? *Surgeon*. 2013;**11(2)**: 96-104.

PROBLEM SOLVING WITH CORONARY CT ANGIOGRAPHY IN CASES OF DIFFICULT CORONARY ANGIOGRAPHY

Editor,

Invasive coronary angiography is the current gold standard in the work-up of non-specific chest pain suggestive of ischaemic heart disease.[1] This case demonstrates how CT coronary angiography can yield a clinically useful answer when traditional catheter angiography runs into difficulty.

A 61 year old female smoker with hyperlipidaemia presented with a four month history of anginal chest pain and dyspnoea with a positive cardiac stress ECG. This was investigated by

invasive coronary angiography, this proved to be challenging due to failure to cannulate the left main coronary artery. However during angiography a large right coronary artery was noted with multiple collateral vessels perfusing the left anterior descending coronary artery territory.

Further anatomical detail of the left coronary artery was revealed through coronary CT angiography which showed a diffusely occluded left main stem with no definite communication with the aorta. Perfusion was maintained by long standing collateralization by vessels originating from a large right coronary artery. The patient went on to receive coronary artery bypass grafting of her left coronary system via a left internal mammary artery graft to the LAD.

In this case, coronary angiography failed to accurately identify pathology in this case due to an inaccessible left coronary artery. As highlighted by figure 1 the left coronary artery was partially visible through contrast supplied from collaterals originating from the right coronary artery. However a significant coronary stenosis could not be excluded. Moreover this patient was not amenable to percutaneous coronary interventions in view of the difficult angiography.

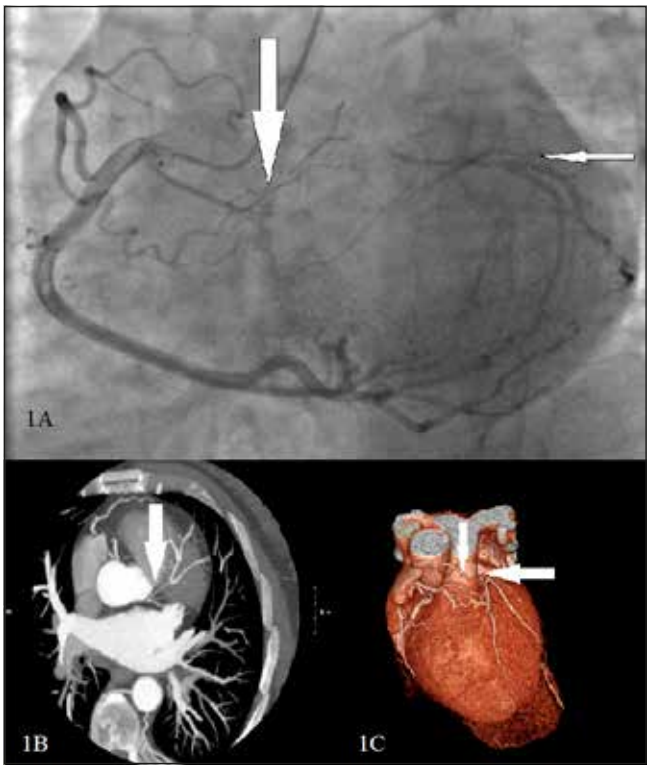

Fig 1. Diagnostic Images
1A: Invasive Coronary Angiography.
Large Pointer - Conus branch collaterals to left coronary sinus.
Small Pointer - Left anterior descending artery territory

1B: Coronary CT angiography axial MPR
Pointer – Remnant Left main stem

1C: Coronary CT Angiography 3D reconstruction
Small Pointer: Collaterals from the RCA perfusing LAD
Large Pointer: Left anterior descending artery

A coronary CT angiogram was performed in order to exclude coronary artery disease and provide anatomical detail for possible surgical intervention. As shown in the figure this technique revealed a completely occluded left main stem. There was a very small caliber left main coronary and proximal left anterior descending artery. The caliber of the LAD then became normal with multiple collateral vessels from the right coronary artery providing collateral antegrade and retrograde flow. From this information obtained, the patient further underwent a left internal mammary bypass graft to her left circumflex artery and was subsequently asymptomatic.

This case report highlights the utility of multi-modal cardiac imaging in cases with unusual coronary anatomy and inconclusive invasive angiography and thus aids in clinical decision making.[1]

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REFERENCES

1. Knickelbine T, Lesser JR, Hass TS, Brandenburg ER, Gleason-Han BK, Flygenring B et al. Identification of unexpected nonatherosclerotic cardiovascular disease with coronary ct angiography. *JACC Cardiovasc Imaging.* 2009; **2(8)**:1085-92.

DELAYED SPINAL CORD ISCHAEMIA AFTER HYBRID THORACO-ABDOMINAL ANEURYSM (TAA) REPAIR

Editor,

The management of thoraco-abdominal aneurysms (TAA) remains a surgical challenge with high rates of morbidity and mortality.

Spinal cord ischaemia with subsequent neurological sequelae is a recognised complication of these repairs, with most of this morbidity occuring acutely. There is no completely satisfactory method of protecting the cord during repair. One strategy is to pre-operatively visualise the segmental artery supplying the Adamkiewicz artery and ensure its revascularisation. Alternatively, a catheter may be placed into the intrathecal space to assess CSF pressure, allowing free drainage of CSF to a pressure below 10mmHg[1].

We report delayed cord ischaemia in a 76-year-old man with a previous open abdominal aortic aneurysm (AAA) repair, presenting with a Crawford Type II TAA.

A hybrid endovascular and open repair was undertaken. Prior to induction, a spinal catheter was inserted, allowing free CSF drainage to below a pressure of 10mmHg. Open visceral revascularisation was performed using a four-limbed graft from the existing distal infra-renal aortic graft to the left and right renal arteries, superior mesenteric artery and coeliac

axis (Figure 1). Endovascular TAA stent grafting was then performed via an open aortic graft conduit using a Relay® thoracic stent. The graft extended proximally beyond the left subclavian and distally to the infra-renal aorta. The APTT was maintained at 2-3 times normal range throughout with heparin.

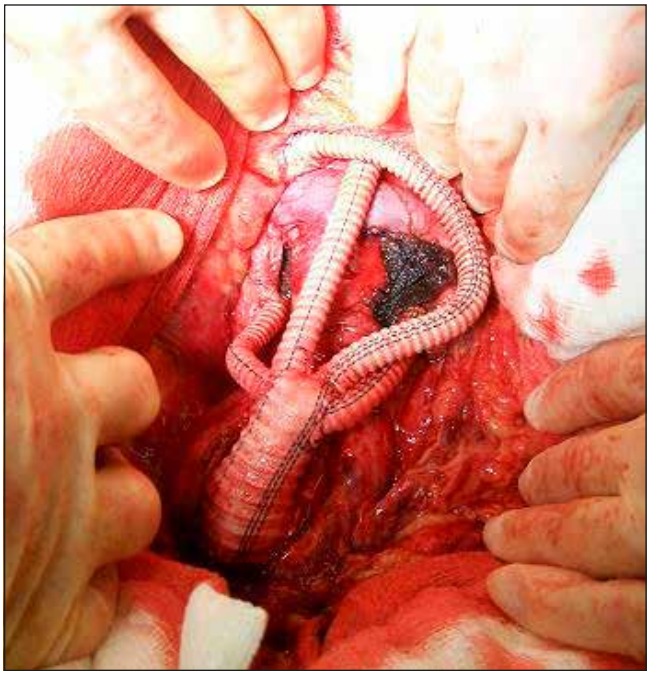

Fig 1.

Once extubated, lower limb motor and sensory function were confirmed as normal and there was no evidence of organ dysfunction.

Twenty-four hours post-operatively the patient developed bilateral lower limb flaccid paralysis, with sensory and motor deficit from T8 downwards. Despite spinal fluid drainage via the spinal drain, there was no improvement. CT showed no evidence of epidural haematoma but showed spinal cord infarction and oedema distal to T8. MRI confirmed anterior pattern spinal cord infarction distal to T8. The patient recovered from surgery but had persistent paralysis of the lower limbs, unchanged at the 12 month review.

Type II aneurysms have a significantly greater risk of paraplegia, with up to 22% of patients presenting with paraplegia up to 3 months after seemingly successful surgery[1]. A series of 89 urgent and elective high-risk patients in Europe demonstrated an 8% risk of paraplegia[1]. Crawford *et al.,* observed an immediate neurological deficit in 68% and a delayed deficit in 32% of patients affected[2]. Murphy *et al.,* found no difference in spinal cord ischaemic rates between patients undergoing hybrid repair and those undergoing open repair[3].

Adjunctive techniques are used to reduce the risk of cord ischaemia. A randomised controlled trial by Coselli et al., demonstrated an 80% reduction in the relative risk of post-operative paraplegia when the technique of CSF drainage was implemented[4]. Safi et al., showed an acute CSF pressure increase in patients prior to development of spinal cord paralysis, preceeded by a period of blood pressure instability[5].

We suggest that delayed spinal cord ischaemia can still occur in a hybrid type repair despite adjunctive CSF drainage. Morbidity and mortality rates are improving but surgery for TAA still carries significant risk.

