ISSN 0041-6193

THE ULSTER MEDICAL JOURNAL

Volume 87 (3) September 2018

Lightning strike near the Bay Road area of Larne

The Ulster Medical Journal

The journal of the Ulster Medical Society. First published in 1932.

Successor to the Transactions of the Ulster Medical Society (1862-1929), and the Transactions of the Belfast Clinical and Pathological Society (1854-1860)

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The journal is published in January, May and September, by the Ulster Medical Society, and typeset and printed in the UK by Dorman and Sons Ltd, Belfast. See inside back pages for institutional and personal subscriptions.

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Ulster Med J 2018;**87(3):**153-154

Editorial

Oxygen: both friend and foe

J Purvis

I enjoy reading books about expeditions and climbing. One recent favourite was *Into Thin Air* by the journalist, Jon Krakauer.[1] Krakauer was briefed by *Outside* magazine to join a large expedition to the summit of Everest (8848m) amidst concerns of increasing commercialisation. His was one of 2 large parties (and several smaller) attempting to summit on the same day in May 1996.

Unfortunately, a major blizzard came in suddenly, catching about 37 guides, clients and Sherpas on the South face, close to the summit. Eight people died – the highest single day mortality on the mountain until 2015 when an earthquake caused an avalanche that struck base camp and killed 22.

Krakauer's book is controversial because it examines factors that may have contributed to the disaster and to an extent, attributes blame without giving those accused a right of reply. Some of those who died had exhibited mild symptoms of high altitude pulmonary oedema or cerebral oedema (HAPE and HACE in American argot) before the summit attempt and arguably weren't in the best shape to survive an unexpected storm.

Severe HAPE requires prompt descent and evacuation to a clinic at 4240m at Pheriche, Nepal where treatment with hyperbaric oxygen and acetazolamide can be given. Nifedipine and sildenafil can be used to decrease pulmonary vasoconstriction associated with hypoxia. HACE presents with vomiting, headache, lethargy and confusion – sometimes causing climbers to just "give up" or "forget" to look after basic safety. HACE can be more rapidly fatal than HAPE and also requires prompt descent, acetazolamide or steroids. Sometimes climbers take prophylactic acetazolamide to prevent symptoms but many climbers at the highest altitudes probably suffer sub clinically from both.

On the day of the final ascent to the summit, one of the experienced guides chose to make a "personal best" without supplementary oxygen and Krakauer felt that in this hypoxic, zombified state, he was not able to look after the clients to the best of his abilities. On his return to Camp 4 (7951m), the guide donned oxygen, ascended and single-handedly went on to rescue 3 stranded climbers – needless to say, he was not best pleased with Krakauer's book.

The physiology on Everest is extreme. At the summit, total barometric pressure is 33.7 kPa. Ambient PO_2 is 7 kPa - the alveolar pressure of oxygen is somewhat lower at 5.7 kPa due to water vapour occupying space in the lungs. [2]

At this low partial pressure, oxygen can only slowly diffuse into the pulmonary capillaries – the transit time of blood through the capillaries becomes critically important and any increase in cardiac output with exertion lowers the transit time further. In addition, nearly everyone at this altitude has some degree of subclinical high altitude pulmonary oedema so that when the arterial PO_2 was recorded in 4 climbers after 20 minutes of breathing ambient air at 8400m, arterial PO_2 was only 3.3kPa at rest! [3] Surprisingly, there is little evidence for anaerobic respiration as lactate levels were not increased in these subjects. [3]

Hyperventilation, stimulated by low PO_2 at high altitude induces metabolic alkalosis which shifts the oxygen dissociation curve to the left increasing oxygen capture but it also lowers arterial PCO_2 inducing cerebral vasoconstriction, decreasing cerebral blood flow and impairing concentration further. Hyperventilation also carries warm moist air away from the body which can hasten the onset of hypothermia and dehydration. [2]

Elite climber, Ed Viesturs, who has scaled all 14 of the World's 8000m + summits without oxygen describes the experience thus "I'd be literally having to force myself after that 15th breath to take the next step." [4]

The oxygen delivery systems used by climbers deliver 4L O_2 per minute and are often used in Camp 4 on the night before an ascent – this lessens the risk of another hazard of climbing – high altitude sleep apnoea/periodic breathing which is associated with poor sleeping, headache and fatigue.

The survival statistics for ascent without oxygen are stark - 1 in 12 climbers descending from the summit without oxygen die versus 1 in 34 of those using supplementary oxygen [3]

With oxygen, its estimated that more reasonable arterial PO2 levels of around 6.7 kPa are achieved which lessens hyperventilation and in turn protects against cerebral vasoconstriction, dehydration and heat loss.[3]

Krakauer observed that a large proportion of the clients on Everest were doctors and dentists – he felt that both professions contain many chronic over-achievers. I suspect we can all think of colleagues who, when advised to go and relax by taking a gentle walk up the Cavehill, will be attempting to summit Everest 2 years later!

Its Monday morning and I am reading through some GP referral letters to cardiology clinic:

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"Please see this 90-year-old patient with dyspnoea. N-terminal BNP is mildly elevated and during a CT abdomen, the Radiologist commented that the inferior vena cava and hepatic veins appeared enlarged possibly reflecting heart failure".

The right-sided venous congestion is almost certainly due to raised right heart pressure secondary to pulmonary hypertension in this age group. What has caused the pulmonary hypertension? A rough calculation estimates that this patient has passed about 50 million litres of one of the most toxic oxidising agents known over their alveoli – not surprising there has been some long-term damage. Diuretics and maybe even pulmonary vasodilators might help – just like the climbers!

Oxygen: both friend and foe.

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Editor's Notes and Forthcoming Events

JOB VACANCIES (I) UMJ EDITOR STARTING JAN 2020

The Editor is mindful that his "tour of duty" ends after publication of the January 2020 edition of the Journal and therefore seeks a Deputy Editor to assist with producing the Journal with a view to taking over as Editor from 2020. Please contact the editor via e-mail at john.purvis@btinternet.com if you are interested.

JOB VACANCIES (II) UMS IT ASSISTANCE

The Society's IT has been managed for many years by one Fellow who now wishes to retire and Council would welcome offers of assistance from Fellows or Members who would be willing personally to look after one or more of these areas for a period of years.

Database

This is perhaps the least onerous of the three items and one which can be managed from home. It would be necessary for the database manager to house securely two small servers in his/her home and to have or acquire a fixed IP address. A desire for perfection would be an advantage.

The present database is internet based and has been developed over the past nine years to suit our needs. It is stable and is unlikely to need major modification unless there are changes in the structure of the Society. The Society Administrator looks after the day to day management but it is useful to have the data checked, and the database manager's administrative account must be used for a small number of operations.

Website

This can also be managed from home but involves somewhat more work than the database particularly at times of change in Council membership, preparation for the new lecture session, and publication of the Journal.

The website has been written directly in html which is somewhat awkward to deal with but which results in a smaller and therefore faster page.

The Office PC

At present this is managed by visiting the Council room every two to four weeks to backup the system and maintain the software. The hardware is a few years old but is working well. Attendance is also required should a problem arise.

Please contact the Hon. Secretary at secretary@ums.ac.uk if you can help

HONORARY UMS FELLOWSHIP FOR DR JOHN LOGAN

Dr John Logan was enrolled as an Honorary Fellow of the Ulster Medical Society on 10th May 2018. Dr Colin Matthews, Hon. Archivist, read out a brief citation of John's contribution to the Society:

John was born on 10 May 1948 into a medical family including great-grandfather GP in Bingley, Yorkshire, grandfather GP in Ballynure, Co. Antrim, father John Stephens Logan (Bunny Logan, also an Honorary Fellow of the Society) and mother Mary Sinclair Thompson Irwin.

He attended RBAI and CAI then studied medicine at Queen's 1966-1972. MRCP (UK) followed in 1975 then FRCP Ed. in 1989 and FRCP Lond. in 1992. He mostly trained in Belfast and was appointed Consultant Physician in General Medicine to Musgrave Park Hospital and Belfast City Hospital in 1982. He retired in 2010.

He was elected a member of the UMS in 1972 and served as Honorary Secretary from 1988 to 1992 then Honorary Archivist from 1999 to 2013. He developed the Society's first database in 1989 and the current online database in 2011. He single-handedly established the UMS website from 2003 onwards.

He has transcribed and placed online much of the archival material of the Belfast Medical Society, Belfast Clinical and Pathological Society, Ulster Medical Protective Association and early Ulster Medical Society. He donated the marble copy of the bust of James McDonnell at present in the foyer of the Whitla Medical Building.

As UMS Secretary, Archivist and IT Coordinator he has spent countless hours transcribing the UMJ onto the website, looking after the membership list and frankly keeping every President sorted and latterly he has been a huge support and resource to our Administrator, Kathy. We wish him well for the future and as a token of our thanks, we are delighted to enrol him as an Honorary Fellow of the UMS.

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Ulster Medial Society Programme 2018-19

Day and Date	Lecture	Title	Venue	Time
Thurs 4th Oct 2018	UMS Presidential Address	**Dr Peter Watson** *"What is a Physician?"*	BCH Postgrad Centre	20.00 hrs
Thurs 18th Oct	UMS	**Dr Neil Kennedy** QUB *"The relevance of rheumatic and romantic heart disease for a global physician"*	BCH Postgrad Centre	20.00 hrs
Fri 2nd Nov	UMS/QUB/NIMDTA Trainee research day	Opportunities, Presentations and Prizes	BCH Postgrad Centre	09.00 – 16.00 hrs
Wed 14th Nov Note: Wed meeting	Joint UMS with BCH	**Dr Jon Stone** Edinburgh Functional neurological conditions	BCH Postgrad Centre	Buffet 17.00 hrs Lecture 18.00 hrs *To be confirmed*
Thurs 29th Nov	Desmond Whyte Lecture	**Dr Barry Kelly** Belfast *"A Golden Age and the Floating Man: Avicenna and the Canon of Medicine"*	Postgrad Centre Altnagelvin Hospital	Buffet 17.00 hrs Lecture 18.00 hrs *To be confirmed*
Thurs 13th Dec	The Gary Love Lecture Joint meeting with Ulster Society for History of Medicine	**Laura Kelly** *History of being a medical student in Ireland*	BCH Postgrad Centre	20.00 hrs
2019				
Thurs 10th Jan	UMS	**Dr Doherty** Trinity College Dublin, Consultant Neurologist *"Concussion: the issues"*	BCH Postgrad Centre	20.00 hrs
Thurs 24th Jan	Joint meeting with Ulster Obs &Gynae Society	**Prof Gary Frischman**, President of Am Soc of Gynae Endoscopy Endometriosis	BCH Postgrad Centre	20.00 hrs
Thurs 7th Feb	UMS Robert Campbell Oration	**Prof Tim Dornan** QUB *"Learning to practise amidst uncertainty"*	BCH Postgrad Centre	20.00 hrs
Thurs 21st Feb	UMS Sir Thomas and Lady Edith Dixon Lecture	**Prof Stuart Elborn** *"Cystic fibrosis; bugs drugs and channels"*	BCH Postgrad Centre	20.00 hrs
Thurs 7th March	Joint meeting UMS and Ulster Society of Gastroenterology	**Mr Simon Paterson-Brown** Edinburgh *"Non-technical aspects of medical practice"*	BCH Postgrad Centre	Buffet 17.00 hrs Lecture 18.00 hrs
Thurs 21st March	UMS	**Prof Chris Elliott** QUB *"Global Food Integrity"*	BCH Postgrad Centre	20.00 hrs
Fri 12th April	UMS	Annual Dinner	The Great Hall QUB	19.30 for 20.00 hrs

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Research for Trainees

Opportunities, Presentations and Prizes

Friday 2 November 2018

Postgraduate Centre, Belfast City Hospital, Belfast HSC Trust

09.00 – 09.10	**Registration**	
09.10 - 09.20	**Welcome**	**Professor Pascal McKeown, Head of Medical School, Queen's University Belfast (QUB)**
09.20 – 09.35	**Why do Research if you want to be a Clinician?**	**Dr Maurice O'Kane, Director, Northern Ireland Clinical Research Network**
09.35 – 09.50	**Why do research as a trainee and how it will be part of my career?**	**Dr Eileen Parkes – Academic Clinical Lecturer (CCRCB, QUB) and Oncology Trainee (NIMDTA)**
09.50 – 10.05	**Research Opportunities in Medical Education**	**Professor Gerry Gormley, Academic General Practitioner, Centre for Medical Education, CME**
10.05 – 10.20	**How can you combine Research and Clinical Work?**	**Dr Bernadette McGuinness, Consultant Physician, Centre for Public Health, QUB**
10.20 – 10.35	**Clinical Academic Pathways**	**Professor Peter Maxwell, Director, Clinical Academic Training Programme (QUB & NIMDTA)**
10.35 – 10.50	**How to obtain Funding to undertake research**	**Professor Danny McAuley, Centre for Experimental Medicine, QUB and Consultant Physician, Belfast HSC Trust**
10.50 – 11.10	**Tea/Coffee and Networking**	
11.10 – 12.00	**Keynote Address: "The Lights came on"**	**Miss Lorna Marson FRCS, Consultant Surgeon, Edinburgh Royal Infirmary and Reader in Transplant Surgery, MRC Centre for Inflammation Research, University of Edinburgh**
12.00 – 14.00	**Lunch (Foyer)**	
12.00 – 13.00	**Meet the Researchers, Find out informally how to get research started and keep going** **(& Eat Lunch!)** Opportunities to have brief interviews with QUB Research Centre investigators	***Centre for Cancer Research & Cell Biology*** *Dr Vicky Coyle* ***Centre for Medical Education*** *Prof Gerry Gormley* ***Centre for Experimental Medicine*** *Professor Jose Bengoechea* ***Centre for Public Health*** *Professor Frank Kee*

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13.00 - 14.00	**Poster Judging & Eat Lunch**	**Case Reports & Case Series** **Quality Improvement** **Medical Education Research** **Clinical Research** **Basic Science Research**
14.00 – 14.10	**Welcome to Prize Presentations**	**Dr Peter Watson** **President, Ulster Medical Society**
14.10 -15.40	**Oral Presentations**	***Chair: Dr Peter Watson*** **Judges: Miss Angela Carragher; Professor Peter Maxwell; Professor Keith Gardiner**
15.40 – 15.50	**Award of Poster Presentation Prizes**	**Dr Cathy Jack, Medical Director, Belfast HSC Trust**
15.50 – 16.00	**Award of Oral Presentation Prize**	**Dr Cathy Jack, Medical Director, Belfast HSC Trust**
16.00 – 16.10	**Concluding Remarks**	**Dr Cathy Jack, Medical Director, Belfast HSC Trust**

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Book Case

'CHORAL WORKS'

Professor Pascal McKeown

Whilst absolutely delighted to have been invited by the Editor to prepare this short piece, I was then faced with a challenge: how does one select only 6 pieces? My personal experience has been in singing the great choral masterpieces, most of which were commissioned for church performance, and that has greatly influenced my choice of music. I have tried to rationalise this by choosing a number of different genres. There is some evidence that choral singing has both physical and mental health benefits. Readers may also wish to peruse Daniel Levitin's book 'This is Your Brain on Music' and 'Musicophilia' by Oliver Sacks.

ORATORIO: HANDEL'S MESSIAH – 'AMEN' CHORUS.

G.F. Handel: Messiah (Watkins Shaw) Paperback Edition Vocal Score: Choral Edition 1999. ISBN-13: 978-0853602118.

Handel's Messiah was first performed in Dublin in 1742 and is now one of the most commonly performed choral works. The opening section of this wonderful oratorio was part of my 'O' level music core curriculum back in the 1970's. Most people will be familiar with the 'Hallelujah' chorus - indeed, as a sixth former at school, I played the viola in my school's performance of this work. Although there are many wonderful choruses in this piece, I recommend that you listen to the final 'Amen' chorus.

MASS: JS BACH'S MASS IN B MINOR – 'GLORIA, ET IN TERRA PAX HOMINIBUS BONAE VOLUNTATIS' SECTION.

Thomaskirche, Leipzig (where Bach worked for many years). Courtesy of Pixabay.

For many, Bach is considered the greatest ever composer. There is something utterly profound about his music, in that he manages to tap into the whole range of human emotion. Considering how prolific he was in writing so many cantatas and other religious works, it was difficult to choose just one piece. However, this is the piece to which I keep returning!

REQUIEM: MOZART – 'LACRIMOSA DIES ILLA' SECTION

Statue of Mozart in the eponymous Mozart Square in Salzburg.

Mozart was a child prodigy but died at the age of 35 in 1791 whilst working on this Requiem. It is thought that Mozart only managed to write the opening bars of this movement and that the whole piece was completed by a contemporary called Süssmayr. This section of the Requiem is so beautifully written and consoling. Many will be familiar with it from having watched the Milos Forman movie 'Amadeus'.

OPERA: BEETHOVEN'S FIDELIO – PRISONER'S CHORUS

Beethoven. Courtesy of Pixabay.

There are composers with many operatic outputs and yet Beethoven only wrote one opera. As with most operas, there is a complex story of love and personal sacrifice. However, in this opera, there is also a very clear message about freedom and justice. Both the music and libretto are wonderfully redemptive. In this particular chorus, the prisoners sing: *O welche Lust, in freier Luft, den Atem leicht zu heben (Oh what joy, in the open air, freely to breathe again).* It's a suitable reflection on current world events!

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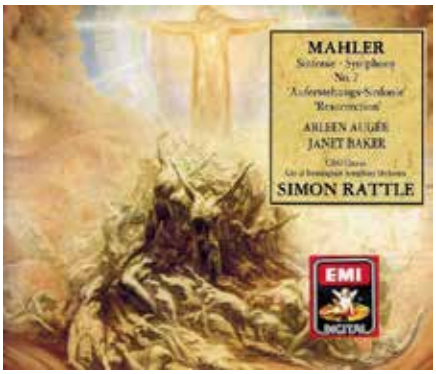
SONG: MORTEN LAURIDSEN – SURE ON THIS SHINING NIGHT

Morten Lauridsen was born in 1943 (http://www.mortenlauridsen.net/MortenLauridsen.html). I have only recently become aware of his music and am enthralled by Lauridsen's sympathetic musical interpretation of James Agee's poem (unfortunately, Agee died of a heart attack in 1955 at the age of 45).

Sure on this shining night
Of star made shadows round,
Kindness must watch for me
This side the ground.
The late year lies down the north.
All is healed, all is health.
High summer holds the earth.
Hearts all whole.
Sure on this shining night I weep for wonder wand'ring far alone
Of shadows on the stars.

SYMPHONY: MAHLER NO. 2 - RESURRECTION (5TH MOVEMENT - AUFERSTEHUNG).



Compact Disc, EMI/Warner Classics

I had the privilege of singing this piece with the Irish Doctors Choir and the European Doctors Orchestra in the Ulster Hall in November 2017. My introduction to this piece was in 1987 (with the amazing performance by Simon Rattle and the City of Birmingham Chorus and Orchestra) and it has been a firm favourite since then. [If listening to Mahler Symphony No. 2 whets your appetite, do have a listen to the final 10 minutes of Mahler's Symphony No. 8 (the 'Chorus Mysticus - Alles Vergangliche' section onwards), which we sang in Ely Cathedral in July 2018!]

Please note that it is possible to access all these works free of charge online (YouTube) so I do hope that you enjoy listening to these pieces!

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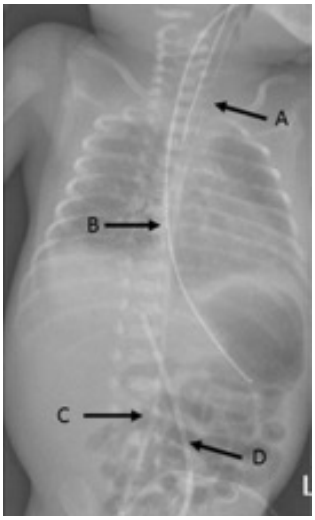
Curiositas (Neonatology)

UNDERGRADUATE QUIZ

1. What abnormalities are seen on the x-ray and what is the underlying diagnosis?
2. How is this condition managed?
3. What is the prognosis?

Dr Christine Sloan (F2, Altnagelvin Area Hospital), Dr David Cummins (ST5, Antrim Area Hospital), Dr Martin Hanna (ST4, Craigavon Area Hospital), Dr David Sweet (Consultant Neonatologist, Royal Jubilee Maternity Hospital).

POSTGRADUATE QUIZ



1. What lines/tubes are noted on this x-ray of a preterm neonate?
2. Where should the tip of each lie when correctly sited?
3. Which requires adjustment in this particular case?

Dr David Cummins (ST5, Antrim Area Hospital), Dr Ben McNaughten (ST6, Royal Belfast Hospital for Sick Children), Dr Christine Sloan (F2, Altnagelvin Area Hospital), Dr David Sweet (Consultant Neonatologist, Royal Jubilee Maternity Hospital).

HISTORICAL QUIZ

1. Who is the subject of this portrait?
2. What role did he play in the development of treatment for respiratory distress syndrome in preterm neonates?
3. What is his connection to the artist?

Dr Ben McNaughten (ST6, Royal Belfast Hospital for Sick Children), Dr David Cummins (ST5, Antrim Area Hospital), Dr Martin Hanna (ST4, Craigavon Area Hospital.)

(Permission to use portrait provided by Dr David Sweet, the artist)

AND FINALLY…

1. Can you identify this logo?
2. What type of chart is seen within the logo?
3. What is the link between this logo and neonatology?

Dr Martin Hanna (ST4, Craigavon Area Hospital), Dr Christine Sloan (F2, Altnagelvin Area Hospital), Dr Ben McNaughten (ST6, Royal Belfast Hospital for Sick Children), Dr David Sweet (Consultant Neonatologist, Royal Jubilee Maternity Hospital).

ANSWERS See overleaf

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

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Curiositas: Answers

UNDERGRADUATE QUIZ

1. There is bowel filling the left hemithorax and obscuring the cardiomediastinal contour. This is consistent with a left sided congenital diaphragmatic hernia.
2. Respiratory stabilisation before surgery is crucial. Neonates with this condition should be intubated at birth. A nasogastric tube should be passed to decompress the stomach and bowel[1]. "Gentle ventilation" should be employed to minimise barotrauma to the lungs although elective high frequency oscillation is not required[2]. Nitric oxide may be utilised in cases of pulmonary hypertension, although evidence for benefit in diaphragmatic hernia is lacking[3]. Extracorporeal membrane oxygenation (ECMO) involves the use of an external gas exchange circuit, preventing further insult to the lungs, however careful selection of suitable cases is required as ECMO cannot reverse severe pulmonary hypoplasia[4]. Surgical intervention to reduce the herniated gastric organs back into the abdomen and close the diaphragmatic orifice is the definitive intervention but can only be undertaken when the baby has been adequately stabilised from a respiratory perspective[1,2].
3. Congenital diaphragmatic hernia is associated with a high degree of morbidity and mortality. A recent study in the United Kingdom and Ireland showed that 16% of neonates did not survive to surgery (other studies suggest that mortality rates range from 10-30%). Post-operative 30-day survival was 98% in those babies that had been adequately stabilised pre-surgery. Factors leading to a worse prognosis included those requiring inotropic support, those that were diagnosed antenatally and female infants[5].

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Dr Christine Sloan (F2, Altnagelvin Area Hospital), Dr David Cummins (ST5, Antrim Area Hospital), Dr Martin Hanna (ST4, Craigavon Area Hospital), Dr David Sweet (Consultant Neonatologist, Royal Jubilee Maternity Hospital).

POSTGRADUATE QUIZ

1. A = Endotracheal Tube; B = Orogastric or Nasogastric Tube; C = Umbilical Arterial Catheter (UAC); D = Umbilical Venous Catheter (UVC).
2. The tip of a correctly inserted ET tube should be projected over the level of T1-T3 on a chest x-ray above the level of the carina[1]. The tip of an appropriately sited orogastric or nasogastric tube should be projected over the stomach bubble below the level of the diaphragm[1]. Umbilical arterial catheters can be used to gain relatively easy arterial access in neonates. Before insertion, the distance between the umbilicus and shoulder tip should be measured. The following table can be used to calculate the distance to which the UAC should be inserted:

Shoulder-Umbilicus Length (cm)	Insertion Length (cm)
8	10
10	12
12	15
14	18
16	20
18	22

An x-ray should be used to confirm the position after insertion. A UAC can be distinguished from a UVC as it will first descend toward the pelvic bone before turning upwards as it enters the iliac artery before finally lying to the left of the spine. A high UAC should lie at the level of the diaphragm (T6-T10) and a low UAC at the level of L3-L5. It is important that it is not positioned at the level of L1 opposite the origin of the renal arteries[1]. The length to which a UVC should be inserted can be determined by measuring the distance between the umbilicus and xiphisternum. Ideally the tip should be projected near the level of the diaphragm. Care should be taken to ensure it does not overlie the liver shadow[1].

3. The tip of the ET tube is at T2-3 and is appropriately sited. The tip of the OG tube is in the stomach. The tip of the UVC is just slightly low at the level of T11. However, the tip of the UAC is too high at T4 and should be retracted.

1. Neonatal Handbook (2017). Royal Jubilee Maternity Service, Belfast, Northern Ireland.

HISTORICAL QUIZ

1. The subject of the portrait is Professor Henry Halliday who worked as a consultant neonatologist in the Royal Jubilee Maternity Hospital.
2. Respiratory distress syndrome (RDS), previously known as hyaline membrane disease, occurs almost exclusively in preterm neonates. It arises from surfactant deficiency secondary to lung immaturity. Surfactant is produced by type 2 pneumocytes within the lungs and serves to reduce the surface tension of pulmonary fluids. In the past, RDS was associated with a high mortality. However, in the 1980s, trials focusing on the use of animal derived surfactants revolutionised neonatal respiratory care. Poracatant alfa, a porcine surfactant developed in Sweden is now the world's top selling surfactant. Professor Halliday was a key figure in the early clinical trials of poractant alfa and the first baby to receive surfactant outside of Sweden was in Belfast in the mid 1980s[1,2].
3. The portrait was painted by Dr David Sweet who is a consultant neonatologist trained by Professor Halliday. He has been involved in clinical trials of a new synthetic surfactant.

1. Halliday HL. (2017) *J Paediatr Child Health* 53: 327-332.
2. Curstedt T *et al*. (2015) *Neonatology* 107: 321-329.

AND FINALLY…

1. This is the logo for Cochrane, a non-profit organisation dedicated to reviewing research in order to facilitate evidence-based medicine. Cochrane was founded in 1993 as the Cochrane Collaboration to provide systematic reviews of current evidence.
2. The chart within the logo is a forest plot, often used to summarise a meta-analysis. The y-axis typically shows the name of the studies whilst the x-axis usually represents the odds ratio or a similar measure of effect. The vertical line represents the line of null effect, where there is no difference between the intervention being assessed and that which it is compared against. Each horizontal line represents a study asking the same clinical question, and represents the 95% confidence intervals of each result. There is often a box included on the line which corresponds to study size. The diamond represents the point estimate and confidence intervals of all the studies combined.
3. The Cochrane logo is a simplified version of a full forest plot showing a meta-analysis of antenatal corticosteroid administration prior to premature labour[1]. This analysis was influential in increasing the use of antenatal steroids given to mothers expected to deliver prematurely with the aim of accelerating foetal lung maturation. The current Cochrane review supports Crowley et al's original work from 1990[1,2], and the use of steroids remains the gold standard in expected preterm delivery.

1. Roberts D et al. (2017) Cochrane Database Syst Rev. 3: CD004454.
2. Crowley P et al. (1990) Brit J Obstet Gynaec. 97: 11-25.

(Permission to use logo obtained from Cochrane)

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Ulster Med J 2018;**87(3):**163-167

Review

Simulation-based Education and Human Factors Training in Postgraduate Medical Education: A Northern Ireland Perspective

Sara Lawson, James Reid, Michael Morrow, Keith Gardiner.

Provenance: externally peer-reviewed.
Accepted: 16th July 2017

ABSTRACT

With their potential to improve patient safety, simulation based education (SBE) and human factors training are gaining momentum across the spectrum of medical education. There are ever increasing drivers for their integration, in particular within the postgraduate arena. This article aims to provide an overview of both simulation based education and human factors training. The breadth of terminology can be bewildering and our target audience is novice or developing practitioners and policymakers. We focus particularly on a regional setting where the Northern Ireland Simulation and Human Factors Network (NISHFN) is working to advance the field.

Key Words: Simulation; Simulation-based education; Human factors

INTRODUCTION

Medical skills and procedures have traditionally been learnt on real patients, but with the advent of new technology it is possible for trainees to practise and master their skills in safe, simulated environments[1]. Simulation is already used as a training tool in many high-reliability industries such as aviation and the military. Its relevance to healthcare relates to an improved learning experience for the trainee which can improve patient safety. Simulation-based education (SBE) is also being used to improve learning from adverse incidents to try and prevent mistakes from recurring. Undergraduate medical education has increasingly moved away from the traditional caricature of *"see one, do one, teach one"* with simulated venepuncture, cannulation and suturing taking place prior to a student attempting such procedures on a real patient.[1] Similarly, in postgraduate medical education, honing technical skills requires deliberate practice and as it has often been said, "*The more I practice, the luckier I get*"[2]. We will start by introducing the concept of simulation and establishing some key nomenclature used in the field before setting it in the Northern Ireland context.

WHAT IS SIMULATION?

Simulation has been defined as "a technique—not a technology—to replace or amplify real experiences with guided experiences that evoke or replicate substantial aspects of the real world in a fully interactive manner"[3]

A number of misconceptions arise concerning which activities constitute 'simulation'. Many clinicians still think it refers only to interactions with plastic manikins. Simulation can refer to human cadavers, simulated patients, screen-based simulation, part-task trainers or even virtual reality[4]. For example, in Northern Ireland there has been a recent communication course for post-graduate paediatric trainees on enhanced communication skills where the School of Drama at Queen's University Belfast provided students as simulated patients.

Fig 1. Postgraduate trainees practising surgical cricothyroidotomy on a task simulator.

Simulation-based education (SBE) has an important role to play as part of a blended approach to learning. The General Medical Council (GMC) document, *Promoting excellence:*

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Standards for medical education and training requires that, "postgraduate training programmes must give doctors in training the opportunity to develop their clinical, medical and practical skills and generic professional capabilities through technology enhanced learning opportunities, with the support of trainers, before using skills in a clinical situation"[5].

Simulation training is often classified as either high or low fidelity; where fidelity refers to how closely the simulation resembles the actual situation being replicated. There are three categories of fidelity: environmental, equipment and psychological. Environmental fidelity refers to the situation in which the simulation takes place, equipment refers to how closely any tools resemble what is used in clinical practice and psychological fidelity is how faithfully the simulation mimics the emotional and behavioural aspects of the real situation.[6.]

It is also useful to consider the importance of realism, "the extent to which the simulation feels and/or behaves the same way as the real-life system"[7]. This can be thought of with regards to physical realism, how much it appears to be a real-life patient, semantic realism, which addresses whether the scenario would play-out like this in the real world and phenomenological realism which refers to how the candidate feels in the scenario. Through a qualitative research study with medical students and post-graduate trainees, Owen discovered that it is issues with semantic realism which are the most poorly tolerated *e.g.* the sequencing of events in the scenario, availability of help and acting out of role[7]. This is important information for educationalists to bear in mind when designing simulation scenarios.

SIMULATION-BASED EDUCATION: TECHNICAL AND NON-TECHNICAL SKILLS

One widely employed SBE technique used to develop technical skills (for example chest drain insertion) is mastery learning. This technique can be used to ensure that each learner reaches a predetermined level of proficiency before progressing, although it is recognised that the time taken to reach this required level will vary depending on the individual. A disadvantage of this process is that it takes considerable faculty time to determine a systematic and validated minimum standard[8]. Consideration should also be given to ensuring the opportunity for *repetitive practice,* which has been shown to produce skill acquisition in shorter time periods than exposure to routine ward work[9]. Eight other aspects have been shown to be important when using simulation as an educational tool; curriculum integration, range of difficulty, being aware of multiple learning strategies i.e. different group sizes or with or without an instructor, clinical variation, a controlled safe learning environment, individualised learning, defined outcomes and validity[9].

SBE has a huge potential to improve skills such as teamwork and communication (conventionally referred to as 'non-technical skills') and to identify latent threats in a clinical environment. Simulation provides a unique opportunity for inter-professional training in a safe learning environment as well as the opportunity to receive immediate feedback from other professionals on the faculty. The relationship between non-technical skills and patient safety is highlighted in the GMC Generic Professional Capabilities Framework which states that doctors in training must understand basic human factors principles and practice at individual, team, organisational and system levels and understand the importance of non-technical skills[10].

Fig 2. Photograph taken at the NISHFN Autumn Conference and published with permission from CAE healthcare. Products featured (left to right): Human worn partial task surgical simulator (cut suit), Replay audio-visual tool used for debriefing, Apollo patient simulator.

DEBRIEFING AND FEEDBACK

It is vital to highlight that SBE acts as an adjunct to clinical experiences and should never be viewed as a replacement. Scenarios must be linked to the curriculum and suitably debriefed to ensure that specific learning outcomes are achieved. Without structured post-event reflective processes the participant's learning is largely left to chance[8]. Structured debriefing affords the opportunity to explore the candidate's pre-existing knowledge and to understand the reasons behind any deviation from expected practice. To be most effective SBE feedback should follow the three Ps; the learning outcomes of the session are **p**lanned, the candidates are **p**repared that they will receive feedback in the "safe" environment and finally feedback is **p**rovided. A wide range of debriefing models already exist but dedicated training in debriefing techniques for simulation faculty is of critical importance (8). Previously in Northern Ireland training in debriefing skills has largely been from personal study of the literature and experiential learning gained by observation of skilled faculty. The Northern Ireland Simulation and Human Factors Network (NISHFN) has developed a Faculty Development Course to introduce structured training in debriefing skills.

STATIC CENTRE VS IN-SITU SIMULATION

Releasing staff from their clinical duties to attend simulation training in static training settings has inherent time constraints and *in-situ simulation* has evolved in response

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to this challenge. In-situ simulation is a training experience that takes place in the actual clinical environment[11]. This allows the clinical team as well as the system processes and environment to be observed. Such an approach is not without challenges; technical issues, timing of the simulation (being considerate of times of particular clinical pressure) and showing consideration to other patients and families[11]. In addition, in-situ SBE must not tie-up vital resources that might be required to address real clinical events. Good advance planning, communication and organisation are vital to the success of this educational approach.