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REFERENCES

1. Bicknell CD, Riga CV, Wolfe JH. Prevention of paraplegia during thoracoabdominal aortic aneurysm repair. *Eur J Vasc Endovasc Surg.* 2009;**37(6):**654-60.
2. Crawford ES, Coselli J S. Thoracoabdominal aneurysm surgery. *Semin Thorac Cardiovasc Surg.* 1991; **3(4):**300-22
3. Murphy EH, Beck AW, Clagett GP. Combined aortic debranching and thoracic endovascular aneurysm repair (TEVAR) effective but at a cost. *Arch Surg.* 2009;**144(3):**222-7.
4. Coselli JS, LeMaire SA, Köksoy C, Schmittling ZC, Curling PE. Cerebrospinal fluid drainage reduces paraplegia after thoracoabdominal aortic aneurysm repair: results of a randomized clinical trial. *J Vasc Surg*. 2002; **35(4):**631-9.
5. Safi, H.J., Miller, C.C., Azizzadeh, A., and Iliopoulos, D.C. Observations on delayed neurologic deficits after thoracoabdominal aortic aneurysm repair. *J Vasc Surg*. 1997; **26(4)**: 616–22

CAMPYLOBACTER: A CHANGE IN PUBLIC HEALTH APPROACH

Editor,

Following the recent focus on campylobacter during Food Safety Week 2014[1], it would be timely to inform readers of recent changes in Public Health investigation of campylobacter cases.

Campylobacter remains the most commonly reported cause of food poisoning. The main sources include raw or undercooked meat (especially poultry), unpasteurised milk and untreated water[2].

Presently, campylobacter infections are reported by microbiology laboratories and clinical teams to the Health Protection Service at Public Health Agency (PHA). Campylobacter reports in Northern Ireland have increased from 843 cases in 2008 to 1350 cases in 2013. Similar increases in campylobacter cases have been seen in all areas across UK. This may be due to increasing sensitivity of testing methods used by laboratories, however, ultimately the cause

is unknown.

Until recently all campylobacter cases reported to PHA were sent a postal questionnaire. Completed questionnaires were then reviewed to identify infection control measures required and to identify outbreaks promptly.

An audit was undertaken to review current practice and identify potential service improvements in this area of health protection.

The audit looked at Campylobacter cases over a 6 month period in 2013. Over this time period there were a total of 837 laboratory notifications with 403 (48%) cases returning questionnaires.

Median time from onset of symptoms until confirmation of infection was 9 days and median time between laboratory confirmation and receipt of completed questionnaires was also a further 9 days.

Majority of questionnaires (96%) did not identify any risk factor exposures, further cases or outbreaks. Of the remaining cases, only 1% led to environmental inspection and sampling of food premises.

On further discussion with other health protection units across the UK, it became clear that there is a wide variation in approach to investigation of campylobacter. Currently there is no evidence to identify the optimal approach to investigation of this disease.

Several limitations were identified from our audit. These included the immediate loss of information on 52% of cases and the significant time delay of 18 days between onset of symptoms and review of case information. Given campylobacters' relatively short incubation period of 3 days on average, these responses were not timely enough to facilitate infection prevention or early identification of outbreaks.

The fact that only 4% of cases required further action revealed an obvious mismatch between the investigative resources required and Public Health action taken.

Based on this audit a new approach to public health investigation of campylobacter was instigated in July 2014, adapted from Good Practice statements published elsewhere[3].

Cases are now reviewed and classified as Not linked, Possibly linked or Probably linked dependant on a number of factors, with a graded response for each. This simple change in clinical practice has led to service improvements from both temporal and financial perspectives.

The PHA would continue to encourage all health professionals in primary and secondary care to be aware of food-borne pathogens. If enteric infection is suspected we would recommend that microbiological testing is requested and that all symptomatic patients are given general infection prevention control advice.

The authors have no conflict of interest.

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REFERENCES:

1. Food Standards Agency. *Food Safety Week 2014: 'Don't wash raw chicken'.* London: Food Standards Agency. Available online from: http://www.food.gov.uk/news-updates/campaigns/campylobacter/fsw-2014. [Last accessed December 2014].
2. Public Health England. *Campylobacter : guidance, data and analysis.* London: Public Health, UK Government. Available online from: https://www.gov.uk/government/collections/campylobacter-guidance-data-and-analysis. [Last accessed December 2014]
3. Health Protection Agency Scotland. Gastrointestinal and zoonoses. Surveillance data and systems. Campylobacter laboratory reporting system. Glasgow: Health Protection Scotland; 2012. Available online from: http://www.hps.scot.nhs.uk/giz/ssdetail.aspx?id=195. [Last accessed December 2014.]

TWO CASES OF PRIMARY ADENOCARCINOMA OF AN ILEAL CONDUIT : CASE REPORTS AND REVIEW OF THE LITERATURE

Editor,

Ileal conduits are used for urinary diversion following cystectomy for trauma, malignancy, congenital defect or neurogenic non-functioning bladder. Urinary diversion tumours are usually in uretero-sigmoidostomies where mixed faeces and urine may be tumourogenic.[1] Tumours in transpositioned small bowel segments are usually found post-cystectomy seeded from the primary[2]. Primary malignancy of the small bowel is uncommon, with 175 cases in the UK over two years. Primary tumours in an ileal conduit are exceptionally rare[2].

We present two patients with primary adenocarcinoma in their ileal conduits.

This 78-year-old woman underwent radical cystectomy and ileal conduit for transitional cell carcinoma (T2N0, Grade 3, CIS bladder only). She had lifelong ciclosporin post cardiac transplant for cardiomyopathy. On admission for bleeding she developed abdominal pain, vomiting and non-functioning stoma. Examination revealed abdominal tenderness and a parastomal hernia. CT scan demonstrated thickened omentum, parastomal hernia, ileal conduit dilatation and small bowel obstruction.

At laparotomy, an ileal conduit tumour was found, adherent to transverse colon, with widespread tumour deposits. The ileal conduit was taken down and refashioned and right hemicolectomy and ileostomy was performed.

Pathology confirmed poorly differentiated adenocarcinoma with desmoplastic stroma arising from the conduit wall involving the ileum, colon and omentum (Figure 1). The patient died from cardiogenic shock within 24 hours.

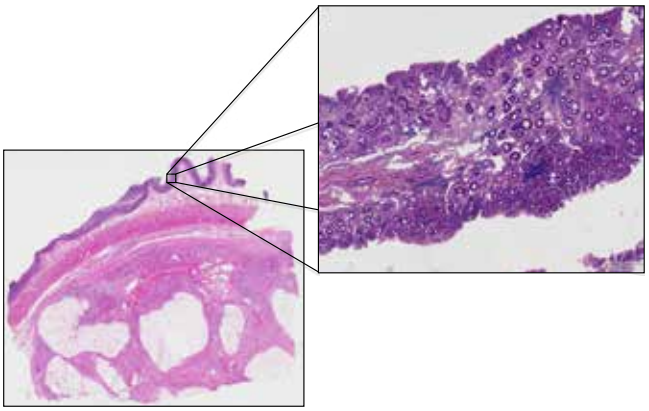

Figure 1: A low and high power photomicrograph of poorly differentiated adenocarcinoma arising from the wall of the conduit.

A 45-year-old woman with congenital ectopia vesica had cystectomy and ileal conduit formation at age five. Later, she had multiple gynaecological procedures, strangulated hernia repair, division of adhesions, hysterectomy and excision of the resultant enterocutaneous fistula.

Presenting with abdominal pain, CT scan showed an obstructing lesion in her urostomy and hydronephrosis. At laparotomy, the conduit was excised and a new one fashioned. Pathology demonstrated a mixed neuroendocrine tumour and mucinous adenocarcinoma. She had adjuvant chemotherapy and remains disease free.

Primary adenocarcinoma in an ileal conduit is rare with the absolute risk unknown[2]. Carcinogenic nitrosamines, increased oxidative stress or release of inflammatory mediators (epidermal growth factor, cytokines and cyclo-oxygenase-2) as a result of chronic inflammation or recurrent infections are possible mechanisms of carcinogenesis[3]. Biopsies of ileal mucosa in patients for 7 years post-surgery found mucosal thinning and villous atrophy but no malignancy.[3] This may have underestimated the latent-period which can be up to 40 years.

Small bowel adenocarcinoma is treated primarily by surgery, however, many present late.[4] Limited data suggests improved survival with adjuvant chemotherapy.[4]

There is no evidence that immunosuppression increases the risk of malignancy in ileal conduits. However, an increased risk of malignancy in renal transplant and rheumatoid arthritis patients, treated with azathioprine, has been observed, with case reports of cancers in patients with Crohn's who receive immunosuppression.[5]

These cases highlight the potential for malignancy in ileal conduits. A high level of suspicion is appropriate in patients with urinary obstruction or pain in the urostomy. They require radiological and endoscopic evaluation for recurrence or primary malignancies of the conduit. Patients with longstanding urinary diversion may warrant surveillance, however there is no consensus regarding this.

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REFERENCES

1. Wielding S, Fineron P, Driscoll PJ, Anderson DN. Late malignant change in an ileal conduit. *Int J Urol.* 2008;**15**(1):99-101.
2. Jian PY, Godoy G, Coburn M, Lynch G, Ro JY, Zhai QJ, *et al.* Adenocarcinoma following urinary diversion. *Can Urol Assoc J.* 2012;**6**(2):E77-80.
3. Aragona F, De Caro R, Parenti A, Artibani W, Bassi P, Munari PF, *et al*. Structural and ultrastructural changes in ileal neobladder mucosa: a 7-year follow-up. *Br J Urol.* 1998;**81**(1):55-61.
4. Dasari BV, Gardiner KR. Management of adenocarcinoma of the small intestine. *Gastrointest Cancer Res.* 2009;**3**(3):121-2.
5. Dasari BV, McBrearty A, Gardiner K. Immunosuppression in patients with Crohn's disease and neoplasia: an ongoing clinical dilemma. Dis Colon Rectum 2012;**55**(9):1008-11.

ADULT SMALL BOWEL MALROTATION – AN AUDIT OF LOCAL PRACTICE.