HUMAN FACTORS

Human factors training is based on optimising performance through better understanding of the behaviours of individuals and the way they interact with their environment[12]. In 2007 Martin Bromiley, an airline pilot whose wife died due to an anaesthetic patient safety incident which had human factor causes, established the Clinical Human Factors Group[13]. A multitude of systems models have been developed in an attempt to explain the complex relationship that exists between human factors and the patient. The World Health Organisation (WHO) identified ten human factor topics most relevant for patient safety; safety culture, manager's leadership, communication, teamwork –structure/processes and team leadership, situational awareness, decision making, stress, fatigue and work environment[13]. There is a clear relationship between SBE deliberate practice, communication skills and enhanced team working. The simulated clinical environment allows the candidate the opportunity to practise decision making and be critiqued on their situational awareness in a safe environment. Communication failure is one of the recurrent themes in adverse events in the healthcare setting; an awareness of human fallibility has allowed the development of systems and processes designed to address some of these issues e.g. the WHO surgical safety checklist[14].

THE NORTHERN IRELAND PERSPECTIVE

In 2015, the Northern Ireland Medical and Dental Training Agency (NIMDTA) appointed a Simulation Lead and Simulation Fellow, as part of the ADEPT Clinical Leadership Fellows' programme[15] and this development has helped facilitate the development of the Northern Ireland Simulation and Human Factors Network (NISHFN). This organisation aims to support and connect individuals with an interest in simulation and human factors training.

We have already established the importance of debriefing and in Northern Ireland there has been a regional push towards developing a structured approach to de-briefing based on and with the permission of the Scottish Centre for Simulation and Clinical Human Factors model.

When it comes to reviewing adverse incidents, simulation and human factors training can be used to replicate the event in question with the explicit aim of extracting learning points and developing recommendations to help prevent future recurrence. Identifying individual, or indeed recurrent patterns of adverse events, enables the development of remedial training approaches to be integrated into regular simulation programmes to assist in the dissemination of learning[16]. A regional example of this is seen in the Royal Belfast Hospital for Sick Children where scenarios based on local adverse events have been introduced to the paediatric in-situ simulation programme[17]. This is not unique to this department and the use of SBE and human factors training to assist in learning from serious adverse incidents is a key part of the vision that the NISHFN has for healthcare education in Northern Ireland.

Fig 3. Anaesthetic trainees experiencing the blended approach to learning through SBE with faculty observing them demonstrate their clinical knowledge as well as non-technical skills such as teamwork and communication.

There is increasing evidence that in-situ simulation has the potential to identify latent threats in the clinical environment[18]. In Northern Ireland in-situ simulation is on-going in all five Acute Trusts and has been integrated into the clinical governance programme in the Northern Trust.

The Northern Ireland healthcare system, like many other regions, suffers from acute financial pressures. SBE is associated with the use of resources in terms of equipment, faculty-training and time away from clinical work. A recent article published in BMJ Open highlights that many SBE studies of effectiveness rarely report costs. Researchers are becoming increasingly aware of the need to look at the cost-effectiveness of SBE and a study has recently been approved to look at effectiveness *and* cost-effectiveness of SBE in preventing falls in hospitalised patients. The authors suggest that this will be the first trial to provide an economic evaluation of SBE for a patient safety outcome[19]. In times of limited resources in the NHS it is worth being cognisant of this relationship between the cost of training aligned to potential improvements in patient safety.

One of the potential pitfalls when using simulation-based education is in reverting to a 'one size fits all approach'. Feedback analysis following an anonymous survey of medical trainees in Northern Ireland revealed one trainee who wrote, "Personally I don't think simulation training works for me…

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I dread the thought of it"[20]. Another theme that emerged from this report was the potential for disruption of clinical work during in-situ simulation, especially if performed out-of-hours[20]. It is critically important that patient safety is not compromised and that arrangements are made in advance for the provision of suitable cover for the clinical environment.

Fig 4. Candidates at a SBE course experiencing communication and decision making in a simulated emergency.

CONCLUSION

There is a growing body of evidence that SBE can have a direct impact on patient safety. This is evident in the published literature including but in no way limited to; improvements in medication administration errors following simulation training[21] and reduction in complications following central line insertions[22]. Debriefing focussing on human factors could help to create an open culture and train professionals to discuss near misses, mistakes and adverse events which could have direct implications on patient safety[4]. This is an area of research that may be of increasing interest to health-care professionals in Northern Ireland.

Recent reports from the GMC and Department of Health make the incorporation of such approaches a priority. There will be an increased drive for integrating simulation-based education and human factors training into both undergraduate and postgraduate healthcare training. The current developments in these areas create an exciting challenge for everyone involved in healthcare education in the region. The NI Simulation and Human Factors Network looks forward to assisting interested stakeholders support and develop simulation and human factors training across Northern Ireland in the coming years.

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Ulster Med J 2018;**87(3):**168-172

Clinical Paper

Lightning injuries in Northern Ireland

Aseel Sleiwah[1], Jill Baker[2], Christopher Gowers[3], Derek M Elsom[4], Abid Rashid[5].

Accepted: 25th January 2018
Provenance: externally peer-reviewed.

ABSTRACT

Introduction: Lightning injuries are uncommon in Northern Ireland (NI) with scarce reports detailing incidence and local experience. We present a case study of 3 patients involved in a single lightning strike with a review of the incidence of similar injuries in the province.

Methods: Data from TORRO's National Lightning Incidents Database between 1987 and 2016 (30 years) were searched to identify victims of lightning injuries in NI. Information on 3 patients with lightning injuries that were managed in our regional burns and plastic surgery service was collected and examined. A supplementary search in hospital records was conducted over the last 20 years to identify additional data.

Results: Prior to our study, 6 victims of lightning injuries were identified of whom 5 survived and 1 died. Our 3 patients comprised of 2 children and 1 accompanying adult. All survived but the adult suffered cardiac arrest and required a prolonged period of cardiopulmonary resuscitation.

Conclusion: While lightning injuries are rare in NI, this is the first report of more than one person affected by a single lightning incident in the province. In our limited experience, immediate public response and prolonged cardiopulmonary resuscitation efforts facilitated by automated defibrillators result in a favourable outcome.

BACKGROUND:

In the United Kingdom (UK), lightning strikes are relatively uncommon compared with other areas of the world. Consequently, reports in the local medical literature on occurrence, morbidity and fatality are relatively scarce.

The Tornado and Storm Research Organisation (TORRO) collects data on national lightning incidents in the UK. For the purpose of our study, we searched this database over a period of 30 years (1987-2016) to review the incidence of lightning strikes and associated injuries and deaths in the UK

METHODS

Data over a period of 30 years were examined from TORRO's National Lightning Incidents Database between 1987 and 2016 with reference to NI. A supplementary search over a period of 20 years (1997-2016) of the records of the Burns Unit in the Royal Victoria Hospital and the Royal Belfast Hospital for Sick Children was conducted using the ICD-10 code X33, which is specific to victims of lightning, to identify other patients. Information on 3 patients with lightning injuries managed recently in our regional burns and plastic surgery service was collected and examined.

RESULTS

The TORRO data over a 30 years period showed that 8 survivors and 1 fatality were recorded in Northern Ireland between 1987 and 2016. The one fatality recorded was an off-duty soldier struck on the Mourne Mountains in 2006.

The hospital data search did not identify any other cases.

The 3 victims recently treated in our unit were struck by lightning in the city of Lisburn. Their cases are presented below:

Case 1:

A healthy man aged 36 was struck by lightning while accompanying his two children (aged 5 and 7 years) from school. The lightning bolt struck him directly causing cardiorespiratory arrest and splashed over his children. Basic life support was initiated almost immediately at the scene by members of the public. Advanced cardiopulmonary resuscitation was commenced by the arriving paramedic team. The initial recorded rhythm was pulseless electrical activity (PEA), which subsequently converted to ventricular fibrillation. The patient was transferred to the Accident and Emergency Department. Spontaneous return of circulation

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was established 50 minutes after the incident. The combination of lightning injury and extended resuscitation period had caused severe metabolic acidosis, hypoxic brain injury and multiple organ failure. The entry wound, which was found at the left side of the neck, had caused a deep dermal burn. The current travelled down the contra-lateral side exiting at the right big toe causing a full thickness burn.

On arrival in Intensive Care, he was critically ill with persistent circulatory failure requiring high volume fluid resuscitation and high dose inotrope therapy. Continuous renal replacement therapy (CRRT) was commenced for this and refractory hyperkalaemia with evidence of considerable rhabdomyolysis (CK 10264 U/L (normal range 40-320 U/L)). He had severe acute respiratory distress syndrome and received lung-protective mechanical ventilation. By the third day, he remained in multiple organ failure with persistently elevated serum lactate levels. He was too unstable for CT scan transfer and underwent an exploratory laparotomy and limited fasciotomies of his right upper and lower limbs. The laparotomy revealed a liver laceration which was packed, whilst his compartments were found to be healthy. On the fourth day, he returned to theatre for further assessment, removal of packs and definitive closure. He was subsequently weaned off inotropes. On the sixth day, he became less dependent on CRRT and a CT scan of his brain and spine was performed. It showed left temporal ischemia, a small subarachnoid haemorrhage and loss of grey-white matter differentiation in-keeping with hypoxic brain injury. This was subsequently confirmed on MRI imaging, MRI of spinal cord was unremarkable.

Fig 1. Lightning burn scar 1 year following the injury

His condition stabilised, and a tracheostomy was inserted on the eleventh day. His renal function recovered and dialysis was discontinued after 20 days. He exhibited profound weakness and underwent neurophysiological studies which showed patchy peripheral neuropathy with axonal loss affecting both motor and sensory fibres. Muscle biopsy showed only patchy neurogenic myopathy with many preserved muscle units on electron microscopy. After a period of confusion, his conscious level improved towards baseline and he made slow progress with intensive multi-disciplinary rehabilitation. Tracheostomy was removed after 33 days and he was discharged from ICU after 49 days. He was transferred to the Regional Brain Injury Unit after 12 weeks and discharged home 26 weeks following his initial presentation. He had progressed well, however he suffered continued weakness of his proximal muscles and mobilised with the help of a crutch. His wounds healed completely without surgical intervention (figure 1)

Case 2

The second victim was a 5-year-old boy walking on the left side of the adult – he sustained a splash type of injury. He suffered a seizure at the scene and was transferred to the emergency department. Endotracheal intubation was performed. CT scan of the head and MRI scan of the neck showed no abnormality. Serum troponin was only mildly elevated (41 ng/L, normal range <14ng/l.). Bedside echocardiogram and ECG were unremarkable.

Fig 2. Left lower limb of the 5-year-old boy showing superficial partial thickness burn and erythema

The lightning splash injury caused a burn to the right occipital area, right side of neck, abdomen, perineum, left lower limb (figure 2) and an exit burn at the plantar aspect of right big toe.

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(figure 3) The total body surface area (TBSA) burned was 4%. His burns were largely superficial partial thickness (treated conservatively) and a small area of full thickness burn at the right big toe. He recovered well without residual disability and was discharged home six days after the injury. The full thickness burn on the big toe was excised and resurfaced with a split skin graft 4 weeks later.

Fig 3. Right big toe of the 5-year-old boy showing full thickness burn

Case 3:

The third victim was a 7-year-old girl walking on the right side of the adult at the time of injury. She also suffered a splash burn from the lightning, approximately 3.5% TBSA, on left upper limb, groin and exit burns on both feet. Keraunographic markings (Lichtenberg figures) were evident on both lower limbs. These were superficial partial thickness burns except a very small area of deep dermal burn at the left forearm. She did not suffer any other serious internal injuries. After six days of hospitalisation. She was discharged home with outpatient follow up plan. Her burns healed 18 days following the injury.

DISCUSSION

Lightning is a high voltage electrical discharge with a massive current ranging from 30,000 to 110,000 amperes (A), although such currents are only applied for 10 to 100 milliseconds (ms)[1]. Energy transfer to the body is therefore limited. Cloud-to-ground strikes can cause significant damage and human loss. There have been many mechanisms of injury described in the literature depending on the method of dissipation of energy. These include direct hit, contact voltage, splashing (side flashing), ground current (step voltage effect and surface arcing), and upward streamer[2].

The effects of lightning on individuals depend on the mechanism of energy transfer. In a review of 19 victims of lightning strikes, Lichtenberg *et al* found that patients with direct mechanism of injury are associated with more severe myocardial dysfunction and pericardial effusion compared to the effects of ground current generated by a nearby lightning strike. They also concluded that the dysfunction was reversible in his series within two weeks [3].

Cooper reported higher incidence of deaths among patients with lower limb and cranial burns in a study that examined 66 cases of lightning injuries. She also concluded that death was unlikely if there was no immediate cardiac arrest[4].

Similar cases have been reported in the literature showing that prolonged resuscitation was successful in managing the patients without major complications with emphasis on the importance of bystanders and paramedics in delivering life support [5]. In our experience, immediate and prolonged resuscitation efforts facilitated by automated defibrillators and public engagement in the process, resulted in a favourable outcome.

Most lightning injury incidents involve only one person but, in this incident, 3 people were injured by a single lightning flash. Exceptionally much larger groups of people have been injured by a single cloud-to-ground lightning discharge. One occurred when a thunderstorm interrupted an under-10-year-olds' football match in Kent, England, in September 1995. Four adults and 13 boys who took shelter under a tree were injured when the tree was struck by lightning and electric current affected them[6,7]. The largest group to be struck by lightning took place at Ascot horse race course, Berkshire, England, in July 1955 when 46 injured spectators had to be taken to local hospitals[8].

Injuries or fatalities caused directly by lightning are a rare occurrence in NI compared to the rest of the UK. NI experiences relatively few days of thunderstorms each year. The annual average 'number of days of thunder heard' is 5 to 9 days, similar to Scotland, Wales and most parts of Ireland, but much less than southern and eastern England which averages 15 to 19 days[9]. Annual average lightning flash density reflects this frequency with rates of less than 0.25 flashes per km^2 per year in NI compared to up to 1.00 flashes per km^2 in parts of England[10] (Figure 4).

Lightning injuries are uncommon in NI. TORRO's National Lightning Incidents Database lists 497 known lightning incidents causing injury or death to one or more persons in the UK during the past 30 years (1987-2016). This 30-year total updates the 25-year analyses of Elsom and Webb[11]. These incidents refer to injuries and deaths caused directly by lightning's electrical discharge. They exclude secondary causes of injury or death like fall or trauma. Of the 497 known

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UK lightning injury incidents, 463 (93.2%) occurred in England and Wales, 27 (5.4%) in Scotland and only 7 (1.4%) in Northern Ireland.

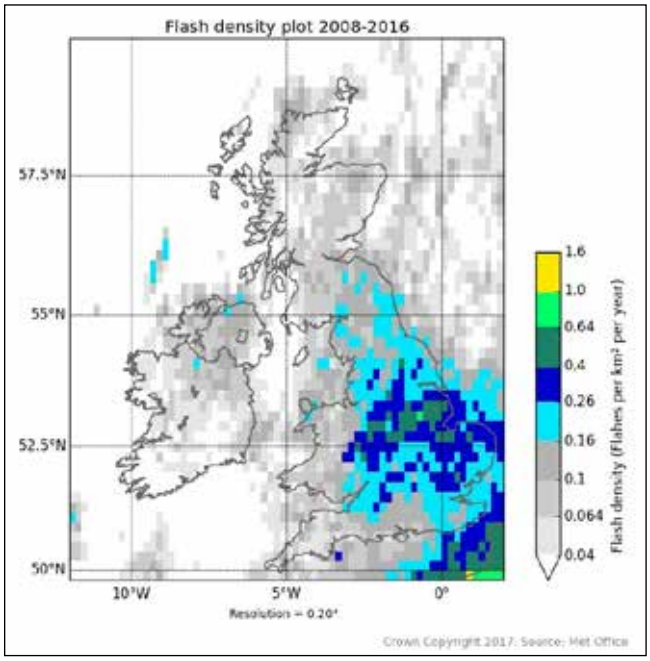

Fig 4. Lightning flash density for the UK, Ireland and surrounding areas highlighting that injuries and fatalities caused by lightning are likely to be relatively few in Northern Ireland compared with some parts of the UK. Maximum flash density (light green colour: up to 1.0 flashes per km^2 per year) is located in the English North Midlands. Data compiled from the Met Office Arrival Time Difference Network (ATDnet) lightning location system. Reproduced courtesy of the Met Office.

Lightning fatalities derived from death certificates in which lightning is the 'underlying cause of death' (currently code X33) have been reported by the Northern Ireland Statistics and Research Agency (Registrar General's Annual Report) since 1964. TORRO, the UK-based TOrnado and storm Research Organisation, complements the agency annual reports, by compiling its own National Lightning Incidents Database which provides more details about each fatality such as the date, type of location and activity being undertaken when struck by lightning. From 1964 to 2016, there have been 158 lightning fatalities in the UK with 144 deaths in England and Wales (91.1%), 11 deaths in Scotland (7.0%) and 3 deaths in Northern Ireland (1.9%). The three deaths in Northern Ireland occurred in 1970, 1982 and 2006 and all were male. The most recent death in April 2006 was an off-duty soldier struck on the Mourne Mountains[12]. This death was recorded in the agency annual records in 2007 because the Coroner's Inquest and the issuing of the final death certificate did not happen until May 2007[13].

Our hospital records failed to show more data about other patients struck by lightning as patients admitted in other health care trusts will be coded at the initial hospital before transfer to our unit.