Editor,

Small bowel malrotation (SBM) is a congenital anatomic anomaly resulting from an abnormal rotation of the midgut during embryogenesis which places the patient at risk of acute and chronic complications. SBM is historically regarded as a paediatric phenomenon, however over the past 30 years literature has increasingly focused on the incidence, significance and management of SBM within the adult population. Traditionally prevalence is often quoted as ~0.2% however authors of more recent studies agree the true incidence of malrotation in adults is underestimated due to the wide range of potential clinical presentations [1].

Symptoms are often mistaken for irritable bowel syndrome, peptic ulcer disease, biliary and pancreatic disease and psychiatric disorders. A number of studies have noted those initially classified as 'asymptomatic' have in fact on careful questioning reported abdominal complaints attributable to their malrotation[1]. Therefore an abnormal junction in an adult should not be dismissed simply as a normal variant.

Upper GI contrast fluoroscopy remains the examination of choice, however with increasing utilisation of CT more recent studies have observed features such as an abnormal SMA/SMV relationship or associated extra-intestinal abnormalities such as aplasia of the uncinate process of pancreas[2].

The greatest controversy surrounds the management of the asymptomatic patient who is discovered incidentally to have malrotation on radiologic examination. The literature is divided with some authors advocating a surgical Ladd procedure only in symptomatic patients. In 2006 Malek

and Burd[3] undertook a unique 'decision analysis' study to assess the risk of surgery compared with "watchful waiting." They concluded observation of completely asymptomatic malrotation in adults older than 20 years of age resulted in increased life expectancy in those individuals.

In contrast, other authors have argued any risk of midgut volvulus, regardless of how small, warrants operative intervention[4]. In the absence of an adequately sensitive or specific tool to predict those at risk of developing such complications, some authors argue surgical intervention should be considered. Authors have also suggested increased access to laparoscopic Ladds procedures, which are associated with reduced post-operative morbidity, should encourage prophylactic correction of asymptomatic SBM[5].

An audit of local practice revealed adequate visualisation of the duodeno-jejunal junction on 92% of audited barium swallows and meals. However only 14% of adult patients with a radiologically diagnosed SBM were referred to a surgical team. As a result of this audit it has been agreed a departmental standardised protocol for upper gastrointestinal barium studies should be created and the local upper gastrointestinal surgeons have supported the referral of adult patients with radiologically diagnosed SBM.

The authors have no conflict of interest.

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REFERENCES:

1. Pickhardt PJ, Bhalla S. Intestinal malrotation in adolescents and adults: spectrum of clinical and imaging features. *AJR Am J Roengenol.* 2002; **179(6)**: 1429-35.
2. Zissin R, Rathaus V, Oscadchy A, Kots E, Gayer G, Shapiro-Feinberg M. Intestinal malrotation as an incidental finding on CT adults. *Abdom Imaging*. 1999; **24(6)**: 550-5.
3. Malek MM, Burd RS. The optimal management of malrotation diagnosed after infancy: a decision analysis. *Am J Surg.* 2006; **191(1)**: 45-51.
4. Kapfer SA1, Rappold JF. Intestinal malrotation – not just the pediatric surgeons problem. *J Am Coll Surg*. 2004; **199(4)**: 628-35.
5. Seymour NE, Andersen DK. Laparoscopic treatment of intestinal malrotation in adults. *JSLS*. 2005; **9(3)**: 298-301.

TRAINEE EXPERIENCE OF OPEN CHOLECYSTECTOMY IN THE LAPAROSCOPIC ERA

Editor,

The laparoscopic approach to gallbladder surgery has almost completely replaced conventional open cholecystectomy (OC) as the gold standard for symptomatic cholelithiasis. The open approach is generally reserved for complex cases with unclear anatomy or intra-operative complications that cannot be managed laparoscopically[1, 2].

The combination of low conversion rates to OC and decreased training hours due to the introduction of the European working Time Directive has led to a hypothesis that current trainees may not be competent to perform open cholecystectomy[1-3]. As the need for conversion to OC is not always predictable, and since experienced colleagues may not be at hand, this is a potentially important clinical governance issue.

We set out to evaluate the experience and competencies of higher surgical trainees in Northern Ireland in the performance of OC.

An email survey of all higher surgical trainees in Northern Ireland was conducted. Each trainee provided their year of training, along with details of how many LC's and OC's they had assisted with, performed with assistance or performed independently. Trainees' confidence to perform the 12 different steps of an OC, as outlined on Intercollegiate Surgical Curriculum Project (ISCP) assessment form were also assessed. Trainee opinion on the available options to enhance OC training was also sought.

Twenty seven (79%) of the higher surgical trainees responded to the survey. The level of training covered the full spectrum of Specialist Training (ST) 3 to ST 8, with 11 (41%) responders within their final 2 years of training.

The survey data is summarised in Table 1.

8 out of the 10 trainees who had performed more than 10 OC's under supervision were in the last two years of their training. Of these 8 trainees, 5 had rotated through an HPB unit.

When asked about their confidence in performing all steps of an OC, 7 trainees were confident of carrying out all steps independently. The most junior trainee confident at performing an OC independently was ST6 level. 9 trainees did not feel confident to perform all steps even with assistance. Of the 9 trainees who had passed through the regional HPB unit, 6 were confident of all steps of OC.

18 (67%) trainees felt they should not be performing LC independently if they were not confident to perform OC. 16 of these 18 trainees plan to perform LC's independently in the future

All trainees felt that through attending theatre lists and rotating through HPB, their ability to perform OC would improve. Simulator practice and watching videos were identified as potentially useful adjuncts to open cholecystectomy training.

The current open surgical simulation studies show, in general, a benefit in developing the surgical skills of surgical trainees. However, these studies do have limitations. There are no current simulators in the literature for training in open cholecystectomy. In hepatobiliary surgery, simulators do exist for t-tube insertion and are being developed for practising forming a choledochojejunostomy and pancreaticojejunostomy[4, 5]. We feel there would be a benefit in developing a simulator for the teaching and practice of open cholecystectomy.

In conclusion, whilst it is of paramount importance to

Table 1.

Number of procedures performed by surgical trainees

Number of trainees who performed each procedure	Number of Procedures				
	0-10	11-20	21-30	31-40	≥40
LC's assisted	-	-	2	3	22
LC's performed under supervision	1	1	1	2	22
LC's performed independently	8	6	2	3	8
OC's assisted	5	12	5	4	1
OC's performed under supervision	17	8	1	1	-
OC's performed independently	27	-	-	-	-

competently perform a laparoscopic cholecystectomy by the completion of higher surgical training, the core skills of performing an open cholecystectomy in a complex situation need to be maintained. Training therefore needs to address the needs of the trainees through rotation through an HPB unit, and simulation.

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REFERENCES

1. Livingston EH, Rege RV. A nationwide study of conversion from laparoscopic to open cholecystectomy. *Am J Surg*. 2004; **188 (3)**: 205–11.
2. Sakpal SV, Bindra SS, Chamberlain RS. Laparoscopic cholecystectomy conversion rates two decades later. *JSLS*. 2010;**14(4)**:476-83
3. Morris-Stiff GJ, Sarasin S, Edwards P, Lewis WG, Lewis MH. The European Working Time Directive: One for all and all for one? *Surgery*. 2005;**137(3)**:293-7.
4. Reznick R, Regehr G, MacRae H, Martin J, McCulloch W. Testing technical skill via an innovative "bench station" examination. *Am J Surg*. 1997;**173(3)**:226–30
5. Narumi S, Toyoki Y, Ishido K, Kudo D, Umehara M, Kimura N, et al. Introduction of a simulation model for choledocho- and pancreaticojejunostomy. *Hepatogastroenterology*. 2012;**59(119):**2333-4

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James Logan Prize Essay

The Challenges of Cancer Pain Assessment

Katherine McCracken

Accepted 20th October 2014

PREFACE

James Alexander Logan, a second-year medical student at the Barts and The London School of Medicine and Dentistry, died in February 2001 after a painful illness. A Trust was set up in his name in 2003 to promote education in the recognition and treatment of cancer pain and it provided funds for an annual essay prize, open to those undergraduate medical students of Queen's University, Belfast, who had completed their fourth year palliative care teaching. The first competition took place in 2010 and the winning entry appeared in the Ulster Medical Journal in 2011.

The Trust itself was dissolved in 2014 but the essay prize continues and the Trust's website can still be accessed at http://www.jameslogantrust.org.uk/

INTRODUCTION

For patients and their families, pain is a feared and distressing component of the cancer trajectory[1]. The burden of cancer pain is widespread with a prevalence of greater than fifty percent in all cancer types[2]. Pain can impair physical functioning and cause or amplify psychological suffering. Despite effective therapeutic options, it is acknowledged that cancer pain is frequently under treated[2, 3]. One barrier to optimal cancer pain management is poor assessment of pain. A comprehensive pain assessment is an essential step in order to control cancer pain but it is not a straightforward task[4]. In this essay I will discuss the challenges of cancer pain assessment, with particular focus on the complex nature of cancer pain, pain assessment tools and populations at high risk of inadequate assessment.

CONCEPTUALISING A COMPLEX PHENOMENON

Cancer pain is complex. Often the product of multiple mechanisms at several sites, it can comprise neuropathic, inflammatory, ischaemic and direct compression effects[3, 5]. It is temporally changing and when present is often at least moderate in severity[2, 6]. Genetic factors, past history, culture and mood affect a patient's experience of cancer pain[7].

Pain in cancer patients is most commonly tumour related but it may also arise subsequent to cancer treatment[3]. For example, oral mucositis is a painful side effect of chemotherapy as is skin erythema following radiotherapy[8]. Alternatively, pain may be linked to a concurrent disorder such as osteoarthritis.

The subjective and multifaceted nature of pain heightens the challenge of pain assessment. Before assessment, the concept of pain should be understood by the health care professional. The term "total pain" is used to refer to the multidimensional nature of pain which encompasses the physical, psychological, social, and spiritual domains[9, 10].

Lame et al. indicate that the effect of pain on quality of life is linked more strongly with a patient's pain beliefs, than with the intensity of pain experienced[10, 11]. At the end of life, concerns such as searching for purpose and leaving loved ones can intensify pain perception. Spiritual distress may reveal itself as physical or psychological symptoms[10].

Viewing pain as a multidimensional entity, allows for pain to be addressed in its entirety and on an individual level. Assessment of pain which leans on pain as being an expression of "actual or potential tissue damage" falls too heavily on the physical trigger[10]. It is important to acknowledge that not all patients will experience pain in every domain, but that ideal assessment of cancer pain fully explores each one.

ASSESSMENT TOOLS

In general, history, physical examination and psychosocial assessment form the basis of patient assessment. There is often incongruity between the care-givers impression of a patient's pain and the patient's subjective experience of pain[12]. Evidence suggests that tools such as the visual analogue scale, numerical rating scales and verbal rating scales can improve communication of pain characteristics and lead to enhanced management, particularly in patients with significant pain[13]. These tools are recommended for use by the European Association of Palliative Care. The Brief Pain Inventory and the McGill Pain Questionnaire are examples of multidimensional instruments which are more comprehensive than rating scales[14].

A lack of documentation of assessment findings is a barrier to effective pain relief [15]. Pain assessment tools facilitate clear documentation and reassessment of employed management strategies. The extensive range of pain assessment tools in existence is an indication of the challenge of pain assessment. A more standardised approach comprising common, international pain assessment tools would be beneficial[12].

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Currently, the growing range of tools seems to be propelled by specific research interests as opposed to a collaborative effort to improve consistency of assessment[4].

There is also need for development of an international pain classification system which is comprehensive, practical and prognostic[16]. Several standardised cancer pain classification systems exist but are not fully validated. Most widely used is The Edmonton Classification System for Cancer Pain (ECS-CP)[4]. After surveying a systematic review which focused on six cancer pain classification systems, The European Palliative Care Research Collaborative recommended ECS-CP for development with the view of it becoming an internationally recognised system[17]. It is currently the subject of international validation studies[4]. ECS-CP considers various factors which appear to be prognostic of complex cancer pain management. The system helps a less experienced clinician to anticipate when specialist advice is required[18]. Consensus on a classification system for cancer pain would provide a common language, comparable to the TNM cancer staging classification system,[16] thereby enabling comparison of pain treatment results[19].

COMMUNICATION BARRIERS AND CHALLENGING POPULATIONS

In 1968, Margo McCaffery formed a definition of pain: "Pain is what the experiencing person says it is, existing whenever he says it does[20]." Pain assessment guidelines still respect the philosophy of her definition today. The nature of pain does not allow for objective assessment. As far as possible, the patient should have an active role in assessment of pain. Cancer patients should be encouraged to communicate their thoughts, fears and expectations about pain[21].

Collaboration and communication between the patient, their family and clinicians aids cancer pain assessment. Good relationships facilitate reporting of concerns and accurate pain evaluation. If a patient feels their opinions will be ignored, they may hesitate to report pain. A patient may hesitate to report pain for a variety of reasons. For example, a study concluded that adolescents may refrain from reporting cancer pain if they believe it will compromise their social activities[22].

Pain may hold a different meaning for a cancer patient relative to patients who experience pain from a non life threatening illness. For a patient with cancer, pain may induce fear if a patient believes pain to be a sign of failure of treatment or disease progression[23]. Fear may subsequently deter a patient from revealing the full nature of their pain. Thus educating the patient about cancer pain and addressing fears and false beliefs is essential in order to ensure accurate pain assessment. From the point of diagnosis, patients should be made aware that cancer pain can be controlled. Fatalistic patient beliefs that cancer pain has to be accepted should be dissolved[3].

Infants, elderly people, those with cognitive impairment or language difficulties, substance abusers and patients at the end of their lives are groups of people who are at higher risk of inadequate pain relief[12].

Screening for cognitive impairment is important as it can affect a patient's experience and expression of pain. Cognitive impairment may be a feature in cancer patients. Dementia or metabolic disturbances are frequent causes[24]. Approximately 51% of patients with terminal illness experience pain during the last 48 hours of life[25, 26]. During this time, the frequency of delirium is reported as between 85% and 90%[27]. Pain should always be considered when assessing the aetiology of delirium in a patient with cancer.

Every effort should be made to elicit self-reporting of cancer pain. If a patient is unable to comply with pain assessment tools or to explain their pain verbally other simple measures can be trialled. For instance, asking the patient to blink once to indicate if pain is present and twice if not. The finger span assessment is another simple method in which a patient is taught to signal pain severity by altering the distance between their thumb and forefinger[12, 28].

Sensitivity to pain behaviours is particularly important in terminally ill patients who are unable to self-report their pain experience. Facial grimacing, bracing and moaning are typical pain behaviours. Other pain related behaviours include agitation, restlessness and confusion[12]. A relative who knows the patient well may be able to enhance cancer pain assessment by detecting subtle changes in behaviour. Physiological signs such as elevated pulse and blood pressure are not sensitive indicators of pain[12]. Specific pain behaviour assessment tools have been developed and can be helpful to assess cancer pain in non-verbal patients[12]. However, behaviours often used to identify pain can be overshadowed by the sedative effects of opioid analgesics.

CONCLUSION

In conclusion, assessment of cancer pain requires a holistic approach. It necessitates acknowledgment of the multiple factors which contribute to an individual's pain experience. It must go beyond the physical trigger, taking account of psychological, spiritual and social dimensions of a patient's life course. Effective assessment of cancer pain prioritises the individual patient and works in association with family members and carers. Development of international consensus on how to classify and assess cancer pain is a current priority which must be rooted in the concept of "total pain." For a patient with cancer, comprehensive assessment of pain is a prerequisite for the appropriate selection of pain management modalities and optimal care and as such is a vital aspect of medical practice.

REFERENCES

1. Tavoli A, Montazeri A, Roshan R, Tavoli Z, Melyani M. Depression and quality of life in cancer patients with and without pain: the role of pain beliefs. *BMC Cancer.* 2008; **8:** 177.

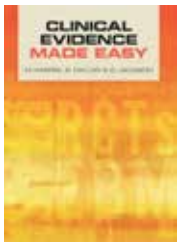
2. van den Beuken-van Everdingen MH, de Rijke JM, Kessels AG, Schouten HC, van Kleef M, Patijn J. Prevalence of pain in patients with cancer: a systematic review of the past 40 years. *Ann Oncol*. 2007; **18(9)**:1437-49.

3. Simone CB, Vapiwala N, Hampshire MK, Metz JM. Cancer patient attitudes towards analgesic utilization and pain intervention. *Clin J Pain.* 2012; **28(2)**: 57–162.

4. Hjermstad MJ, Fainsinger R, Kaasa S; European Palliative Care Research Collaborative (EPCRC). Assessment and classification of cancer pain. *Curr Opin Support Palliat Care.* 2009; **3(1):**24-30.
5. Schmidt BL, Hamamoto DT, Simone DA, Wilcox GL. Mechanism of cancer pain. *Mol Interv.* 2010; **10(3):** 164–78.
6. Daut RL, Cleeland CS. The prevalence and severity of pain in cancer. *Cancer.* 1982; **50 (9)**:1913–8.
7. Ripamonti CI, Bossi P, Santini D, Fallon M. Pain related to cancer treatments and diagnostic procedures: a no man's land? *Ann Oncol.* 2014; **25 (6):** 1097-106.
8. Viet CT, Corby PM, Akinwande A, Schmidt BL. Review of preclinical studies on treatment of mucositis and associated Pain. *J Dent Res.* 2014; **93(9)**:868-75.
9. Richmond C. Obituary: Dame Cicely Saunders. *BMJ* 2005; **331(7510)**: 238.
10. Mehta A, Chan LS. Understanding the concept of "total pain": a prerequisite for pain control. *J Hosp and Palliat Nurs.* 2008; **10 (1)**:26-32.
11. Lame IE, Peters ML, Vlaeyen JW, Kleef Mv, Patijn J. Quality of life in chronic pain is more associated with beliefs about pain, than with pain intensity. *Eur J Pain.* 2005; **9(1)**:15-24.
12. Herr K, Coyne PJ, Key T, Manworren R, McCaffery M, Merkel S, *et al.* Pain assessment in the nonverbal patient: position statement with clinical practice recommendations. *Pain Manag Nurs.* 2006; **7(2):** 44-52.
13. Breivik H, Borchgrevink PC, Allen SM, Rosseland LA, Romundstad L, Breivik Hals EK, *et al.* Assessment of pain. *Br J Anaesth.* 2008; **101(1):** 17-24.
14. Scottish Intercollegiate Guidelines Network (SIGN). Control of pain in adults with cancer: a national clinical guideline. Guideline 106. Edinburgh: Scottish Intercollegiate Guidelines Network, NHS Scotland; 2008. Available online from: http://www.sign.ac.uk/pdf/SIGN106.pdf. Last accessed November 2014.
15. Herr K, Titler MG, Schilling ML, Marsh JL, Xie X, Ardrey G, *et al*. Evidence-based assessment of acute pain in older adults: current nursing practices and perceived barriers. *Clin J Pain.* 2004; **20(5)**:331-40.
16. Fainsinger RL, Nekolaichuk CL. A 'TNM' classification system for cancer pain: The Edmonton Classification System for Cancer Pain, (ECS-CP). *Support Care Cancer.* 2008; **16(6):**547-55.
17. Knudsen AK, Aass N, Fainsinger R, Caraceni A, Klepstad P, Jordhoy M, *et al.* Classification of pain in cancer patients--a systematic literature review. *Palliat Med.* 2009; **23(4)**:295-308.
18. Fainsinger RL, Nekolaichuk CL. Cancer pain assessment--can we predict the need for specialist input? *Eur J Cancer.* 2008; **44(8)**:1072-7.
19. Hjermstad MJ, Gibbins J, Haugen DF, Caraceni A, Loge JH, Kaasa S, EPCRC, European Palliative Care Research Collaborative. Pain assessment tools in palliative care: an urgent need for consensus. *Palliat Med.* 2008; **22 (8)**: 895-903**.**
20. McCaffery M. Nursing practice theories related to cognition, bodily pain, and man-environment interactions. Los Angeles, CA: University of California; 1968.
21. Jefford M, Tattersall M. Informing and involving cancer patients in their own care. *Lancet Oncol.* 2002; **3 (10):** 629–37.
22. Ameringer S. Barriers to pain management among adolescents with cancer. *Pain Manag Nurs*. 2010; **11(4):**224-33.
23. Lemay K, Wilson KG, Buenger U, Jarvis V, Fitzgibbon E, Bhimji K, *et al.* Fear of pain in patients with advanced cancer or in patients with chronic noncancer pain. *Clin J Pain.* 2011; **27(2):**116-24.
24. Buffum MD, Hutt E, Chang VT, Craine MH, Snow AL. Cognitive impairment and pain management: review of issues and challenges. *J Rehabil Res Dev.* 2007; **44 (2):** 315–30.
25. Lichter I, Hunt E. The last 48 hours of life. *J Palliat Care.* 1990; **6 (4):** 7–15.
26. Sykes N, Thorns A. The use of opioids and sedatives at the end of life. *Lancet Oncol* 2003; **4(5**): 312–318.
27. Agar M, Lawlor P. Delirium in cancer patients: a focus on treatment-induced psychopathology. *Curr Opin Oncol.* 2008; **20(4):** 360–6.
28. Merkel S. Pain assessment in infants and young children: the finger span scale. *Am J Nurs*. 2002; **102 (11)**:55-6.