This NI event involved people undertaking their 'daily routine' activity when struck by lightning: a parent collecting children from school. Elsom[14] and Elsom and Webb[13] analysed the incidence of lightning fatalities in the UK using three broad groups of activities being undertaken at the time they were struck: at work, undertaking the daily routine, and participating in leisure, recreation and sports activities. Around three-quarters of all fatalities in the past three decades were amongst people participating in leisure, recreation and sports activities. The remaining 30 per cent were split approximately equal between the other two activity categories. Jensenius[15] performed a similar analysis of USA lightning fatalities for the past decade and also found that people participating in leisure, recreation and sports activities accounted for the majority of fatalities. Lightning injuries are associated with a similar broad activity distribution[11]. In contrast, during and prior to the early twentieth century, lightning injuries and fatalities at work, especially amongst those working in agriculture, were far more common. For example, in the UK around the 1850s and 1900s, more than half of all lightning fatalities occurred while people were working and there were few fatalities amongst the smaller number of people engaged in leisure, recreation and sports activities[14].

The risk of injury from lightning may be reduced significantly by seeking shelter when thunderstorms develop. Safe shelters include a well-grounded, substantial building or a metal-topped, enclosed motor vehicle. Small structures (huts, sheds) are not safe as they are not usually electrically earthed. Nor is standing under a tree safe. If caught out in the open, adopting the 'lightning crouch' (crouch down, head tucked down, heels together, arms resting on your knees, and hands covering your ears) has been advocated as a 'last resort' by the Wilderness Medical Society (WMS) which provides lightning safety guidelines[1]. However, many believe this does not provide a significant level of protection from being injured or killed by a direct lightning strike. People on exposed hill or mountain slopes are advised that it is better to continue moving downhill to a safe shelter even though it may take some time to reach[16]. Lightning is more likely to strike hill peaks so descending to a lower altitude reduces the risk of being struck. If in a group, spreading out increases the chances for survivors who could come to the aid of any victims from a lightning strike.

In conclusion, while lightning injuries are rare in NI, this is the first report of more than one person affected by a single lightning incident in the province. In our limited experience, immediate public response and prolonged cardiopulmonary resuscitation was key to a favourable outcome.

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Ulster Med J 2018;**87(3):**173-176

Clinical Paper

Public Health Bacteriology of Commercially Composted Domestic Food and Garden Waste by the 11 Councils in Northern Ireland – Persistence Of *Clostridium perfringens* and Implications for Local Food Safety

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Accepted: 21st November 2017
Provenance: externally peer-reviewed.

ABSTRACT

Background: New legislation has been introduced in Northern Ireland from April 2017, requiring domestic households to recycle all domestic food waste items. The purpose of this study was to examine the bacteriology of compost derived from this source which is supplied free-of-charge to the public for horticultural use.

Methods: Municipal compost samples were compared microbiologically with commercial garden compost samples, examining total viable count and diversity of bacteria cultivated.

Results: The municipal compost had a mean Total Viable Count (TVC) of 1.53 x 10^8 colony forming units (cfu)/ g compost, whereas the commercial garden compost had a mean TVC of 4.5 x 10^7 cfu/g compost. *Campylobacter, Salmonella* and *Listeria* were not isolated from any compost. Twenty-three bacterial genera were represented amongst the 46 organisms recovered. Of these, *Pseudomonas aeruginosa* and *Clostridium perfringens* were the most clinically significant.

Discussion: The application of municipal compost to cultivate non-food plants, such as roses and flowers presents minimal risk, provided safe handling practices are adopted and hands are thoroughly washed and dried afterwards. However, if applied to soil growing food produce, it is important that municipal compost does not enter the food chain without an effective critical control point which would prevent germination of spores of *Clostridium perfringens*. Risk may be increased in products such as marinades, home canning, home bottling and associated products. These methods of food preparation are common in ethnic Eastern European populations in Northern Ireland, where awareness of risk needs to be increased.

INTRODUCTION

New legislation has been introduced in Northern Ireland (NI) from April 2017, requiring households in each of the 11 local council regions to recycle all domestic food waste items. As a result, NI households collect all uneaten food, food that has passed its "*Best Before*" or "*Use By*" date and raw food, including raw meat. Items are usually deposited into brown bins, used solely for collecting domestic organic waste, although some councils, for example, Ards and North Down Borough Council, use green bins. Food waste is collected along with other sources of domestic organic waste from each household, including garden waste materials. The waste is usually collected on a bi-weekly basis by the local council authority and sent for commercial composting. At certain times of the year, residents can freely collect the composted material, termed "*Rosey-lea*" from their local council, especially during International Compost Awareness Week, usually in April-May each year. Given that waste food

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entering the composting cycle may be heavily contaminated with foodborne pathogens, we examined the public health bacteriology of the composted material which the public may use for the cultivation of fruit and vegetables.

METHODS

Source of composts and sampling protocol

Two types of compost were examined in this study, municipal compost from domestic food and green waste material (n=10) and commercially available garden compost (n=2). Municipal compost was obtained from Mid & East Antrim Council Recycling Yard for the period 01 April – 01 June 2017. Commercially available garden composts (75L) were purchased from a local hardware shop.

Microbiological examination of composts

(i). Total viable count (TVC): The total number of culturable bacteria was enumerated quantitatively as follows:- Serial dilutions of each compost were prepared in peptone saline solution (Oxoid CM0733) and 100μl of each dilution was spread onto the surface of Standard Plate Count (SPC) agar (Oxoid CM0463; Oxoid Ltd., Basingstoke, UK) and were incubated both aerobically and anaerobically at 20°C for 72h. After this period, all colonies on the plate were counted and the count expressed as colony forming units (cfu) per g compost.

(ii). Identification of organisms from composts: SPC plates from (i) above were examined for different colonial types. Resulting colonies were purified and subcultured on SPC agar, as detailed above prior to identification using the MALDI-TOF system (Biomerieux, France), in accordance with the manufacturer's instructions.

(iii). Detection of the presence of *Salmonella*, *Campylobacter* & *Listeria* in compost:

(a). *Salmonella*

25g of compost was weighed into a sterile stomacher bag and a 1 in 10 dilution made using buffered peptone water. Samples were then stomached for 30 seconds prior to transfer to glass honey jars and incubated at 37°C for 18 hours. Following incubation, 0.1mL aliquot of the pre-enriched culture was transferred to 10mL of Rappaport Vassiladis Soya Peptone (RVS) Broth and Muller Kauffmann Tetrathionate Novobiocin Broth (MKTTn), ensuring particulate matter was not collected and incubated in a water bath at 37°C for 24 hours. RVS and MKTTn broths (10μl) were subcultured to Xylose Lysine Desoxycholate agar and Brilliant Green Agar and incubated at 37°C for 24 hours.

(b). *Campylobacter*

25g of compost was weighed into a sterile plastic closure bag and homogenised in Bolton broth at a 1 in 10 dilution. Three to four bags were placed in 2.5L plastic rectangular boxes (Thermofisher) and incubated in a microaerophilic atmosphere (Campygen, Oxoid) at 37°C for four to five hours before being transferred to 41.5°C for a further 44 hours. Broths were then sub-cultured onto *Campylobacter* selective agar (mCCDA) and again using the plastic boxes and microaerophilic atmosphere, incubated at 41.5°C for 48 hours.

(c) ***Listeria***

25g of compost was weighed into a sterile stomacher bag and homogenised with approximately half of 225ml of Half-Fraser broth. Contents of the stomacher bag were transferred to the honey jar with the remaining Half-Fraser broth and incubated at 30°C for 44 hours. Half-Fraser broths were sub-cultured (0.1mL) to Full Fraser broth (10mL) and incubated at 37°C for 44hrs as well as being sub-cultured to *Listeria* chromogenic agar and Oxford agar and incubated at 37°C for 48 hours. Plates were examined for growth at 24 and 48 hours.

RESULTS

In this study, 10 municipal compost samples were compared with two commercial garden compost samples. The municipal compost samples were taken from a single site over a 12-week period. The municipal compost had a mean Total Viable Count (TVC) of 1.53 x 10^8 colony forming units (cfu)/ g compost, [Range: 9.1 x 10^5 – 5.1 x 10^8 cfu/g], whereas the commercial garden compost had a TVC of 4.5 x 10^7 cfu/g compost. [Range: 1.2 x 10^7 – 7.8 x 10^7 cfu/g]

Overall, this study collected 46 bacterial isolates (43 from municipal compost and 3 from commercial garden compost). Twenty-three bacterial genera were represented amongst the 46 organisms isolated from both compost types, comprising 14 (14/23; 61%) Gram-negative genera, including *Achromobacter, Acinetobacter, Brevundimonas, Chryseobacterium, Comomonas, Fusobacterium, Morganella, Neisseria, Parabacteroides, Proteus, Providencia, Pseudomonas, Serratia* and *Shewanella*. Nine (9/23; 39%) Gram-positive genera were identified, including *Aerococcus, Bacillus, Clostridium, Corynebacterium, Paenibacillus, Rhodococcus, Staphylococcus, Turicella* and *Vagococcus*.

Clostridium perfringens was the only organism which was isolated from both municipal and commercial composts and all other organisms isolated were unique to that compost type. In addition, this species was the most frequently isolated (5/46; 10.8%) from compost.

Campylobacter, Salmonella and *Listeria* were not isolated from any compost sample examined.

DISCUSSION

The recent requirement to recycle all food waste material in Northern Ireland and the potential for NI householders to utilise the resulting compost provides challenges for public health. Local council guidance now requires all domestic food waste to be collected for commercial composting.

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Significantly, this includes raw meat (red meats, chicken, pork and fish) which may contain foodborne bacterial pathogens, such as *Salmonella, Campylobacter, Listeria* and pathogenic *E. coli* organisms. A failure to eliminate these pathogens during the composting process will allow their potential re-entry into the food chain, when used for growing fruits and vegetables.

Recycling waste is a prudent idea for a sustainable green environment but there must be checks and balances to ensure minimum public health risk. EU legislation for recycling food/animal waste ingredients recommends stringent composting pit temperatures of 70°C or separate exposure to this temperature for at least 1 hr before the batch is released back to human and/or animal habitats.

This study of the microbiology of municipal and commercial garden composts demonstrated the presence of a diverse variety of bacterial genera and species, with 23 bacterial genera being identified from 46 bacterial isolates obtained. This represents a huge diversity reflecting heterogenous composition of the samples. With the exception of *Bacillus clausii*, all bacteria identified have been reported in the literature as potential human pathogens.

Whilst these organisms may have the potential to infect humans, they generally remain infrequent causes of infection. However, there are two notable exceptions; the Gram-negative bacterium *Pseudomonas aeruginosa* (*P. aeruginosa*), and the Gram-positive spore-forming bacterium, *Clostridium perfringens* (*C. perfringens*). *C. perfringens* was isolated in 4/10 municipal composts as well as in both commercial garden composts.

Three species of *Pseudomonas* were isolated from the compost material; *P. aeruginosa, P. mendocina* and *P. stutzeri*. Of these, *P. aeruginosa* is the most clinically significant, particularly in patients with cystic fibrosis (CF), where this organism is responsible for increased morbidity and mortality.[1] CF patients and the parents of CF children often alter their lifestyle in order to reduce the risk of contact with *P. aeruginosa* by avoidance of reservoirs of this organism, especially water sources (hot tubs, jacuzzis). This report has identified municipal compost as a source of *P. aeruginosa*, so CF families should be aware of the risks of handling compost or home-grown produce.

Although *C. perfringens* may be commensal in the human intestine, illness is caused by eating food contaminated with large numbers of *C. perfringens* bacteria that produce sufficient toxin to cause illness. The incubation period is usually 6-24 hours post ingestion, followed by diarrhoea and abdominal cramps, but generally not with fever or vomiting. Symptoms usually last up to 24h, although in severe cases, symptoms can last for one to two weeks.[2] *C. perfringens* can survive high temperatures. During cooling and holding of food at temperatures from 12°C–60°C, the bacteria may grow and they can grow very rapidly between 43°C–47°C.[2]

C. perfringens is an important aetiological agent of food-poisoning in Northern Ireland, where 24 cases were recorded in 2016.[3] Of these, the majority (17; 70.8%) were in patients aged 65 years or older, with the remainder (7; 29.1%) in patients 45-64 years, representing an age specific incidence of 5.7 and 1.5 per 100,000 population. It is unknown if any of these cases were related to produce grown in compost.

Nevertheless, it is important that we examine the implications of this data. Foodborne outbreaks of *C. perfringens* involving leafy and vine-stalk vegetables have been described.[4] The growing social trends of sustainability and consuming organic foodstuffs, as well as an ageing susceptible population are factors which could exacerbate *C. perfringens* food-poisoning. Growing and cooking home produce has become more popular in recent years, especially amongst older people.

In Eastern European cultures, there is a tradition of preserving food through home canning, as well as preparing food marinades, which have a relatively high pH and are left at room temperature to mature. Such practices have led to outbreaks of *Clostridium* food-poisoning.[5,6] Therefore, whilst it may be relatively safe for the NI indigenous population to immediately prepare dishes from home-grown vegetables, where *Clostridium*-contaminated compost has been applied, Marinating or home canning may increase *Clostridium* growth and create a food safety vulnerability amongst some ethnic groups.

In conclusion, the composts examined in this study contained a diverse range of bacteria, which may cause human infection. In particular, *Clostridium perfringens* is an important foodborne pathogen. The application of compost to cultivate non-food plants, such as roses and flowers presents minimal risk, provided safe handling practices are adopted and hands are thoroughly washed and dried after completion of gardening activities. However, if compost is applied to soil growing edible produce, it is important that the produce does not enter the food chain domestically or commercially without the inclusion of an effective critical control point, which would eliminate *Clostridium perfringens* and prevent germination of its spores. The latter is particularly important if home canning and marinating are employed – such practices are common in ethnic Eastern European populations in NI, where educational awareness needs to be increased to avoid potential food-poisoning. Anyone handling compost should ensure that their hands are washed with warm water and soap and are thoroughly dried after exposure.

ACKNOWLEDGEMENTS

Author MF was supported by a Japan Public-Private Partnership Student Study Abroad Program TOBITATE Young Ambassador Program awarded by the Japan Society for the Promotion of Science (JSPS). Author JEM is in receipt of a Great Britain Sasakawa Foundation Travel Award to support research on antimicrobial resistance studies between the UK and Japan.

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Ulster Med J 2018;**87(3):**177-180

Clinical Paper

Progression from acute to chronic hepatitis B is more common in older adults

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Accepted: 9th December 2017
Provenance: externally peer-reviewed

ABSTRACT

PURPOSE: The rate of progression of acute Hepatitis B (HBV) to chronic disease is quoted as <10%. The purpose of this study was to determine the rate of progression from acute to chronic HBV in Northern Ireland (NI), assessing the influence of age, gender and biochemical parameters.

METHODS: All "acute" HBV cases diagnosed in NI between 2011 and 2015 were reviewed. Inclusion criteria: 1). positive HBsAg and positive HBV core IgM; 2). in the absence of positive HBV core IgM, positive HBsAg with a recent negative HBsAg. Patient age, HBsAg, HBV core IgM, peak bilirubin and peak ALT were recorded, along with date and result of repeat HbsAg testing. Mann-Whitney U test was used to compare mean age, peak ALT and bilirubin between clearing and non-clearing groups. Fisher's exact test was used to compare progression to chronicity according to gender and age less than or greater than 50yrs.

RESULTS: Of 80 identified cases, 4 incorrectly categorised cases were excluded. Of the remaining 76, (15 female (mean age 37.27yr), 61 male (mean age 47.39yr)) follow-up data was available for 71 patients (15 female (mean age 37.27yr), 56 male (48.59yr)). All female patients cleared HBV. 42 of 61 males cleared HBV (p=0.0313).

Overall the chronicity rate was 18.42% The mean age of those clearing the virus was 43.88 years, versus 55.64 years for those going on to develop chronic HBV (Mann-Whitney U test, z= -2.68, p=0.0037). Clearance rate was 83.72% in patients aged <50yrs and 63.64% in patients ≥50yrs (p=0.0068).

Mean peak ALT (U/L) and peak bilirubin (μmol/L) for the clearing group were 2130 and 174 respectively compared to 656 and 100 for the non-clearing group (z= -3.51, p=0.0002, z= -2.35, p=0.009).

CONCLUSION: Our results suggest a higher than expected rate of progression from acute to chronic HBV with a significantly higher risk for those over 50yrs. This suggests a need to revise information provided to older patients with acute HBV regarding the likelihood of progression.

Key words: Hepatitis, HBV, Acute, Chronic, Progression, Northern Ireland

INTRODUCTION

The rate of progression from acute to chronic hepatitis B in adults is typically quoted as 5-10% [1] with the rest clearing the infection. A review of Northern Ireland 2012-2013 data had suggested a higher rate, with 28% of acute cases failing to clear the virus within 6 months of diagnosis.[2] A retrospective review of the acute HBV cases diagnosed in NI between 2011 and 2015 was undertaken to further investigate this inconsistency. The primary objective was to determine the rate of development of chronic HBV amongst acutely infected patients and to assess the influence of age, gender and biochemical parameters on the development of chronicity. A secondary aim was to determine whether those developing chronic infection had been referred for specialist assessment.

METHODS

Case definition: World Health Organisation (WHO) criteria for laboratory diagnosis of acute hepatitis B is a positive anti-HBc IgM result.[3] European Centre for Disease Prevention and Control (ECDC) criteria for differentiating acute and chronic hepatitis B define acute HBV infection by the presence of anti-HBc IgM, or detection of HBsAg or HBV-DNA with

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previous negative HBV markers less than 6 months ago.[4]

All new "acute" hepatitis B cases diagnosed between 2011 and 2015 were evaluated for inclusion.

The inclusion criteria in this review were: 1. positive HBsAg and positive HBV core IgM; 2. in the absence of positive HBV core IgM, positive HBsAg with a recent negative HBsAg.