Book Reviews

CLINCAL EVIDENCE MADE EASY



M Harris, G Taylor, D Jackson, Publisher Scion Publishing Limited 2014. ISBN-13: 978-1907904202. RRP: £18.50

This is a short book, 207 pages excluding the index, and is ideal for health professionals who wish to learn about or improve their skills in clinical evidence and critical appraisal.

The reader can use the book like a critical appraisal course manual working through each chapter consecutively.

Alternatively for the person with some knowledge of clinical evidence methodology and critical appraisal, perusal of individual chapters allows improvement in specific concepts as needed.

For individuals with a competent working knowledge of clinical evidence methodology and critical appraisal skills it is an excellent reference text.

The first section deals with understanding clinical evidence.

The second section deals with clinical evidence at work

The chapters are succinct. The text is simple and easy to follow.

The concepts are extremely well explained throughout.

In particular the second section explains how to integrate critical appraisal into daily practice using examples from the literature.

It allows the reader to better appraise medical literature including scientific papers, clinical guidelines, health economic guidelines and evidence from pharmaceutical companies.

Appraisal tools to do this are conveniently incorporated into the latter chapters.

I really like this book. The title says it all- Clinical Evidence Made Easy

Dr Marie Staunton.

MEDICAL STATISTICS MADE EASY, 3RD EDITION.

M. Harris and G. Taylor.
Publisher: Scion Publishing Ltd 2014.
ISBN-13: 978-1907904035. RRP £16.50.

I really quite enjoyed this book – a lot of time and effort has gone into taking the fear out of statistics for the reader which makes it a pleasure to read.

A grading system of stars and "thumbs up" is used to denote how important and how technically difficult each topic is. Each topic in the book is then described using the same headers throughout:

How important is it?

How easy is it to understand?

When is used?

What does it mean?

Watch out for…

Worked example

This care and attention means it's possible just to dip into this book if you want to check some facts or you can read through it at a deeper level if you are planning out a research paper. The authors see their target audience as dividing into those who just want to be able to explain statistics in a viva situation, those who have to analyse a paper and those who are planning a research project. I would have to say that they have succeeded in their goal.

The book starts with simple statistics such as percentages, mean, median, mode and standard deviation. Then it works through confidence intervals, P values, t-tests and other parametric tests including chi-square tests right through to statistics which compare risk such as odds ratios, correlation, regression and survival statistics such as Kaplan-Meier plots and the Cox regression model.

The last section of the book then looks at all of these in terms of more complex real life examples from clinical papers reproduced with permission of the various journals – I thought this final section really helped with the understanding of difficult clinical trials.

Overall, I would thoroughly recommend this book for anyone needing to critically analyse a paper or think about the initial stages of a research project. It is not a complete textbook of statistics but more of a primer. It might sit on your bookshelf for a while gathering dust, but it will be there when you need it.

Dr John Purvis.

Ulster Med J 2015;**84(1):**63-65

Abstracts

Proceedings of the second annual Queen's University Belfast Student Research Symposium

Wednesday 12th November 2014, Riddel Hall

Nathan Cantley, Meghan Deery, Philip McCaughey, Elizabeth Malcomson, Samara Fleville, Aaron Bell

Contact Details: Nathan Cantley, ncantley01@qub.ac.uk

OVERVIEW

On the 12th November 2014, the Queen's University Academic Medicine Society (QUAMS) convened the second annual Student Research Symposium at Riddel Hall. The meeting was organised in collaboration with staff from the School of Medicine, Dentistry and Biomedical Sciences, had over 100 registered delegates and funded by a £10,000 INSPIRE grant from the Academy of Medical Sciences.

The conference was the second conference to engage with medical and dental students from across all year groups and empower them to put forward abstracts to present as oral and poster presentations. A keynote speech by trainee surgeon Mr Edward Fitzgerald, concerned student engagement with research with tips and tricks for students to get their foot in the door. The event also brought together academic leads from the School of Medicine, Dentistry and Biomedical Sciences Intercalated Degree and Summer Studentship programmes.

28 students submitted abstracts to the conference on a wide variety of topic areas and backgrounds. Some of the topics included surgical admission rates, female genital mutilation in low and middle income countries as well as cystic fibrosis and nerve degeneration. All 28 students were offered the opportunity to present with 6 selected for oral presentations. Judges were present to assess all the students who presented with a winner and runner-up selected from each category of presentation. The winning abstracts are detailed below with the student indicated by a ** in each case.

The conference organisers are incredibly grateful for all the help received from staff in the university and hope to see as many students as possible for the 2015 Student Research Symposium next academic year. For more information about QUAMS and the symposium, please go to www.quams.org.uk.

ORAL PRESENTATION- WINNER

"The impact of pre-pregnancy care on pregnancy planning indicators in pregnancy complicated by diabetes mellitus"

Meghan Deery[1], Lesley Hamill[1], David R McCance[2], Michelle Spence[3], Fiona Alderdice[4], Roy Harper[5], and Valerie A. Holmes[1]

Background: Women with diabetes are at increased risk of adverse pregnancy outcomes compared to the background maternity population. Pre-pregnancy care (PPC) constitutes specialised medical care provided for women with diabetes which reduces adverse pregnancy outcomes. Two thirds of women in the Confidential Enquiry into Maternal and Child Health received suboptimal PPC[1]. This study evaluates the provision and impact of self-reported and optimal PPC in Northern Ireland (NI).

Methods: Data on PPC was collected during patients' first visit to a specialist antenatal-metabolic clinic as part of a regional service evaluation of the integration of a preconception counselling resource into routine care in NI. 'Optimal PPC' was defined according to NICE Guidelines. Women who reported receiving PPC were compared to those who did not receive PPC. Women categorised as receiving 'optimal PPC' were compared to those who received suboptimal or no PPC.

Results: 129 women attended clinics over a 12 month period. 80% (n=103) of women reported receiving PPC, with 38% (n=54) categorised as having received optimal PPC. Women who reported receiving PPC and those who received 'optimal PPC' had significantly lower HbA1c at their first clinic visit (56.4mmol/mol vs 64.1mmol/mol, P=0.032 and 51.4mmol/mol vs 63.3mmol/mol, P<0.001, respectively).

Conclusion: Two thirds of women who reported receiving PPC did not receive optimal care, highlighting a discrepancy between how women perceive PPC and current best practice. Both self-reported and optimal PPC were associated with improved glycaemic control, with optimal care having a greater impact. Further efforts are needed to ensure that all women with diabetes receive optimal PPC.

Footnote

1. Confidential Enquiry into Maternal and Child Health (2007) Diabetes in Pregnancy. Are we Providing the Best Care? Findings of a National Enquiry: England, Wales and Northern Ireland London: CEMACH

ORAL PRESENTATION- RUNNER-UP

"Investigating the clinical potential of induced pluripotent stem cell-derived endothelial cells in wound healing"

Philip McCaughey, James Bojdo, Christina O'Neill, Jasenka Guduric-Fuchs, Sophia Kelaini, Reinhold Medina, Sandra McAllister, Andriana Margariti, Alan Stitt

Centre for Experimental Medicine, School of Medicine, Dentistry and Biomedical Sciences, Queen's University Belfast, BT12 6BA

Background: Following cutaneous injury, timely restoration of integumental integrity is essential to restore homeostatic conditions. Revascularization is a critical process in wound healing; however conditions associated with defective endothelial function and repair, such as diabetes, impair this process, leading to the development of chronic wounds. Studies have shown that endothelial progenitor cells (EPCs) have an important role in physiological tissue repair and regeneration, but these cells can be difficult to isolate and become senescent relatively quickly in culture. Therefore, translation to clinical use may be problematic. Induced pluripotent stem cells (iPSCs) offer promise as an alternative source of proliferative cells from which endothelial-like cells may be generated. Methods: Induced pluripotent stem cells (iPSCs) were generated from human fibroblasts via a DNA-free integration method over a period of 28 days. Endothelial differentiation was achieved by seeding cells on collagen IV-coated dishes in EGM-2 medium supplemented with vascular endothelial growth factor, following which cells were selected for either CD34 or KDR - known vascular progenitor markers. Three-dimensional cultures were performed to investigate the potential to produce implantable microvascular networks.

Results: iPSCs were successfully generated from human fibroblasts and subsequently differentiated into proliferative, endothelial-like cells (iPSC-ECs) capable of forming microtubular networks in collagen scaffolds in vitro. In addition, a number of novel genes implicated in the processes of endothelial differentiation and angiogenesis were found to be upregulated.

Conclusion: This work demonstrates that it is possible to generate iPSC-ECs from adult human fibroblasts. iPSC-ECs had similar characteristics to EPCs and have considerable potential for clinical use as personalised, cell-based therapy.

POSTER PRESENTATION- WINNER

"Induction of zinc finger protein A20 in Cystic Fibrosis: Investigating compounds with anti-inflammatory action"

Beth Malcomson[1], Shu-Dong Zhang[2], Madeleine Ennis[1] and Bettina C Schock[1]

1- Centre of Infection and Immunity, 2- Centre for Cancer Research and Cell Biology, Queen's University Belfast, BT9 7BL

Background: Various CFTR gene mutations lead to sticky mucus production throughout the body in Cystic Fibrosis (CF) patients. Bacterial colonisation in airway epithelium leads to chronic inflammation and tissue damage, exacerbated by faulty regulation of the innate immune response that can ultimately lead to respiratory failure. In the Toll Like Receptor 4 (TLR4) signalling pathway that contributes to this response against Gram negative bacteria, the protein A20 negatively regulates Nuclear Factor-κB. In turn this is responsible for the release of the pro-inflammatory cytokine, IL-8.

In CF a lack of A20 contributes to the hyperinflammatory phenotype of the airway epithelium. Connectivity Mapping has been successful to predict licensed cancer drugs that can modify the expression of a given target gene. We hypothesise that Connectivity Mapping can be used to predict drugs that exert an anti-inflammatory effect in primary nasal epithelial cells (PNECs) by up-regulation of A20. The study investigated the effects of the predicted drugs (one positive, one negative) on A20 mRNA expression and LPS induced IL-8 release.

Methods: Using 6 independent GEO databases of 81 samples of epithelial cells from CF and non-CF subjects, linear regression analyses were applied to A20 correlates to create a gene signature. The predicted A20 inducing drugs include Azoclonol, Ikarugamycin, and Quercetin but Fluvastatin was predicted not to induce A20. Non-CF and CF (F508del homozygous) PNECs were pre-treated for 1h with Fluvastatin (0.1, 1μM), Quercetin (0.1, 100μM) and Dexamethasone (1μM) followed by stimulation with lipopolysaccaharide (LPS 10ug/ml for up to 24h).

Results: LPS induced IL-8 release determined by ELISA (PeproTech) in the 24h supernatant was significantly reduced in CF PNECs with Fluvastatin pre-treatment ($p<0.05$) at 0.1 and 1 μM and in non-CF PNECs at 1 μM ($p<0.05$), confirming previous findings in CFBE41o- and 16HBE14o- cell lines. With Quercetin pretreatment LPS induced IL-8 release was decreased without statistical significance at 0.1 μM (n=4). Total RNA was extracted and reverse transcribed into cDNA for qPCR analyses of A20 mRNA. Fluvastatin pre-treatment (with and without LPS stimulation) did not induce A20 at any concentration, Quercetin in line with the hypothesis shows A20 up-regulation at some time points but to date only non-CF PNECs (n=3) have been analysed.

Conclusion: Connectivity Mapping can successfully predict drugs from a list of already licensed drugs to induce A20. Some of these drugs may be repositioned as anti-inflammatory for CF patients with chronic airway inflammation.

POSTER PRESENTATION- RUNNER-UP (JOINT PRIZE)

"Identification of inflammasome expression in EAE" Samara Fleville- Abstract not published here

"Preliminary assessment of the expression and release of soluble endoglin in cultured human placental trophoblasts

under hypoxic and diabetic stresses"

Aaron Bell, Michelle B Hookham, Kathy Darragh, Dongxu Fu, Anna Connell, Timothy J Lyons, and Jeremy Y Yu

Centre for Experimental Medicine, School of Medicine, Dentistry and Biomedical Science, Queen's University Belfast, Northern Ireland, UK

Introduction: Preeclampsia (PE), manifested as new-onset hypertension and proteinuria occurring after 20 weeks of gestation, remains a major cause of morbidity and mortality in pregnancy. Women with diabetes are at a greatly higher risk of developing PE (15-30% vs. 3-5% in general population). It is believed that maternal vascular symptoms are mediated by an abnormally increased release of anti-angiogenic factors such as soluble endoglin (sEng) from the placenta, possibly due to hypoxia. We previously found that the presence of pre-gestational diabetes raises blood levels of sEng during the second half of gestation, which may contribute to the higher incidence of PE in these women.

Objective: To determine if the expression and release of sEng can be modulated by hypoxia and diabetic conditions in a common human trophoblast cell line.

Methods: Cultured BeWo choriocarcinoma cells were treated with stresses simulating PE (hypoxia) and diabetes (high glucose, 'heavily glycated, oxidized LDL') for 24-48 hours. Expression of endoglin was quantified by RT-PCR in cell lysate, and sEng was measured in supernatant by ELISA.

Results: Hypoxic treatment enhanced cellular expression of endoglin at the mRNA level, but appeared to reduce its protein release in supernatant when compared to normoxia. Levels of sEng in supernatant were not affected by high glucose, but were decreased by modified vs. native LDL.

Conclusion: In this preliminary exploration, we found that hypoxia and diabetes-relevant stresses altered the expression and release of sEng in cultured BeWo trophoblast cells. Further investigation is needed to confirm the observation, and to understand the mechanisms.

Book (and CD) Case

Dr Michael Cave

Six favourites

THE RITE OF SPRING

Igor Stravinsky (numerous recordings available)

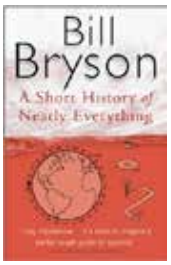
This ballet, depicting a barbaric pagan ritual, caused a minor riot when premiered in 1913, but is now widely considered to be the most influential work of the 20th century. The music is dissonant and repetitive. When quiet it is mysterious and ominous. When loud it is mechanical, incessant and strangely elating. How Stravinsky conceived the sound in his head, let alone wrote it down on an orchestral score, will always amaze me. You might hate it, but listen to it at least once anyway.

BRAHMS: THE SYMPHONIES

Simon Rattle, Berliner Philharmoniker (EMI Classics, 2009)

This music is profound, cleverly constructed and deceptively complicated, but to analyse it while listening is a mistake. Above all, it is BEAUTIFUL - just listen, and enjoy. This version was recorded live during concerts in 2009. The dynamics are breathtaking, the intonation and balance perfect, and the intensity and passion that Brahms wrote into the music shines out in abundance.

A SHORT HISTORY OF NEARLY EVERYTHING



Bill Bryson (Black Swan, 2004)

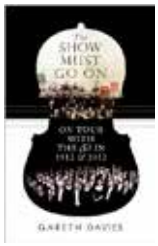
Bill Bryson is not a scientist, and is best known for his travel books, but here has researched millennia of natural history and presents it in a way that fascinates, amazes and amuses in equal measure. His curiosity and thirst to know more are infectious, and his accomplished and humorous writing makes potentially difficult and dull subjects both easy and interesting. I'm told the illustrated version is even better.

QUANTUM

Manjit Kumar (Icon Books, 2008)

A well written and engaging account not just of the work of the great 20th century physicists, but of their lives and personalities; how they argued and competed, but worked together to understand the forces that govern our universe. I have read this book several times and still have no grasp of quantum mechanics, but that is not the point. It the insight into the minds and lives of these great thinkers that stimulates in us the same curiosity and wonder that inspired them.

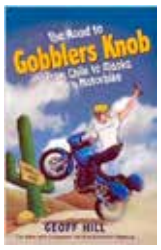
THE SHOW MUST GO ON



Gareth Davies (Elliot and Thompson 2013)

Gareth Davies is principal flute in the London Symphony orchestra, but also a very readable and humorous writer. Here he gives a carefully researched account of the orchestra's tour of the USA in 1912, alongside personal anecdotes from their world tour a century later in 2012. An informative, but not too serious, insight into the world of the professional orchestral musician.