For the subset of samples tested after July 2014, quantitative results for Anti-HBc IgM were still available for analysis. Anti-HBc IgM testing was determined using the Roche cobas immunoassay on an Elecsys analyser. A cutoff index (COI) of 1.0 equals approximately 100 Paul Erlich I-U/mL. Specimens with a COI ≥1.0 are considered positive, whilst those with a COI <1.0 are considered negative. The equivocal range set by the manufacturer is 0.9-1.1.

Chronic infection was defined as a positive HBsAg at ≥6 months from the first positive HBsAg result. This was in keeping with the widely accepted definition of chronic HBV and in accordance with ECDC criteria.[3-5] The result from the first repeat HBsAg test taken at ≥6 months was used. This period ranged from 6 months to greater than 1 year in some cases.

Data collection: Northern Ireland has a single public health agency and a single virus laboratory which performs all HBV serology tests for the region. It was therefore possible to capture all acute HBV cases diagnosed in NI during the study period. The laboratory results for each patient were reviewed. Peak bilirubin and peak ALT were recorded, along with the date and result of repeat HbsAg testing. The age and, where available, clinical details and HIV status were also recorded. Peak bilirubin and ALT were defined as the highest value in the month preceding and following the date of HBsAg positivity.

Data analysis: The overall chronicity rate, mean age of patients who cleared and did not clear the virus, mean peak ALT and mean peak bilirubin were calculated. The Mann-Whitney U test was used to determine the significance of the differences in age, peak ALT and peak bilirubin between the clearing and non-clearing groups, using all available results (ALT was unavailable for 9 of the 71 patients and bilirubin was unavailable for 4). 2x2 contingency tables were constructed and Fisher's exact test was used to compare progression to chronicity according to gender and age less than or greater than 50yrs using known outcomes (i.e. cleared and not cleared, positive and negative).

RESULTS

80 cases were identified, 4 had been incorrectly categorised as acute infections and were excluded. Of the remaining 76 patients, all but 2 patients had both positive HBsAg and positive HBV core IgM. The two exceptions met the second inclusion criterion in that there was evidence of recent seroconversion to HBsAg positivity. 75 of the 76 patients were Caucasian. 15 were female (mean age 37.27yr) and 61 were male (mean age 47.39 yr). Follow up data was available for 71 out of 76 patients (15 female (mean age 37.27yr), 56 male (mean age 48.59yr)).

Progression to chronic infection: Data is summarised in Table 1. Of the 71 patients for whom follow up data was available, 57 cleared the virus within 6 months of diagnosis. 14 patients did not clear within 6 months and were therefore deemed to have progressed to chronic HBV infection. These figures gave an overall chronicity rate of 18.42%, where n=76. This rose to 19.72% when the 5 patients for whom there was no follow data were excluded from the analysis, i.e n=71. All 14 patients who had failed to clear the virus within 6 months had been referred for hepatology follow up. All female patients cleared HBV. 42 males cleared HBV (clearance rate female 100% v male 68.85%, p =0 .0313).

Age: The mean age of the 76 patients was 45.39 years (range 17-75 years). The mean age of the group who cleared the virus was 43.88 years (range 17-75 years) and was 55.64 years (range 36-71 years) for the chronic group (Mann-Whitney U test, z = -2.68, p = 0.0037).

When divided into two groups according to age <50 and ≥50, chronicity rates were 6.98% for those <50 years and 33.33% for those ≥50 years. Clearance rates were 83.72% and 63.64% respectively, p = 0.0068.

ALT: Peak ALT (ALT at +/- 1 month from the date of HBsAg positivity) was available for 51 of the patients who cleared the virus and 11 of the patients who progressed to chronicity. The mean peak ALT for the cleared group was 2130 U/L. The mean peak ALT for the chronic group was 656 U/L (z score = -3.51, p value 0.0002).

Bilirubin: Peak bilirubin (bilirubin at +/- 1 month from the date of HBsAg positivity) was available for 55 of the patients who cleared the virus and 12 of the patients who progressed to chronicity. The mean peak bilirubin was 174 μmol/L for the cleared group and 100 μmol/L for the chronic group (z score = -2.35, p value 0.009).

HIV status: It was possible to determine the HIV status for 64 out of 76 patients. 58 patients were HIV negative. 6 patients were HIV positive at the time of their acquisition of HBV. Of these 6 patients 4 cleared HBV and 2 progressed to chronic infection. Out of the overall 14 patients who progressed to chronic HBV infection, HIV status was unknown for 2.

HIV positive individuals were less likely to clear HBV with a higher chronicity rate of 33.33% versus 17.24% in HIV negative individuals. However, the overall number of HIV positive patients was small and the difference was not found to be significant (p value 0.5896).

Clinical picture: 12 patients did not have symptoms of acute hepatitis. From the information available, the majority of these cases appear to have been picked up through screening or follow-up of recent risk of exposure. There were 5 patients who did not have any information available regarding clinical

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TABLE 1:

HBV clearance rates by gender, age, HIV status and clinical presentation

	Number	HBV cleared	HBV not cleared	Unknown	Clearance rate (%)	Chronicity rate (%)
Male	61	42	14	5	68.85	22.95
Female	15	15	0	0	100	0
Age <50	43	36	3	4	83.72	6.98
Age ≥50	33	21	11	1	63.64	33.33
HIV positive	6	4	2	0	66.67	33.33
HIV negative	58	44	10	4	75.86	17.24
Symptomatic	57	48	5	4	84.21	8.77
Asymptomatic	12	4	8	0	33.33	66.67
Complex presentation	2	1	1	0		
Unknown	5	4	0	1		

presentation. 2 patients had complex clinical presentations and therefore symptoms of acute hepatitis were difficult to differentiate.

All other patients (57) had either an acute symptomatic illness or were clinically jaundiced. All except for 3 had a bilirubin >20 µmol/L. Of the 3 exceptions, 2 did not have any clinical information available with the remaining patient describing an acute illness following a clear risk-associated incident.

Symptomatic individuals had a HBV clearance rate of 84.21% versus 33.33% in the asymptomatic group (p value 0.0001).

In terms of the quantitative data for anti-HBc IgM in the subset of 26 cases presenting after July, one case had a negative anti-HBc IgM with the highest recorded value for this case being 0.23 COI. This case however met the second of the inclusion criteria, having had a recent negative HBsAg and went on to demonstrate clearance.

The range of positive values was 2.05 – 57.28 COI. The mean anti-HBc IgM value was 27.7. Of the 26 cases with quantitative anti-HBc IgM results, three failed to clear HBsAg. Two of these cases had anti-HBc IgM values above the mean. One had a low anti-HBc IgM result at 2.31. However this value was still well above the equivocal range. The next recorded anti-HBc IgM for this case, three months later, was negative.

DISCUSSION

The geography of Northern Ireland and the structure of its health care system make it ideally placed for a survey of acute hepatitis B infection. It has one public health agency, one virology laboratory and one hepatology service. The Hepatitis B and C Managed Clinical Network (MCN) brings together the leads from each of these specialties and coordinates joint working between the specialties. It is therefore possible to capture and follow all new diagnoses of acute hepatitis B infection. This work was initiated by the MCN and stemmed from a routine audit of acute hepatitis B cases carried out by the network.[2] It has revealed a number of interesting findings.

The incidence of acute hepatitis B in Northern Ireland in the period 2011-2015 was estimated to have been 1.03 per 100,000 (population of NI 1,851,600 at 30th June 2015).[6] This is slightly higher than the incidence of 0.83 per 100,000 reported in England in 2015, but lower than the incidence in London (1.53 per 100,000). The highest incidence of acute HBV in England was observed in men aged 45-54.[7] This review of Northern Ireland's data has shown the highest frequency in men aged 55-64, possibly suggesting a higher incidence of older men becoming infected with HBV in NI.

Firstly, our results suggest that between 2011 and 2015 the rate of progression to chronicity was higher than expected. A widely cited literature review looking at 10 studies of generally healthy adults reported a range of 0-12.1% chronicity following acute hepatitis B infection. The pooled incidence of chronicity was 4% in the 7 studies of initially uninfected populations.[1] In view of this, the rate of progression from acute to chronic hepatitis B is usually cited as less than 10%. The result in our survey was 18.42%.

Secondly, as far as we are aware, this is the first report of an increased rate of development of chronic HBV in an older Caucasian population. Our results suggest that, the risk of progression to chronicity was significantly higher in patients aged over 50yrs (6.98% vs 33.33% p = 0.0068). Whilst a recent review of HBV infection in the elderly has suggested that the rate of developing chronic infection may be as high as 59%[8] this figure appears to be based on a single report of a 1993 outbreak in a Japanese nursing home[9]. The average patient age in this study was 77.4 years.[9] With the exception of this study, the possible association of increased risk of progression to chronicity with increasing age has not been widely described, nor has it been described in a Caucasian population. Another study, carried out in Shanghai and focusing on the viral determinants of progression from acute to chronic infection, found that progression was commoner with genotype C2 than genotype B2 and that patients with HBV C2 were more likely to be older men. However, age and gender were not found to be independent risk factors

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for chronicity.[10] Neither genotype B nor C is prevalent in the UK and our study did not gather genotype data. Other studies have looked at different aspects of hepatitis B infection in older age groups. Findings include an increased prevalence of chronic hepatitis B infection in those aged ≥50 years than in younger individuals[11], lower peak serum bilirubin and ALP levels[12] and a higher spontaneous HBsAg seroclearance rate in elderly adults with chronic HBV.[13] However, these studies did not specifically address chronicity rates following acute hepatitis B infection.

Other results from our study agree with previously established concepts including the observation that males had an increased rate of developing chronic infection (22.95% v 0% p =0 .0313). Whilst this is recognised[5], it may be partly explained by the increased age amongst the male group in our study. Additionally, those clearing the virus, and therefore not developing chronic infection developed significantly higher peak levels of ALT (2130.49 V 656.18 p = 0.0002) and bilirubin (174 V 99.75 p = 0.009). The influence of LFTs in predicting progression is well accepted in practice, with those experiencing a more active hepatitis being at lower risk of developing chronic infection.

Regarding HIV, the numbers in this survey give a chronicity rate of 33.33% in HIV/HBV coinfected patients. The prevalence of HIV/HBV coinfection is thought to be 5-7% in HBV low-endemic countries[15]. Patients with HIV have been found to be at increased risk of developing chronic hepatitis B after an acute infection. It has been suggested that this increase may be as great as six times that of HIV seronegative patients[16,17]. The numbers in this survey give a chronicity rate of 33.33% in HIV/HBV coinfected patients, 1.8 times higher than the overall chronicity rate. However, the small number of coinfected patients makes it impossible assess significance from this survey.

A potential weakness of our data is that although we have used an internationally accepted case definition for acute HBV, using anti-HBc IgM as the key marker, it is possible that low levels of anti-HBc IgM can occur in chronic HBV infection following hepatic flares. Hence a new diagnosis of a previously unrecognised case of chronic HBV undergoing such a flare could potentially be misconstrued as an acute HBV infection. It would be useful to analyse quantitative anti-HBc IgM results to investigate this but these values were only available for 26 cases. From this limited data no cases had results close to the cut-off for anti-HBc IgM and 2 of the 3 cases that did not clear infection in this dataset had anti-HBc IgM values greater than the mean thus giving some reassurance with regard to this potential criticism.

The association between older age and increased rates of progression to chronicity is not hitherto well established in the literature. The findings of this study suggest that clinicians may need to revise the information provided to patients regarding the likelihood of development of chronic HBV following acute infection dependent on the patient's age.

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Ulster Med J 2018;**87(3):**181-184

James Logan Prize Essay

The Challenge of Cancer Pain Assessment

Rachel McKee

Accepted: 26th February 2018

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

Saint Augustine wrote that "the greatest evil is physical pain." Pain is often one of the most feared, distressing and burdensome symptoms for cancer patients. Despite vast advances in both the diagnosis and treatment of cancer in recent years, alongside hugely significant pharmacological and technological developments, 52-77% of cancer patients experience pain[1] and 35% of these patients report their pain as being moderate to severe[2].

Cancer pain is hugely complex and challenging to both assess and manage. The experience of pain is unique to each patient and will vary throughout their disease process. The variance in pain relates to tumour growth, side effects of anti-tumour treatment, metastases and presence of other co-morbidities.

In the assessment and management of cancer pain it is important that the immense stress and anxiety that a cancer diagnosis brings is not underestimated. Patients can often have fears relating to the future, prognosis, families, finances and treatment. All of which can all have a significant impact on pain perception; thus reinforcing the importance of holistic patient care within the cancer setting[3].

Pain can be hugely debilitating both physically and psychologically and can have a considerable impact on quality of life. Despite the aforementioned advances in medicine, statistics clearly show that cancer patients' still experience significant levels of pain; thus management within this patient population is presently inadequate. Constructing an optimal analgesic strategy for cancer pain relies on comprehensive assessment through compiling and reviewing the history of the pain complaint and effective clinical examination[4].

The dynamic and complex nature of cancer pain can lead to challenges when assessing these patients and often presents a barrier to optimal pain management. This paper aims to identify and discuss the major physician and patient barriers to adequate pain assessment and management within the cancer population and highlight patient groups at particular risk of inadequate pain control.

Barriers to effective pain management within the cancer population can be broadly categorised into two main groups:

I. Factors relating to the patient themselves; and

II. Factors that are extrinsic to the patient including physician factors, complexities relating to the cancer pathophysiology and pain pathways and lack of effective, validated assessment tools.

PATIENT FACTORS

Misconceptions relating to analgesics

Patients may unintentionally hinder effective management of their pain. This is attributed largely to fears relating to analgesics; their side effects, addiction, tolerance and a reluctance to report increases in pain due to fears it may indicate deterioration in their disease status or prognostic decline[5].

Ward et al. constructed the "Barriers Questionnaire" to identify patient barriers contributing to inadequate pain control. In addition to the above, it also identified that patients refrained from reporting pain as they didn't wish to distract physicians from treating the cancer or impede delivery of anti-tumour treatment, fear of injections, religious beliefs and worries surrounding being a troublesome patient were also significant barriers[6].

Several studies have proposed the use of Pain Education Programmes (PEPs) to eliminate patient misconceptions thus enhancing patients' ability to report pain, facilitating more effective physician assessment and treatment. Evidence relating to their effectiveness is largely inconclusive and more high-quality research is needed to determine their usefulness within the cancer patient population[7,8].

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Patient Demographics

Patient age is an important factor to consider when assessing and managing pain in the cancer setting. Cancer incidence increases with age and elderly patients typically present with advanced pathology often complicated by multiple comorbidities[9]. Elderly cancer patients may demonstrate additional barriers which can impede effective assessment, such as cognitive impairment and they often experience altered, atypical pain experiences and display differing responses to analgesics prescribed. Similarly, they may be at increased risk of experiencing undesirable side effects and at higher risk of drug toxicity due to associated decline in renal function with age[11].

Ethnicity is another factor which must be considered. The World Health Organisation formulated a structured guideline for the management of cancer pain, however, significant disparities exist in the context of providing adequate pain control for patients in ethnic minority groups. Cleeland et al. investigated this phenomenon and concluded from their study of 1300 patients that those in ethnic minority groups were two thirds less likely to have appropriate opioid analgesics prescribed when compared to non-Hispanic white individuals. Furthermore, the vast majority of high quality evidence relating to cancer pain assessment has been conducted in Caucasian individuals, thus highlighting a need for further research into cancer pain management in patients from ethnic minority backgrounds[12]. Suboptimal treatment has been attributed to communication barriers between patients and medical staff, differences in socioeconomic status and unintentional stereotypes conveyed by medical staff[13]. In a society defined by an aging population and increasing ethnic diversity, more research is needed to further identify barriers to assessment of pain and strategies to optimise pain control in these patient groups.

EXTRINSIC FACTORS

Physician Factors

Doctors have cited the most significant barriers to adequate pain control as inadequate assessment of the pain complaint owing largely to lack of a reliable, validated assessment tool, reluctance of patients to report pain and insufficient physician knowledge of analgesics and pain management strategies[5].

Several studies identified inadequate knowledge of analgesics as one of the most significant barriers to effective pain management in up to 50% of physicians[12]. Regarding tolerance to opioids 50% of physicians demonstrated sparse understanding, 20% overestimated the likelihood of patients developing addiction and most significantly there was a lack of knowledge regarding the pharmacology and prescription of such medications relating to dosage, timing, administration routes and drug conversion calculations[15]. Positively, the majority of healthcare workers were aware of the importance of appropriate pain control in improving quality of life, however many felt that they had limited ability to manage pain amongst cancer patients[12]. A systematic review determined that medical staff who delivered optimal analgesic control were less concerned with side effects and addiction and prescribed stronger opioid medications whilst demonstrating knowledge on how to effectively assess the requirement for breakthrough pain relief and ability to prescribe appropriately.

Pain Assessment Tools

Lack of an effective and validated pain assessment tool specifically designed for use within the cancer population has been identified by 20-80% of Doctors as one of the main barriers to effective pain management. The majority of Doctors did not use any pain assessment tools or take detailed pain histories relating to the type and nature of the pain[13]. Those who did use assessment tools, in 80% of cases chose the numerical rating scale and visual analogue scale in and more detailed measures such as the "McGill Pain Questionnaire" were rarely used[14]. A concerning finding from the "EPIC" multicenter study determined that 27% of cancer patients were not asked about pain by their physicians, highlighting the need for enhanced knowledge regarding assessment and treatment in this area[15].