THE ROAD TO GOBBLERS KNOB



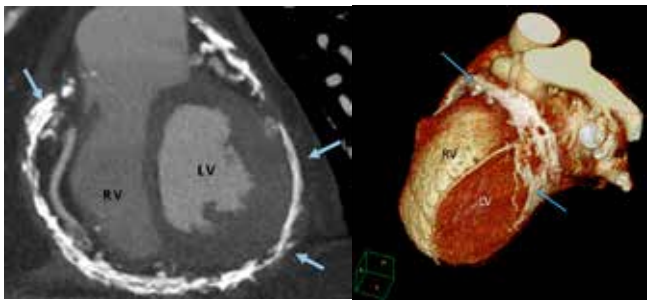
Geoff Hill (Blackstaff Press 2007)

Belfast journalist Geoff Hill and a long suffering companion travel 16000 miles on the Pan American Highway from Chile to Alaska on a pair of motorbikes. The tale is told with a strictly tongue in cheek history of each country visited, followed by an account of the pleasures and not infrequent dangers of the trip. Enjoyable light reading, not even remotely intellectual, with plenty of laugh out loud moments.

Curiositas

POSTGRADUATE QUIZ

A 37 year old gentleman with recurrent chest pain and dyspnoea on exertion was referred for cardiac CT examination after an equivocal exercise stress test.

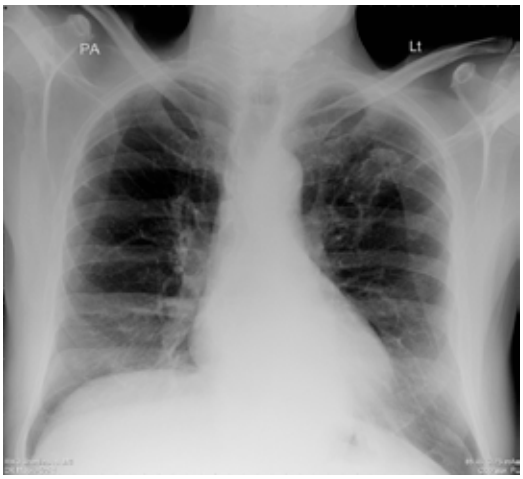


1. What abnormality (highlighted by arrows) is visualised on these CT images?
2. What is the diagnosis?
3. What is the somewhat appropriate German descriptive name for this condition?

Dr Claire McCune, Dr Jonny Hogg and Dr John Purvis (Cardiac Unit. Altnagelvin Hospital, Western HST, Londonderry). Corresponding author: Dr John Purvis (Consultant Cardiologist, John.purvis@btinternet.com)

MEDICAL STUDENT QUIZ

What festive chest x-ray sign is evident and what is the typical causative agent?



Dr Ian Bickle, Consultant Radiologist, Raja Isteri Penigran Anak Saleha Hospital, Bandar seri Begawan, Brunei Darussalam.

GENERAL PRACTICE QUIZ

A three month post-partum 30 year old presented to her GP with a 'painful wrist'. During her pregnancy she had a tingling sensation in her thumb, index, middle and part of her ring finger – which has now resolved. Presently, she has pain over the base of her right thumb and the distal forearm. The pain is exacerbated when she places her hand in the position shown.

1. What is this 'manoeuvre' better known as?
2. What condition does it test for?
3. What other condition is described in this case? What is the significance of these conditions in relation to pregnancy?

Glenn Ritchie (Medical Student, Queen's University Belfast) and Dr Gerry Gormley, (Senior Academic General Practitioner, Queen's University Belfast).

HISTORICAL QUIZ

1. Who is the famous Ulster physician depicted in this statue?
2. Where would you find this memorial?
3. What is the 'device' featured beside him?

Michael Corr (Medical Student, Queen's University Belfast) and Dr Paul Hamilton (Specialty Registrar, Chemical Pathology, Belfast Health and Social Care Trust)

AND FINALLY…..

Curiositas is pleased to announce the appointment of two medical student sub-editors: Michael Corr and Glenn Ritchie. Michael and Glenn are currently fourth medical students at Queen's University Belfast. Curiositas looks forward to working with them.

ANSWERS See overleaf

CONSIDER CONTRIBUTING TO CURIOSITAS?
Please refer to '*Curiositas: Guidelines for contributors*' http://www.ums.ac.uk/curiositas.html and email *curiositas@ums.ac.uk* with your ideas and submissions.

Curiositas: Answers

POSTGRADUATE QUIZ

1. **What abnormality (highlighted by arrows) is seen on the CT images?** There is extensive calcification of the pericardium. Calcification tends to be most marked within the atrioventricular groove (between atria and ventricles) but may extend to cover the remainder of the heart. A thin shell of calcification surrounding the heart on chest X-ray is a useful clue – appearances are much more dramatic on CT imaging.

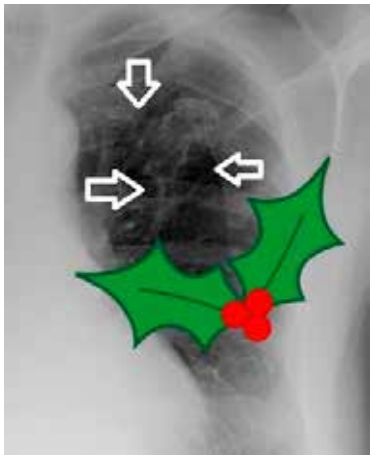
2. **What is the diagnosis?** Chronic constrictive pericarditis. The thickened rigid pericardium prevents adequate filling of the heart producing symptoms of dyspnoea and fatigue. Compression of the right ventricle leads to back pressure affecting the superior vena cava (causing a raised jugular venous pressure) and inferior vena cava (causing hepatic congestion).The diagnosis is notoriously difficult to make on clinical grounds alone.

3. **What is the somewhat appropriate German descriptive name for this condition and what is the treatment?** Panzerherz (armoured heart). The English literature refers to it as a porcelain heart. Diuretics may give symptomatic relief for a while, but the definitive treatment is surgical stripping of the thickened pericardium. This may be hazardous as the thickened material can become adherent to and penetrate into the underlying myocardium. Sometimes the surgeon can only break the thickened mass up into several semi-mobile plates resembling medieval plate armour.

Dr Claire McCune, Dr Jonny Hogg and Dr John Purvis (Cardiac Unit. Altnagelvin Hospital, Western HST, Londonderry). Corresponding author: Dr John Purvis (Consultant Cardiologist, John.purvis@btinternet.com)

RADIOLOGICAL QUIZ

The 'holly leaf' sign refers to the characteristic appearance of a calcified pleural plaque on a chest X-ray. The shape and irregular, coarse, nodular outline gives rise to this description relating to the leaves of a holly tree – a tree most associated with Christmas. It accounts for the appearance of only a small proportion of all pleural plaques. Pleural plaques typically occur in those exposed to asbestos, such as individuals working in the ship-building and construction industries.



Dr Ian Bickle, Consultant Radiologist, Raja Isteri Penigran Anak Saleha Hospital, Bandar seri Begawan, Brunei Darussalam.

GENERAL PRACTICE QUIZ

1. What is this 'manoeuvre' better known as? Finklestein's test. Pain is felt at base of the thumb along the tendons of the extensor pollicis brevis and abductor pollicis longus muscles.

2. What condition does it test for? De Quervain's Tenosynovitis. Inflammation and thickening of the sheath surrounding the aforementioned tendons.

3. What other condition is described in this case? What is the significance of these conditions in relation to pregnancy?
   Pregnant women are prone to developing carpal tunnel syndrome during pregnancy, but after pregnancy they can be prone to developing De Quervain's from holding their new born - 'Mummy's thumb'.

Glenn Ritchie (Medical Student, Queen's University Belfast) and Dr Gerry Gormley, (Senior Academic General Practitioner, Queen's University Belfast). (Dr Jonathan Morrow kindly provided the images for this question)

HISTORICAL QUIZ

1. Professor Frank Pantridge was born in Hillsborough, County Down in 1916. He graduated in medicine from Queen's University Belfast in 1939. He served in the Medical Corps of the British Army during World War II, and during the Fall of Singapore was taken as a prisoner of war by the Japanese. He was later awarded the Military Cross for his service. In 1950, he became a lecturer at the pathology department of Queen's University Belfast. He then undertook a scholarship at the University of Michigan department of cardiology, before returning again to Belfast when he was appointed as a professor at Queen's University, and a consultant cardiologist at the Royal Victoria Hospital. Working with his colleague Dr John Geddes, he introduced cardiopulmonary resuscitation to Belfast in 1957. However, Pantridge noted that most patients with ventricular fibrillation need an intervention before reaching hospital. By 1965, Pantridge's first portable defibrillator (weighing 70 kg) was being fitted into a Belfast ambulance. Three years later, the design had been refined so that the device weighed a mere 3 kg. In a landmark paper in the Lancet in 1967, he presented the Belfast Plan which showed improved survival through delivering emergency cardiac care in the community. It was this paper which spread his message across the world and earned him the title 'The Father of Emergency of Medicine'.

2. Outside the offices of Lisburn Borough Council, Lagan Valley Island Centre.

3. A portable defibrillator.

For further information on the life and work of Professor Frank Pantridge: Ulster Med J 2010; 79(Suppl 1): 1-2. Curiositas would like to thank Lisburn City Council who kindly gave permission for use of these images and providing supplementary information

Gamechangers

MAJOR TRAUMA NETWORKS

Ms Susan Yoong and Prof Roy Spence

Trauma is the commonest cause of death in patients under 40 years of age. Up to 30% of deaths from Major Trauma may be avoidable. It is estimated that the immediate management of a Major Trauma patient costs the NHS between £0.3 and £0.4 billion per year. In February 2010 the National Audit Office produced a document on Major Trauma Care in England stating that the current services for people who sustained Major Trauma were inadequate. Without doubt, one of the game changers in the management of the severely injured patient has been the introduction of Major Trauma Networks in the United Kingdom.