Structuring of Healthcare Services

Perhaps one of the most significant barriers to optimal pain assessment and management can be attributed to the fragmented nature in which cancer patients are managed. Care of such patients takes place in multiple settings by a range of health care professionals depending on the cancer trajectory. These will typically include but not limited to general practitioner care in the community to hospital-based care delivered by oncologists, surgeons and palliative care specialists. Although multidisciplinary team management of cancer patients is the gold standard approach, this can lead to inconsistencies in care and thus in pain assessment and management also[16].

Healthcare for cancer patients is increasingly being delivered in the primary care setting. As a result, research into analgesics and pain assessment tools to date has primarily been conducted in the hospital environment, which has led to an absence of high quality research relating to cancer pain assessment in the community [16,17].

CONCLUSION

Despite vast diagnostic and therapeutic advances in recent years, cancer pain remains inadequately assessed and managed. Suboptimal treatment of pain can have a devastating impact on quality of life.

Effective assessment of pain in the cancer setting involves holistically assessing the patient, looking beyond the pathology and encompassing psychological, cultural, social and spiritual contributors to the pain experience. Approximately 14 million people are newly diagnosed with cancer worldwide each year, enhanced pain assessment has the potential to benefit all cancer patients and make their cancer journey more manageable.

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The importance of developing an assessment strategy that will effectively evaluate patient pain whilst being user friendly and deliverable in the hospital and community care environments is imperative. Further high-quality research is required to improve the standard of care amongst the cancer patient population. This must be reinforced despite the extreme pressures faced by physicians in the clinical environment today.

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Ulster Med J 2018;**87(3):**184-187

Medical History

William Alexander (1844-1919): Contributions to Gynaecology and Neurology

AJ Larner

Accepted: 8th April 2018
Provenance: internally peer-reviewed

SUMMARY

William Alexander was born in Country Antrim and trained in Belfast before moving to Liverpool where he spent the entirety of his clinical career. His first interest was in surgery, ample opportunity for which was afforded by his appointment to the Liverpool Workhouse Infirmary, and subsequently to the Royal Southern Hospital, Liverpool. He pioneered new surgical techniques in both gynaecology and neurology, none of which has survived, but a more lasting contribution was the founding of a dedicated Home or Colony for Epileptics in Maghull, a model of care which was subsequently adopted in other centres in the United Kingdom and in the USA and Australia.

INTRODUCTION

The fluidity of professional boundaries in medicine and surgery in the late nineteenth and early twentieth centuries made it possible for an individual clinician to have broad interests of a kind that would not be permissible in today's more structured and competence-based medical profession. Although specialist hospitals for particular categories of patient or disease had been established in some of the major metropolitan centres in the course of the eighteenth and nineteenth centuries, specialisation was still looked down upon in many quarters. Hence it was possible for William Alexander to develop expertise in, and make contributions to, both gynaecology and neurology.

EARLY CAREER

William Alexander (Figure 1) was born in Holestone, Country Antrim, in 1844. He received his medical education at the Queen's College, Belfast. His obituary records a brilliant student career, winning many scholarships and prizes, before graduating in 1870 and obtaining the gold medal and exhibition. Thereafter he travelled to Liverpool, where he was appointed to the full-time post of Resident Medical Officer at the Liverpool Workhouse situated on Brownlow Hill in May 1872. It was here that he reportedly developed the "remarkable skill which made him one of the leading surgeons in the north of England". In 1875, he set up in general practice in Rodney Street, Liverpool, and two years later, in 1877, he became a Fellow of the Royal College of Surgeons (FRCS).[1,2]

Fig 1. Alexander's portrait by Copnall, reproduced from Macalister (opposite p.121).[3]

In 1883 Alexander was appointed Honorary Medical Officer to the Liverpool Central Relief and Charity Organisation Society, a philanthropic body which sought to help the poor of the city, an appointment which was in due course to have significant repercussions. He was Surgeon to the Royal Southern Hospital, Liverpool, from 1889 to 1910, and Visiting Surgeon to the Brownlow Hill Infirmary. In his history of the Royal Southern, Macalister reports that Alexander maintained a general practice until comparatively late in his career, and

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that the "gynaecological work in the Hospital was carried out by … William Alexander between … 1888 and 1910 as a branch of general surgery". He described Alexander as a "diehard so far as antiseptics were concerned",[3] a topic Alexander published on as late as 1886, although he combined them with modern aseptic surgery.[4]

GYNAECOLOGY

Gynaecological surgery formed a substantial component of Alexander's work, both at the Workhouse and at the Royal Southern, and appears to have been the subject of some of his earliest identified publications in 1881.[5,6]

His claim to eponymous fame rests on his description of an operation to correct the position of the retroflexed uterus by shortening of the round ligaments, which he reportedly first undertook in December 1881,[7] and first reported in a paper published in 1882, followed by a monograph of 1884.[8,9] (A paper on the subject was "promised" at the 51st annual meeting of the British Medical Association in Liverpool in July/August 1883.) However, "Alexander's operation" had in fact been previously suggested by the French surgeon Alexis-Jacques Alquié (1812-1864) in 1840**,** although Alexander was apparently unaware of this precedent,[7] and hence is sometimes known as the Alquié-Alexander operation. James Adams (1818-1899) in Glasgow also performed this surgery, apparently from February 1882 onwards, again apparently without Alexander's knowledge.[7] The procedure enjoyed some popularity at the end of the 19th century.[10-12]

As Macalister indicates, Alexander's work in gynaecological surgery continued, culminating in a large work on "Practical gynaecology" published in five instalments in the *Liverpool Medical-Chirurgical Journal* between 1897 and 1899, running to over 100 pages.[13] Therein Alexander reported that for backward displacements of the uterus "I only perform one operation, and that is shortening the round ligaments".

NEUROLOGY: TREATMENT OF PEOPLE WITH EPILEPSY

Alexander was interested in experimental surgical approaches to epilepsy. His operations included trephination of the skull,[14] removal of the superior cervical sympathetic ganglia, and ligation of the vertebral arteries. The latter approach, prompted by the belief that the medulla was the origin of epileptic seizure activity, was developed in the early 1880s, (contemporaneous with the surgery for retroflexed uterus, the papers appearing in the same volume of the *Medical Times and Gazette*).[15,16] However, by the time of his monograph on the treatment of epilepsy, published in 1889, the initial optimism for vertebral artery ligature had waned to such an extent that the operation was abandoned in favour of cervical sympathetic ganglionectomy, much of the book being devoted to case histories of this operation (numbers of which mention that surgical dressings were changed "under the spray").[17] Later still, trephination and fenestration of the dura mater became his approach in selected cases.[18]

Despite his interest in gynaecological surgery, there is no evidence that Alexander ever undertook such operations to try to treat epilepsy, as his Liverpool contemporary Francis Imlach had (controversially) done.[19]

What about medical therapy for epilepsy? The comments of the gynaecologist Sir Charles Locock reported in the medical press in 1857 (e.g. *Lancet*, i:528) are credited with bringing bromides, the first partially effective medication for epilepsy, into widespread use, but Macalister reported of Alexander that "At a very early period he concluded that the routine use of potassium bromide in epilepsy was inadvisable and often harmful and he limited its employment considerably".[3] Certainly excessive bromide could have detrimental effects, although numbers of patients reported in Alexander's monograph were taking them.[17] In a later report, he stated:

> The medical treatment that we have found most beneficial and least harmful has been a scruple each of bromide of soda and of borax three times a day, well diluted in barley water and given after the three chief meals of the day.[20]

NEUROLOGY: CARE OF PEOPLE WITH EPILEPSY

Working together with Henry Cox in the Central Relief and Charity Organisation Society committee, Alexander saw the need for provision for people with chronic epilepsy. This was an era when "epileptics", as people with epilepsy were then termed, were marginalised and stigmatised. Their tendency to seizures meant that sustained employment was seldom available and for want of sustenance patients often ended up dependent on the Poor Law and hence accommodated in workhouses; no doubt Alexander saw numbers of them in the Liverpool institution. The only other recourse for those who could not be supported by their families was the asylum, although it was recognised that this was not appropriate for numbers of so-called "sane epileptics".

Alexander and Cox initiated a plan to open a home for people with epilepsy near Liverpool. Alexander reported that:

> In the early part of the year (1888) I was consulted as to the desirability of establishing a hospital for epilepsy in Liverpool, by a philanthropic gentleman, who saw the great difficulties in the treatment of the disease, that both doctors and patients laboured under.
>
> I immediately objected to a hospital for such cases, … but proposed a home in the country, where work, treatment, education, and all good influences could be brought to bear …[17]

This plan was modelled, at least in part, on the Bethel Epileptic Colony founded in 1867 at Bielefeld, Westphalia, in Germany, which had previously been visited by members of the committee and subsequently (June 1888) by Alexander. His vision was to "maintain a home-life away from the homes of the patients", but that "all must be employed in some way or other".

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A suitable country house was found, the Manor House in Maghull, and the first patient was admitted on 28 December 1888. Dr Alexander was the Acting Honorary Medical Consulting Officer, to whom applications for admission were to be addressed. The role of Local Honorary Medical Officer with responsibility for day-to-day treatment of the patients was undertaken by a Maghull general practitioner. Places were quickly taken up at the Home, also sometimes known as the Epileptic Colony or Epileptic Institution, funded by either private or public means. Early reports indicated patients were by and large healthy and happy.[21] It may well be that quality of life at the Home was far better for people with epilepsy than would have been the case living in the community or obliged by want of other resources to enter the workhouse.

The Maghull Homes gradually expanded as demand for places increased (numbers peaked at over 400), and it continued to be involved in the care of people with epilepsy for over 100 years.[22] Amongst Alexander's final papers is one entitled "Scientific and clinical reports on epilepsy", published in five instalments in the *Liverpool Medical-Chirurgical Journal* between 1905 and 1908, running to almost 100 pages.[23] This included photographs of the patients/colonists at their occupations and sporting recreations and gave a generally upbeat assessment of the value of the "home" or "colony" system. His conclusion, "There is no doubt that an epileptic colony is the best atmosphere for an epileptic as far as health, life, and happiness is concerned", may well have been true for the times.

The epileptic colony model was subsequently taken up elsewhere in the United Kingdom, perhaps most notably at Chalfont St Peter under the auspices of the National Society for the Employment of Epileptics (later the National Society for Epilepsy) with links to the National Hospital at Queen Square, London.[24] Alexander was called upon to advise, both at its foundation, and as late as 1910 on the question of medical staffing.[25] Epileptic colonies were also established in the USA, and in Australia.

A Special Care Home was opened at Maghull in the mid-1970s which was named Alexander Home in memory of the founder, and opened by Harold Wilson, the then prime minister.[22] This building was later demolished, as times changed and the focus of the institution, now renamed the Parkhaven Trust, turned to care of the elderly.

CONCLUSION

William Alexander has been described as a "forgotten pioneer".[26] He died in 1919 and was buried at Heswall, Wirral (Figure 2). Certainly his various surgical innovations have been (rightly) abandoned, and the notion of epilepsy colonies is now antiquated. Nevertheless, Alexander helped to focus care on people with epilepsy in an era when they were largely neglected, many being deemed hopeless cases. His *BMJ* obituary stated that "he was unostentatious in manner, his opinions were lucidly expressed, and in speech he was never redundant".[1] Macalister described him as a "tower of clinical experience", of strong physical make-up, and of a kindly nature and very sympathetic to the sufferings of his patients.[3]

Fig 2 (2 panels). Alexander's grave at St Peter's Church, Heswall, Wirral (photographs courtesy of EHD Larner).

ACKNOWLEDGEMENTS

Thanks to Sue Curbishley and Adrienne Mayers for accessing relevant books at the Liverpool Medical Institution Library; and to Maggie O'Neill at Parkhaven Trust for information on the Alexander Home.

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Ulster Med J 2018;**87(3):**188-193

Medical History

Sir Sheldon Francis Dudley, his Contributions to Diphtheria and the Aftermath of the Sinking of *HMS Curacoa* by the *Queen Mary*

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Accepted: 12th June 2017
Provenance: internally peer-reviewed

Key Words: WWII, Shipwrecks, Infectious disease, Diptheria

INTRODUCTION

Off Londonderry, the *Queen Mary*, of over 81,237 gross tons, collided at a speed of 28 knots (33.5 mph) with the Royal Navy's anti-aircraft cruiser *Curacoa*. The cruiser was sliced in two at 2:20 p.m on Friday, 2 October 1942. Both halves sank within two to five minutes.

Twenty-seven RN officers and 412 ratings were aboard the two halves of *Curacoa;* 338 men perished (Fig. 1). [1,2] Of the 918 crew and 10,230 U.S. GIs on board the *Queen Mary*, none were hurt. As per orders the *Queen Mary* continued at twelve, then twenty knots for Greenock[1]. There, the U.S. 29th Infantry Division troops entrained for the South of England, with photographs of the sinking of the Belfast-based HMS *Curacoa*[1].

The bows of the *Queen Mary* that cut through the *Curacoa* and 20 feet of her stem were repaired in a dry dock in Boston, Massachusetts from 14 October to 2 November 1942[3].

RESCUE

The RN destroyers *Bramham, Cowdray* and *Skate* arrived 2 hours after the incident at around 4:20 p.m. to reach the 101 survivors – two were badly injured. Sea temperature was 13-16°C [4]. A "Most Secret" signal was sent to the Admiralty from Ballykelly: "*Curacoa* sunk 55.50 N 08.56W. Survivors including Captain picked up by two destroyers returning Londonderry..."[1].

Fig 1. The Queen Mary, HMS Curacoa Incident (oil on canvas), Harley Crossley (1938-2013), Bridgeman Images.

Lieutenant-Commander Baines, Commanding Officer of the *Bramham* and his First Lieutenant, David Mountbatten, Marquess of Milford Haven expertly controlled the rescue operations with loudhailers. Black tar oil was widespread and hazardous[1].

ADMIRALTY CONTROL

From the time that *Bramham* and *Cowdray* set off with the 101 survivors of the *Curacoa,* the Admiralty imposed strict secrecy[5,6,7].

Upon arrival at Londonderry, the 101 survivors were confined in Church premises with curtains drawn and lights on all that Friday night[7]. The Admiralty, with the tacit acceptance of Vice Admiral Sir Sheldon Francis Dudley, newly knighted and appointed Head of RN Medical Services, empaneled a Secret Court of Enquiry for Sunday, October 4, 1942 on board the *HMS Argus* anchored at Gourock in the Clyde[1]. The RN destroyer *Saladin* transported the survivors from Lough Foyle to Gourock. Survivors were then entrained in a sealed train non-stop for the 425 mile journey to Greenwich[7].

By 1942, regional censorship units had been established in Belfast, Birmingham, Bristol, Cardiff, Glasgow, Leeds and Manchester. Approximately 250 active Official Censors were based in these cities and in London[5]. Early in 1942, Byron Price of the Associated Press led a dozen U.S. experts on censorship to the UK. The issue of a U.S. Government Code of Wartime Practices was approved as in force. The UK was classified as a U.S. War Zone. According to UK Defense (General) Regulations 1939 No. 3:

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"…No person shall

1) obtain, 2) record, communicate to any other person or publish, or

3) have in his possession any document containing, or any other record whatsoever of, any information being, or purporting to be, information with respect to any of the following matters, that is to say

a) the number, description, armament, equipment, disposition, movement or condition of any of His Majesty's forces, vessels or aircraft…"[5]

At the War Cabinet Meeting on 9 October 1941, it had been decided to review what measures should be taken to "prevent the publication by the Press of articles likely to react unfavourably on this country's relations with foreign powers"[8]. Therefore a week after the sinking off Londonderry, informal discussions took place with representatives of the War Cabinet and UK and US Medical and Legal leaders. The following aspects of the Greenwich incarceration of *Curacoa's* Belfast –based ratings were considered:

Firstly, there seemed, despite two hours afloat in salt water in a 20-30 foot Atlantic swell, to be no serious physical sequelae to the survivors[9]. Secondly, the GI's on the *Queen Mary* had taken photos, and thirdly, the Greenwich site of incarceration had previously linked Dudley to a hostile question in the House of Commons[10,11] .

Fig 2. Sir Sheldon Francis Dudley (1884-1956), Surgeon,Vice-Admiral and Chief of Medical Services Royal Navy. Bromide print by Walter Stoneman, 1936. From the collections of the National Portrait Gallery, London, image no. NPG 167276 . Reproduced with their permission, solely for this Medical History.

Dudley had been appointed Royal Navy Pathologist to Greenwich in 1921 (Fig. 2). Among his duties was "supervision of the pupils of the Royal Hospital School"[10]. One thousand boarders and 100 day boys stayed at the Royal Hospital School for three years of three terms per year.

Detailed medical records were maintained for each boy. "Hygienic conditions and sanitary discipline were good[10]. Frequent examinations of the throat and nose included cultures. Space between dormitory beds was adequate and according to accepted standards. Incidence of "certain bacterial diseases, and particularly diphtheria, was considerable"[10].

Dudley said these schoolboys were an almost ideal 'experimental herd'. The result of this public statement led to a question in the House of Commons 'on the ethics of making helpless schoolboys the subject of experiments'[10,11].

On 23rd March 1933 the Royal Naval School was moved from its historic Greenwich buildings to Holcomb, Suffolk[12].

MEDICAL LEADERSHIP

Surgeon Vice-Admiral Sir Sheldon Francis Dudley, Medical Director-General of the Royal Navy from the summer of 1941 until the end of World War II, had qualified in 1906 from St. Thomas's Hospital before immediately joining the Royal Navy. His forbears had settled in County Tipperary during the 1620s, and his uncle was Rector of Glenarm, County Antrim[10]. In 1913, Dudley married Ethel Franklyn, a widow with one son. Dudley played rugby for United Hospitals and then for United Services. During World War I, Dudley served as Senior Medical Officer of the Royal Navy Air Service at Dunkirk; for this service in 1919 he was appointed OBE. In 1920 Dudley won the Liddle, London, Prize for a paper on the epidemiology of influenza[10,13]. In 1922 Dudley won the Gilbert Blane Medal and Neech Prize for an essay on "The Carrier Problem"[14]. In 1923 Dudley was appointed Professor of Pathology at the Royal Navy Medical School, Greenwich: Dudley's office was close to the Royal Hospital School, "whose thousand boys provided an 'ideal community' for testing his epidemiological views", according to the *British Medical Journal*[15].

Schick in 1913 described the intradermic test for susceptibility and immunity to the infectious disease caused by *B. diphtheria*[16]. A negative reaction indicates the presence of antitoxin. In 1922 Dudley began throat cultures and Schick tests for the 950 boys of the Royal Navy Boarding School at Greenwich. The "new" boarders were thrice as often susceptible to developing clinical diphtheria as "old" boarders. In nine months, 92 percent of the boys who developed clinical diphtheria became immune. The period of "carrying" diphtheria bacilli was always short. During seven months 30 percent of the boys were recognizable carriers (Fig. 3) (Table 1)[17].

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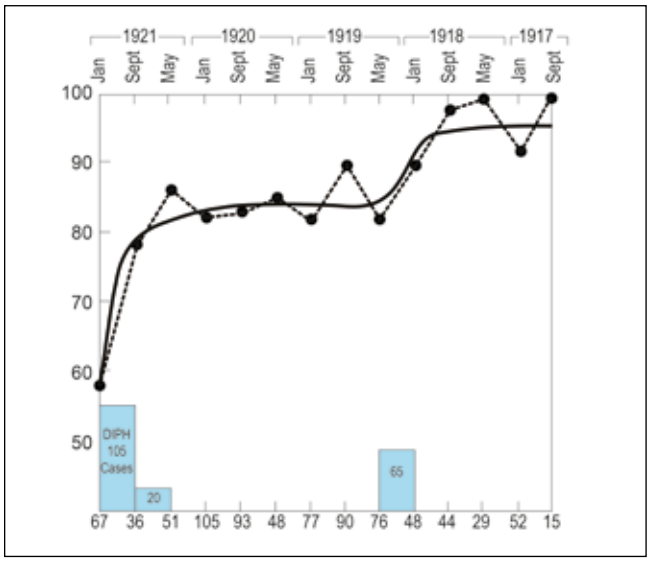

Fig 3. "831 Residential Schoolboys; Relation between number of terms in school, Schick reaction and diphtheria outbreaks. Number of boys 'new boys' out of 831 tested joining school each term.
Note: Shaded rectangles on bottom line represent character and density of diphtheric infection. The numbers associated with these rectangles include carriers of morphological diphtheria: Bacilli as well as clinical diphtheria cases." Redrawn from Dudley, 1922[17].

Dudley wrote special reports for the Medical Research Council (MRC), "The Schick Test, diphtheria and scarlet fever" (1923)[18], "The spread of droplet infection in semi-isolated communities" (1926)[19], and "Active immunization against diphtheria: its effect on the distribution of antitoxic immunity and case and carrier infection" (1934)[20]. Dudley's 1931 Milroy Lecture, "Lessons on the distribution of infectious diseases in the Royal Navy", became of seminal importance in World War II[21]. Dudley's work led to mass X-ray screening for tuberculosis[22], aided the eradication of diphtheria and was cited as justification for control and prevention of inadequate bed, bunk and hammock spacing[23]. For the *Queen Mary*, this reduced troop carrying capacity from 15,000 to 12,000 Allied warriors[3]. During World War II, Dudley chaired the Shipwreck Research Committee of the Medical Research Council[24]. Dudley's work on infectious disease control and vaccination resulted in much progress[25].

Dudley's 1931 Milroy Lecture summarized his experience of infectious disease as then Surgeon-Captain in the Royal Navy and emphasized the longitudinal contribution of the RN's study population since 1856[21]. He associated transmission of infectious diseases with population density aboard ship and in training facilities. Dudley's 1921 study of epidemic influenza had described transmission of infectious disease as a function of "infectivity of the specific germ and the density, that is, the number per unit area, of people susceptible to that degree of infectivity"[13]. His later investigations made use of the RN's "unbroken statistical record" on cholera, cerebrospinal fever, fevers, pneumonia and other infectious diseases[25,26].

Table 1.

Dudley's Conclusions: Royal Hospital School Of Greenwich

(1)	" 'New' boys were three times as often susceptible to diphtheria as 'old boys' (Fig. 3).
(2)	A graph (Fig. 3) is shown which indicates that the 'old' boys became immune during outbreaks of diphtheria, and that between outbreaks no immunity was developed.
(3)	The fact that the 'old' boys were older was insufficient to account for the more frequent immunity.
(4)	In the course of three months 32 per cent of the susceptible boys became immune.
(5)	In the course of nine months 92 per cent of the boys who developed clinical diphtheria became immune.
(6)	The period of 'carrying' diphtheria bacilli was always short, and it is estimated that during seven months 30 per cent of the boys were recognisable carriers.
(7)	Under these circumstances it is probable that all boys in the school had the opportunity of being affected by the diphtheria bacillus to a slight unrecognizable degree."[17]

DEVELOPMENTS AFTER SEALED TRAIN TO GREENWICH

The Allied Surgical Consultants protested the Greenwich incarceration. The survivors of the *Curacoa* were thereupon released for a fortnight's home leave, but still sworn to secrecy[7]. They were then forthwith assigned to Landing Ship Tanks (LSTs) and Minesweepers: the Belfast connection with Northern Ireland therefore continued at Salerno, Normandy D-Day to the Scheldt and its V weapon bombardment[27,28].

The Royal Naval Medical Services report listed 347 deaths by drowning in 1942. Since this figure was preceded by 234 reported deaths by drowning in 1941 and followed by 632 in 1943[29], it remains uncertain whether some or all of the 338 *Curacoa* deaths were included.

During the World War II years, the weekly Epidemiological Notes published in the *British Medical Journal* attest to the importance of standardised reporting and, demonstrated no increase in infectious diseases in Northern Ireland[30]. As Medical Director-General of the RN, Dudley equated the importance of control of infectious disease and general hygiene with strategic military operations, especially outside of Western Europe, and noted that "the number killed in Bengal by preventable disease in one year was five times the 300,000 killed by high explosive in the armies of the British Empire during five years of war"[25].

A YEAR AFTER DUDLEY'S DEATH

In 1957 a Grant from the Northern Ireland Hospitals Authority supported the establishment of the Virus Reference Laboratory of the Department of Microbiology at Queen's University Belfast[31,32], to provide both serological testing and virus isolation. The laboratory continued work begun

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in that Department to diagnose poliomyelitis, aseptic meningitis and encephalitis, influenza (types A, B and C), psittacosis, *Rickettsia burneti*, adenoviruses and others. The work of these investigators and their colleagues led to recommendations for immunization of schoolchildren that would reinforce immunity to diphtheria, tetanus and poliomyelitis at the time of school entry, and also provide primary immunization for children with no previous immunization history[33,34,35]. Pertussis was subsequently added to their investigations of a quadruple vaccine for infants[35].

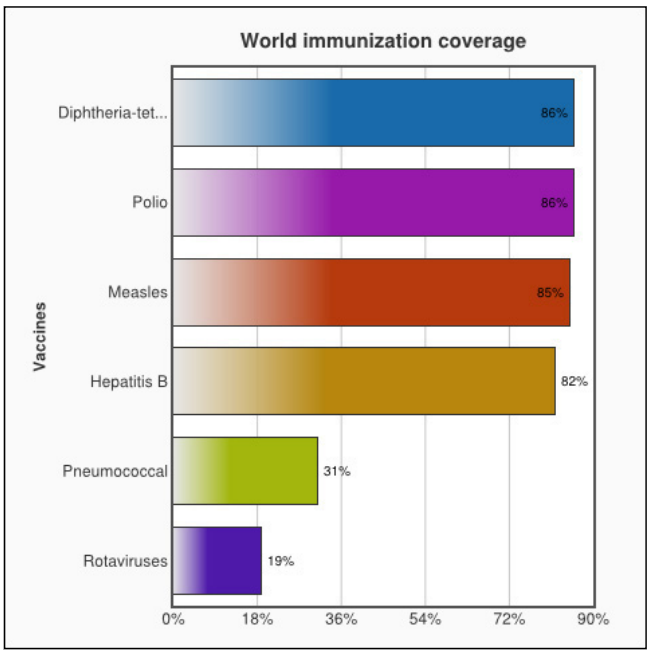

Fig 4. World Health Organization (WHO) immunization data, 2015[36]

According to the World Health Organization (WHO), immunization currently prevents two to three million deaths each year from diphtheria, tetanus, pertussis and measles, but improved global vaccination coverage could prevent an additional 1.5 million deaths each year. While estimates of unvaccinated infants worldwide are as high as 19.4 million, in 2015 the recommended series of three doses of diphtheria-tetanus-pertussis (DTP3) was administered to approximately 86 percent of infants worldwide[36] (Fig. 4).

Improvements in surveillance and timely reporting of infectious disease outbreaks have both promoted ongoing vaccination campaigns for rapidly evolving pathogens

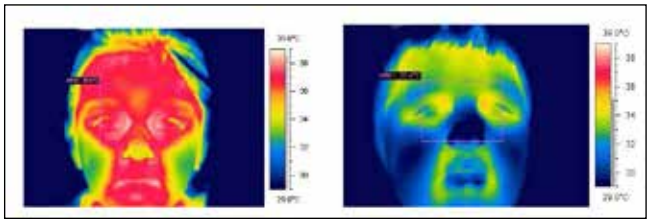

Fig 5. Thermograms of the face of a young male child. Left: during fever; right, a normal healthy child of the same age. Reproduced by permission of the authors exclusively for this Medical History[45].

such as influenza viruses, and are key factors in controlling the spread of diseases for which vaccines have yet to be developed[37,38,39,40,41]. Training of Emergency and Primary Care Physicians and Health Care workers in requisite information transfer has played a crucial role[41,42]. Mass screening of travellers at international checkpoints during disease outbreaks using thermographic fever screening, questionnaires and other means may play an increasing role in global containment of emerging infectious diseases[43,44,45,46] (Fig. 5).

MORE ON SECRECY

The Secrecy Order on the fate of the *Curacoa* was lifted just after VJ Day. The GI-taken photos of the sinking, totally split, cruiser were available for trials in the UK's High Court, the Court of Appeal and the House of Lords[1,47]. The Captain of the *Queen Mary*, Cyril Illingsworth[48] was subsequently knighted and the Captain of the *Curacoa* received the DSO for mine-sweeping in the Mediterranean[49]. The Marquess of Milford Haven received a DSC and OBE in 1942[50]. Sir Sheldon Francis Dudley had been elected FRS in 1941[10].

At the end of World War II Dudley was awarded the United States Legion of Merit in 1946 on the recommendation of General Dwight Eisenhower to the U.S. Congress with the approval of President Harry S. Truman[51,52]. The citation was for his supervision of the Atlantic Transportation from and to the USA of their two million troops: of this two million over a quarter of a million had come to Scotland on the *Queen Mary*[3].

In his later years Dudley published his views on the UK's healthcare system[53] and education[54]. Dudley died on May 6, 1956, aged 71, and was survived by his wife Ethel[10].

ACKNOWLEDGEMENTS

The authors wish to thank A.J. Blechner, Research Librarian and Library Instruction Coordinator, Aslihan A. Bulut, Librarian and Program Coordinator for Foreign, Comparative and International Law, and Meg Kribble, Research Librarian and Outreach Coordinator, of the Harvard Law School Library Reference Staff for their expert assistance. The authors wish to thank Diane Sredl, Data Reference Librarian of the Government Documents Collection, Lamont Library, Harvard University, for expert assistance. The authors wish to thank Prof. E. Francis Ring, Head of the Medical Imaging Unit, University of South Wales, and his colleagues for permission to reproduce sample screening thermographs.

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Ulster Med J 2018;**87(3):**194-196

Medical Education

Education and Support for Healthcare Professionals to Prevent Future Pandemics: Report of a Conference Workshop

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Accepted: 17th June 2018
Provenance: internally peer-reviewed.

ABSTRACT

Introduction: Pandemic infectious diseases pose a real threat to patients and public health in all countries around the world. Healthcare professionals need education and support to prevent these pandemics. However, the provision of this education is not always straightforward, and the views of healthcare professionals from different sectors and different countries should be continually taken into account when providing new educational resources. The following is the report of a workshop that was held to seek the views of healthcare professionals on e-learning and clinical decision support resources as means of providing education in pandemic infectious diseases.

Themes: There was consensus among delegates that just providing e-learning or clinical decision support on its own is not enough - you need to do more if you are going to drive usage, achieve clinical engagement, and ensure that users put their learning from the e-resources into action for the benefit of their patients. Drivers of these outcomes include the provision of content in the appropriate languages, overcoming technology barriers, linking the resources to CPD programmes or existing curricula, strategic engagement of different types of healthcare professionals, and giving due consideration to sustainability and cost effectiveness.

Concluding remarks: Providing e-learning and clinical decision support resources will be essential if we are to achieve the goal of preventing infectious disease pandemics. But this will not be achievable unless we listen to the practical problems that different stakeholders have in implementing educational programmes. The purpose of this paper is to share these challenges and potential solutions with the wider infectious diseases and global health communities.

INTRODUCTION

Pandemic infectious diseases pose a real threat to patients and public health in all countries around the world. In recent years, there have been outbreaks of Zika and Influenza, and there are fears of further outbreaks of Ebola.[1 2]

Healthcare professionals need education and support to prevent these pandemics. However, the provision of this education is not always straightforward, and the views of healthcare professionals from different sectors and different countries should be continually taken into account when providing new educational resources.

The following is the report of a workshop that was held to seek the views of healthcare professionals from different sectors and different countries on e-learning and clinical decision support resources as means of educating healthcare professionals in pandemic infectious diseases. The workshop took place at the Geneva Health Forum 2018 on the 11 April 2018 in Geneva, Switzerland. The Geneva Health Forum is a forum for the dissemination of innovative practices in global health. It enables discussions on global health issues which are based on practical experiences from around the world. It brings together stakeholders from a range of sectors including health, academia, politics, and civil society. It is run by the University Hospitals of Geneva and by the University of Geneva.

The workshop was comprised of delegates with an interest in education for healthcare professionals to prevent future pandemics. The delegates were from Europe, Africa and Asia and represented different sectors in healthcare including public health, infectious diseases, and primary and secondary care.

The corresponding author (KW) introduced the workshop and gave an outline of BMJ's resources in clinical decision support – BMJ Best Practice – and e-learning – BMJ Learning. Both resources can be used to help doctors and other healthcare professionals to recognise, report and refer patients with pandemic infectious diseases.

BMJ Best Practice supports medical professionals with their clinical decisions at the point-of-care. It provides content that is evidence based, continually updated, and at the same time

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practical and actionable. It gives answers that are structured around the patent consultation and that fit with the clinical workflow. It is available online and offline (via an app) and can be accessed on a wide range of different electronic devices.

BMJ Learning provides interactive and multimedia medical education. It covers clinical and non-clinical topics and both common and rare conditions – from influenza to Ebola. It is available in a variety of interactive formats, including text, images, animation, audio and video – to suit different contexts and different learners [3]. The content is typically case based and contains clinical scenarios - giving learners the opportunity to apply learned knowledge. There are assessment questions at the end of the resources to enable learners to test the knowledge that they have gained.

The second author (ER) presented the objectives of the educational and clinical decision support resources and how they have been implemented so far, outlining the main impacts and success stories. ER concluded by identifying the key ingredients needed to sustain initiatives such as this. These are: a committed leadership with a plan to support initiatives into the long-term; an enabling environment conducive to accrediting online learning as source of continuing professional development (CPD); and the integration of online learning resources into the medical academic curriculum.

The third author (AH) gave an outline of the importance that outreach and engagement to the relevant healthcare groups and professionals has been across all elements of educational programmes. It was noted that it is not advisable to simply turn on access to a resource and assume users will naturally change their behaviour without prompt or support. The outreach has been conducted across a range of digital and online channels and further supported with face-to-face engagement. There were a number of examples highlighted such as email campaigns, social media targeting, case study interviews, podcast series and knowledge quizzes.

THEMES

The delegates then discussed the resources and other issues related to pandemic infectious diseases in more detail.

The first theme that emerged from the discussion was one of language. The resources are available in English and have been translated into several languages including Portuguese, Chinese, Georgian, Ukrainian, Azerbaijani, Vietnamese and Russian. English is the first language of a number of countries that are at risk of an infectious disease pandemic. It is also the language of medicine and healthcare in other countries and so is widely understood by doctors. However, there are other countries at risk where healthcare professionals do not speak English and so translation is required in these cases. In some countries the doctors might understand English but frontline community health workers might not understand it and so translation would then be required.

A second theme that emerged is that, although the clinical resources like those provided by BMJ Best Practice and BMJ Learning are vital, they will not meet the needs of all learners. Some learners from a public health background need resources that are based around epidemiology and community health. They need these resources to help them learn how to conduct public health needs assessments and to develop managerial and leadership skills. Delegates were also interested in other infectious disease – besides pandemic infectious diseases. These included neglected tropical diseases, tuberculosis and other infectious diseases that place a high burden on the countries in question.