UK Regional Trauma Networks were first introduced across England in 2012 with 22 designated Major Trauma centres. Major Trauma constitutes injuries which may result in permanent disability and/ or combinations of injuries with an Injury Severity Score (ISS) of greater than 15. Results from the Trauma Audit and Research Network (TARN) national audit 2014 show that 30% more patients are now surviving severe trauma, since the introduction of Major Trauma Networks. Scotland has announced plans to develop a Major Trauma Network which should become operational in 2016.

Northern Ireland has recently committed to auditing outcomes in Major Trauma which will hopefully lead to the development of improved care for people who suffer serious injuries in our population. With the number of road traffic fatalities increasing from 48 in 2012 to 79 already in 2014 in Northern Ireland, we can no longer afford to lag behind the rest of the UK in relation to the delivery of Major Trauma care.

REFERENCE

1. McCullagh AL, Haycock JC, Forward DP, Moran GC. Major Trauma Networks in England. *Brit J Anaesth* 2014; **113**: 202-206

MEDICAL EDUCATION. PREPARATION FOR PRACTICE: CHALLENGES, VISION AND NEXT STEPS

Michael Corr (Phase 4 Medical Student, Queen's University Belfast)

Glenn Ritchie (Phase 4 Medical Student, Queen's University Belfast)

Dr Gerard Gormley Senior Academic General Practitioner

If you are involved in medical education, from committed clinical teachers to educational scholars, the GMCs report 'State of Medical Education and Practice in the UK 2014' is an essential read.1 The State of Medical Education and Practice in the UK report is a document that culminates GMC data with other sources to provide a picture of the medical profession in the UK and the challenges that it faces. The authors overriding aim is to use the data collected to promote discussion and debate on how to support doctors and improve patient care. The report shows that overall new doctors feel more prepared for their first years of medical practice than ever before and the majority believe the skills they learn in medical school equip them for the world of work. However there is significant variation in the sense of preparedness between medical graduates from different universities ranging from 60% to 85%. Areas where graduates feel the most unprepared include prescribing safely, raising concerns and dealing with end-of-life care. This paper reiterates the call that undergraduate medical training needs to reflect the work place more to create resilient, professional and employable medical graduates. The disparity in preparedness of medical graduates from different institutions suggests educators need to share best practice and also research novel methods to increase preparedness within the undergraduate curriculum. Finally this report maps the challenges that medical education must overcome in the next decade and reflects a challenge to educationists to improve and innovate training whilst inspiring the next generation of doctors and benefiting the patients that they will serve.

1. General Medical Council. The state of medical education and practice in the UK report: 2014. Available online from: http://www.gmc-uk.org/publications/25452.asp Last accessed Jan 2015.

STEREOTACTIC RADIOTHERAPY FOR EARLY STAGE LUNG CANCER

Aidan Cole[1] and Gerard G. Hanna[1,2]

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In the treatment of cancer technological advances over the last decade now permit very accurate delivery of high doses of radiotherapy to small targets. This is collectively known as stereotactic radiotherapy and can be delivered to the brain, which is known as stereotactic radiosurgery or to extra-cranial sites, which is known as stereotactic ablative body radiotherapy (SABR). Given the precision of treatment, surrounding normal tissues are largely spared which permits the delivery of very high doses of radiotherapy, which in turn increases the chance of control / cure of the lesion treated.

For those patients with early stage non-small cell lung cancer (NSCLC) and who are not fit for surgery owing to comorbidities, radiotherapy is offered. Conventional radiotherapy offers local control rates of 50-60%, but following treatment with SABR local control rates are 80-90%. When introduced in the Netherlands, SABR led to an improvement in overall survival for patients with stage I NSCLC with a hazard ratio of 0.70 (CI: 0.49-0.99)[1]. At the

NI Cancer Centre, SABR treatments for NSCLC have been available since July 2013 and this is now the standard of care for patients with stage I NSCLC and who are medically inoperable. The role of SABR is emerging in other tumour types and SABR may be able to treat to oligomestatic disease with the hope of curing disease, previously thought incurable[2]. Further studies are in set-up to assess the efficacy of SABR in a range of range of clinical settings.

REFERENCES:

1. Palma D, Visser O, Lagerwaard FJ et al. Impact of introducing stereotactic lung radiotherapy for elderly patients with stage I non-small-cell lung cancer: a population-based time-trend analysis. J Clin Oncol 2010; 28: 5153-5159.

2. Iyengar P, Kavanagh BD, Wardak Z et al. Phase II Trial of Stereotactic Body Radiation Therapy Combined With Erlotinib for Patients With Limited but Progressive Metastatic Non-Small-Cell Lung Cancer. J Clin Oncol 2014; 32: 3824-3830.

So you want to be a **Specialty Doctor**

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Accepted 11 December 2014

SO, WHAT EXACTLY IS A SPECIALTY DOCTOR?

Specialty Doctors are doctors and dentists who generally work within one specialty, invariably in secondary care, under the supervision of one or more Consultants. Estimates suggest that there are probably more than 20,000 doctors within this grade in the UK and more than 500 here in Northern Ireland.

The term Specialty Doctor appeared in 2008 with the inception of the new terms and conditions of a national contract for this group of doctors, who are neither trainees nor Consultants. This group used to be called the "Non-Consultant career grades" and more recently have been known as "SAS" doctors.

So, the term "Specialty Doctor" is new but the grade is certainly not. SD equivalents have been around for a long time, with many different titles but all under the umbrella of the NCCGs and more recently SAS doctors (**S**taff Grades, **A**ssociate Specialists and **S**pecialty Doctors). There are still some Staff Grade and Associate Specialist doctors around however these particular job titles are now closed to new applicants and their numbers will continue to dwindle as these doctors leave the workforce.

The minimum criteria necessary to become a SD include, full registration with the GMC and at least 4 years, full time, post graduate training (or its equivalent on a part time basis), at least 2 of which should be in a training post in a relevant specialty. Many in this grade, however, have extensive experience, postgraduate qualifications, and some may even be on the Specialist Register or GP Register.

The terms and conditions (T&Cs) for SDs are very similar to those of consultants, with a few minor differences. Just like our GP and Consultant colleagues, SDs are obliged to engage in the appraisal process, keep their CPD up-to-date and of course have the same responsibility to go through the revalidation process on a five yearly basis. The biggest difference of the contract, however, is the pay scale, with the top of the SD pay scale being just below the start point of the Consultant scale.

The standard 40 hour, (10PA∗) full time, SD job plan would in general have 9 PAs for direct clinical care (DCC) and 1 for **S**upporting **P**rofessional **A**ctivities (SPA). Holiday and study leave entitlements are similar to those of Consultants and for those who want to take on leadership or teaching roles, and have the capability to do so, there should be nothing to hinder this.

The role of the SD differs from trainees and Consultants in that the vast majority of their working week is involved with direct patient care. This may be entirely in an outpatient setting, it may be more inpatient based, sometimes a mix of both and in some specialties there may be significant numbers of theatre or interventional sessions each week, as would be the case in the surgical specialties and radiology etc.

SO, WHY WOULD ANYBODY WANT TO BE A SPECIALTY DOCTOR?

There are many reasons why this grade can be an attractive career choice to a wide variety of individuals. Most of these relate to the invaluable benefits of being able to control a better balance between your work pattern and your personal life. Your job plan can be adapted to your own particular needs, and changed, during the annual job planning process, each time your personal situation changes, as it will undoubtedly do during a career that may span up to 40 years. An example of this would be an annualized contract where unpaid leave is taken during school holidays but the deduction in salary is spread evenly over 12 months. Or you can opt for flexible leave whereby the extra time taken in school holidays is paid back during the school term so that no salary reduction is necessary.

Specialty Doctor status can be achieved within 4 years of graduation and it is not essential to have any postgraduate qualifications. This provides the option of a permanent job in a specific specialty, early in your career, without the stress of chasing training posts, moving frequently and taking postgraduate exams. SDs can become very experienced clinicians and often work with high levels of autonomy and, as such, are very valuable members of their team. SDs can, if they choose to, develop their role clinically, in management or in teaching, all of which helps to maintain high levels of job satisfaction, personal achievement and respect from our colleagues.

I have worked within this grade for a long time, I have maintained a healthy work/life balance throughout and I have been able to develop my own career within my specialty, within management and within medical politics.

Would I recommend the new generation of doctors to, at least, consider this career pathway?

I most certainly would.

[∗ Programmed Activity = 4 hours]

THE ULSTER MEDICAL JOURNAL

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Manuscripts should be accompanied by a covering letter **signed** by all the authors agreeing to publication and stating that the work has not been published elsewhere; and stating that they have been actively involved in the preparation of the paper and outlining their contribution to the paper. Any conflict of interest should be declared.

A **PDF** copy of the printed and signed covering letter is ideal for electronic submission.

A Consultant or GP Principal (or equivalent) is required to act as guarantor of the manuscript (usually as a co-author) in case of any issues that may arise after publication.

If e-mail submission is not possible, A CD or memory stick containing the manuscript, tables, images and covering letter can be sent to the Editor at: Dr John Purvis, Consultant Cardiologist, Cardiac Unit, Altnagelvin Hospital, Londonderry, BT47 6SB, Northern Ireland.

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Colour images and tables are encouraged and there is currently no charge for colour reproduction.

Images and tables should be included as separate high resolution .jpg or .tif files and NOT embedded in the Word manuscript file. Images should be appropriately annotated and labelled.

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    4. the year.
    5. volume number and issue number (in brackets) **in bold**.
    6. first and last pages.

- *Example:* Devlin LA, Price JH, Morrison PJ. Hereditary non-polyposis colon cancer. *Ulster Med J* 2005;**74(1)**: 14-21.
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