A third theme of the discussions was barriers to access of the resources. Online connectivity is an issue in many of the low-income counties that are most at risk of pandemics. Connectivity may be absent or low in certain countries. The delegates agreed that low bandwidth resources would be required in many countries or that an app might be required (BMJ Best Practice is available via an app). Delegates stated that the only electronic devices that were available to many healthcare professionals were smart phones and so it was essential that the resources were mobile-friendly.

The fourth theme was that of the exact audience that the resources were targeted at. There was consensus that many of the countries that were most at risk had a shortage of doctors and in particular a shortage of infectious disease specialists. Delegates felt that as a result the resources needed to be suitable for frontline primary care doctors – this is because these were the ones who would be responsible for recognising, referring and reporting most patients. Resources for health promoters and community health workers would be welcome also.

The fifth theme was continuing professional development (CPD). Delegates agreed that countries at risk of pandemics were often the same countries where CPD is not compulsory or where frameworks for CPD were weak. There was a realisation that many low-income countries were at different stages in their journey to introduce CPD. However, the provision of e-learning and online clinical decision support were seen as opportunities to develop an infrastructure for CPD and that they can be a means of demonstrating tangible and positive outcomes from CPD.

The sixth theme related to the involvement of low income countries. Delegates realised that the resources were created by BMJ and independent international experts, however they were keen that local healthcare professionals be involved in the resources also. There was support for the process of involving local healthcare professionals in the quality assurance of translated content. Delegates were also interested in allowing local healthcare professionals to have input into country portals that act as points of entry into the resources.

The seventh theme related to blending the online resources with face-to-face education that healthcare professionals were already receiving. It was felt that initiatives such as this

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would be more likely to succeed if they could be integrated into existing curricula. Ideally the resources would be used to drive quality improvement programmes but delegates considered that a great deal of support would be needed in certain countries before they would be ready to undertake these programmes in a formal and systematic manner.

The eighth and final theme that was discussed concerned the sustainability of initiatives in this field. Delegates discussed other projects that they had been involved with in the past that were too expensive or not sustainable. Some had been involved in "train the trainer" programmes. The purpose of these programmes had been to cascade new guidelines from the Ministry of Health or other authorities to the frontline. However, delegates stated that these programmes were slow and expensive and often did not work into the long term. There was optimism among delegates that e-learning and online clinical decision support resources should be more sustainable. They also felt that online resources would be scalable and thus be more cost effective than other methods of reaching healthcare professionals.

CONCLUDING REMARKS

Even though the purpose of the workshop was to discuss e-learning and online clinical decision support, much of the discourse covered issues around the online resources. There was consensus that just providing e-learning or clinical decision support on its own is not enough - you need to do more if you are going to drive usage, achieve clinical engagement, and ensure that users put their learning from the e-resources into action for the benefit of their patients. Drivers of these outcomes include the provision of content in the appropriate languages, overcoming technology barriers, linking the resources to CPD programmes or existing curricula, strategic engagement of different types of healthcare professionals, and giving due consideration to sustainability and cost effectiveness[4].

Providing e-learning and clinical decision support resources will be essential if we are to achieve the ultimate goal of preventing infectious disease pandemics. But this will not be achievable unless we listen to the practical problems that different stakeholders have in implementing educational programmes. The purpose of this paper is to share these challenges and potential solutions with the wider infectious diseases and global health communities.

SOURCES OF FUNDING

None

ACKNOWLEDGMENTS

We are grateful to all those who attended and contributed to the workshop

CONFLICTS OF INTEREST

KW works for BMJ Learning and BMJ Best Practice which produce a range of resources in infectious and non-infectious diseases.

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Letters

I'M AN LGBT MEDICAL STUDENT, GET ME OUT OF HERE:

Does sexuality contribute to Northern Ireland's brain drain? Findings from a survey of medical students at Queen's University Belfast

Editor,

The loss of highly educated undergraduates and graduates from Northern Ireland (NI) to other countries for study and work, otherwise known as "Brain Drain", is well recognised [1]. The intention to leave among NI students is significantly higher than comparable Northern European countries [1, 2]. In particular, those within highly skilled professions such as medicine deem it "a necessity" for training purposes [1]. Existing literature suggests that contributing factors include geographical isolation, lack of opportunity and historically high mobility levels of young people from the island of Ireland [1,2]. This trend is particularly prevalent within Irish doctors in training, with 88% either contemplating or definitely migrating following graduation [3].

A survey of 16-year-olds in NI found that non-heterosexuals had worse experiences in education, reported worse mental health and were more likely to say that they will leave NI with no intention to return [4]. In addition, this study found that 'brain drain' did not exist in a significant way in any group other than those with same-sex attraction [4].

Our recent study at Queen's University Belfast (QUB) examining the experiences of lesbian, gay, bisexual and transgender (LGBT) medical students compared to their heterosexual peers suggests a novel factor contributing to the brain drain phenomenon. The study, an anonymous online survey disseminated to all medical students registered at QUB, had a total of 427 responses (30.5% response rate). Principal findings are detailed in Tables 1 and 2.

TABLE 1:

Sexual Orientation

Sexual Orientation	*%*	*Num.*
Heterosexual	*75.24*	*310*
Gay/Lesbian	*15.53*	*64*
Bisexual	*6.07*	*25*
Other	*0.73*	*3*
Prefer not to say	*0.49*	*2*

It found that students from NI identifying as heterosexual are 1.5 times more likely to definitely plan to stay following graduation than non-heterosexuals. Non-heterosexual students from NI were over 5 times as likely to state definitely that they plan to leave NI following graduation. Moreover, this statistically significant difference (Chi-square test, p-value < 0.00001) did not exist in students not originally from NI. When asked if students were aware of peers applying outside of NI because of their sexual orientation, almost 20% responded 'yes', with the number rising to 38% among non-heterosexuals.

TABLE 2:

Planning to stay in Northern Ireland

Do you plan to stay in NI for further Foundation Training?		
From NI		
	Heterosexual	Non-heterosexual
Yes	59.90 (127)	39.39 (26)
No	4.72 (10)	25.76 (17)
Unsure	12.26 (26)	16.67 (11)
Skipped	23.11 (49)	18.18 (12)
Not from NI		
	Heterosexual	Non-heterosexual
Yes	19.79 (19)	18.75 (6)
No	30.21 (29)	31.25 (10)
Unsure	28.13 (27)	43.75 (14)
Skipped	21.88 (21)	6.25 (2)

So why are native non-heterosexuals more likely to plan to leave than non-heterosexuals from other countries? Comments from the survey included: "Northern Ireland is a very difficult place to find a partner in due to the political climate and lack of LGBT visibility".

While anti-discrimination legislation was harmonised in England, Scotland and Wales under the British Equality Act 2010, legislation in NI remains discordant. A key difference relates to same sex marriage: protection is granted under the Equality Act 2010, but under current NI legislation it is illegal as defined in Section 75 of the Northern Ireland Act 1998.This is particularly poignant for QUB's medical school, wherein 70% of its students are from NI originally and 22% of respondents identified as non-heterosexual.

The issue of LGBTQ+ teaching was also raised by the General Medical Council (GMC) during their most recent visit to QUB in April 2017. In their report they noted that a significant number of students felt that they did not have a good understanding of LGBTQ+ medical issues. This report expressed "concern that subjects such as LGBTQ+ were given very minimal time within the curriculum" [5].

These findings point towards the critical need for strategies to improve the non-heterosexual medical student experience and working environment, in order to prevent further and potentially irreversible loss of talented young doctors to other parts of the UK and beyond.

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PNEUMOBILIA VERSUS PORTAL VENOUS GAS IN BLUNT ABDOMINAL TRAUMA

Editor,

Hepatic portal venous gas (HPVG) and pneumobilia secondary to blunt abdominal trauma are rare CT findings. Appearances are similar and can lead to diagnostic confusion. HPVG, was first described by Wolfe and Evans in 1955[1] in relation to non-reversible intra-abdominal pathology in post mortem infants. Other causes have subsequently been described, but it is a rare finding in blunt abdominal trauma[2]. Pneumobilia has been reported in the context of emphysematous cholecystitis, passage of a biliary stone and endoscopic retrograde cholangiopancreatography (ERCP) but rarely in trauma.[3]

The following case supports the postulate that neither pathology is an absolute indication for exploratory laparotomy in an otherwise stable patient.

CASE REPORT

A 61-year-old white male was transferred 25 miles from the scene of a high-speed road traffic accident to the Royal Victoria Hospital. He was the driver of a car involved in a head on collision. He was restrained by his seatbeat and entrapped for 45 minutes due to driver compartment intrusion. Type II diabetes was his only significant past medical history.

He arrived in the resuscitation department 88 minutes after impact. He had been immobilised at the scene. Primary survey revealed haemodynamic stability and a GCS of 15/15. He was vomiting copious amounts of clear fluid with associated severe generalised abdominal, right-sided chest and lower back pain. He had both a seatbelt sign and extensive bruising across his right lateral chest and back. Bloods including amylase were unremarkable. A full-body Trauma CT scan was conducted. The initial report identified significant global injuries including; a mid-shaft fracture of the right clavicle, multiple right-sided rib fractures, an unstable two column fracture of L5 vertebral body, traumatic liver laceration with associated pneumobilia segment 4A (figure 1), right posterior transverse abdominus avulsion, extensive thickening of the small bowel, flattening of the IVC and hyperenhancing adrenals suggesting hypovolaemia and shock. No mesenteric haematoma, free fluid or pneumoperitoneum was present.

On surgical reassessment the patient remained generally tender despite analgesia however haemodynamically was stable with no peritonitis. The decision was made not to proceed to immediate laparotomy. The patient was transferred to the High Dependence Unit for monitoring. Intubation was not required.

Fig 1. Gas in liver initially described as pneumobilia reported on review of images as portal venous gas, given peripheral distribution away from the main biliary tree.

The following day radiology review suggested the gas within the liver was in the portal venous system (HPVG), likely related to acute gastric dilatation as gas was also seen within the stomach wall dependently in the left upper quadrant (gastric pneumatosis) (figure 2), with small foci of gas in the adjacent gastric veins. As he remained stable we continued conservative management and the patient was successfully discharged home 21 days post admission.

Our case adds to the growing body of evidence that post-traumatic HPVG and pneumobilia are surrogate markers of significant trauma but neither sign in isolation should prompt immediate exploratory laparotomy in an otherwise stable patient.

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Written informed consent was obtained from the patient for publication of this case report and any accompanying images.

Fig 2. Incidental finding of gas within stomach wall

Keywords: pneumobilia, blunt trauma, portal venous gas

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JOHN FAGAN AND THE PNEUMATIC TYRE

Editor

It cannot be said of many presidents of the Ulster Medical Society that they helped to change the world but if a claim by John Fagan is true then he was one. The pneumatic tyre was patented in 1845 by Robert William Thomson who, despite demonstrating its advantages on heavy horse-drawn vehicles, could not make it a commercial success. John Boyd Dunlop, a veterinary surgeon with a large practice in May Street, Belfast, filed his own patent in 1888 but acknowledged that it was doubtful it was valid when, in 1890, he learnt of Thomson's prior art. The efficiency and comfort of the pneumatic cycle tyre and its success in cycle races lead to a huge demand for it especially after Charles Kingston Welch made it detachable.

Sir Arthur du Cros published a history of the pneumatic tyre in 1938[1] and was well placed to do so as he had been a director of the Pneumatic Tyre and Booth's Cycle Agency (his father's company with Dunlop on the Board) and of its successors, the first being the Dunlop Pneumatic Tyre Company. John Fagan (later Sir John Fagan), twice President of the Ulster Medical Society, had suggested that Dunlop's son, Johnnie, should take up cycling as it was an excellent form of exercise. The granite setts in the streets of Belfast made riding on solid tyres a jarring experience and Dunlop began to experiment with non-solid ones, initially filling them with water. Fagan had experience of air mattresses in his medical practice and du Cros states that Fagan frequently claimed to family and friends that he had suggested to Dunlop that he would be better to use air. Du Cros knew Dunlop very well from 1892 onwards and does not record any denial by him which perhaps lends credence to Fagan's claim. Thus Fagan would seem to have had a significant influence on the re-discovery of the pneumatic tyre on which modern road and air transport depends.

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PARANEOPLASTIC VITELLIFORM MACULOPATHY – ASSOCIATION WITH PRIMARY CANCERS

Editor,

We wish to highlight an important potential ophthalmic paraneoplastic presentation, that should trigger further investigations to diagnose underlying malignancy.

Paraneoplastic disorders are conditions related to systemic malignancy, but the effects occur at a site remote from the original tumour or metastases.[1] It is estimated that paraneoplastic syndromes affecting the nervous or visual systems occur in about 0.01% of patients with cancer[2]. A systematic review in 2013 by Rahimy and Saraf listed the 23 cases of paraneoplastic vitelliform maculopathy (PVM) reported in the literature at that time. Most of the cases described were associated with cutaneous or choroidal melanoma and only rarely with carcinoma. All the cases in the review were either associated with metastatic disease at the time of presentation to ophthalmology or metastases were discovered within the following months[3]. The average age of onset was 59 years, with equal sex distribution[3].

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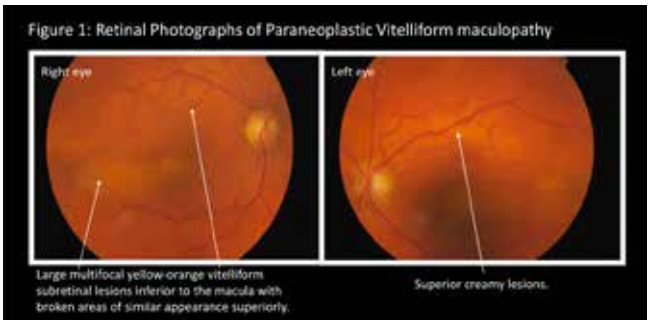
We present two cases of PVM; one associated with underlying cutaneous melanoma and one with primary breast carcinoma.

The first case was a 68-year-old lady (Figure 1) who presented with a one-year history of gradually decreasing vision bilaterally. She had a background of grade III ductal breast carcinoma, diagnosed five years previously. This was treated with mastectomy, chemotherapy and radiotherapy. At presentation her vision was RE 6/12, LE 6/15.



The second case was a 48-year-old lady who presented with bilateral visual distortion and gradually increasing blurred vision over 1 year. She had a medical history of malignant melanoma diagnosed 4 years before and treated with surgical resection and chemotherapy. At presentation to the ophthalmic team her vision was 6/6 right eye, 6/12 left eye. On retinal examination both cases revealed multifocal yellow-orange vitelliform lesions.

Prompt recognition of the clinical appearance of PVM can facilitate early investigation of underlying malignancy and metastases and it must be remembered that PVM may be the presentation of a distant primary malignancy. In the first case described here, there is currently no evidence of underlying metastases; this patient remains under close monitoring. Unfortunately, there is evidence that PVM is a poor prognostic indicator, with most patients having metastatic disease diagnosed shortly after presentation and succumbing to this from months to four years after presentation with PVM[3].

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THE CHALLENGE OF ACHIEVING ADEQUATE ORAL IMMUNOSUPPRESSION IN A RENAL TRANSPLANT RECIPIENT WHO DEVELOPS SHORT BOWEL SYNDROME (SBS)

Editor,

A 39-year-old male with a renal transplant was admitted to hospital with abdominal pain and vomiting. A computed tomography (CT) scan of abdomen showed ischaemic large bowel. He proceeded to a laparotomy with ileocaecal resection and right hemicolectomy. 2 days later he had worsening abdominal pain and a repeat CT abdomen demonstrated ischaemic small bowel. He had a further laparotomy, small bowel resection and end ileostomy, leaving only 1 metre of small bowel distal to the duodenal-jejunal flexure. 12 days later there was recurrence of small bowel ischaemia and a further 20cm of distal ileum was removed, leaving only 80cm of small bowel. Initial post-operative immunosuppression was established with intravenous (IV) hydrocortisone and IV cellcept, with no impairment in graft function.

The clinical challenge was how to achieve adequate oral immunosuppression in a patient with only 80cm of small bowel, presuming drug absorption from the gastrointestinal tract is significantly reduced.

Animal studies demonstrate tacrolimus absorption is predominantly in the upper part of the small intestine[1] and the colon[2]. On review of the literature there are multiple cases which describe the use of tacrolimus in SBS, in both kidney[3] and other solid organ transplants [4, 5]. Interestingly, adequate tacrolimus levels can be achieved in the presence of a jejunostomy[4] and even in complete absence of small bowel[5].

We stopped cellcept, commenced oral tacrolimus (Prograf) and converted IV hydrocortisone to oral prednisolone. Tacrolimus absorption was monitored with blood trough levels (target trough 5-10 μg/L). The patient was initially commenced on Prograf 5mg BD (0.15mg/kg). The first trough level was 12μg/L. After a period of elevated levels the dose was reduced to a maintenance dose of 1.5mg BD and this remained stable for many months

7 months later he underwent surgery to reverse the ileostomy. After reversal surgery, tacrolimus trough levels rose to 14-18 μg/L and Prograf dose was reduced to 1mg BD, maintaining stable trough levels 4-8 μg/L. There were no concerns regarding medication compliance with this patient. It is noteworthy that with ileostomy reversal, trough levels rose significantly. This supports observations in animal studies of further tacrolimus absorption in the colon[2].

This case reminds us of the challenge of attaining adequate oral immunosuppression in renal transplant recipients who develop SBS. Tacrolimus can be used in this situation. Trough levels should be monitored and the dose adjusted in line with the surgery performed.

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A CALCANEUS FRACTURE WITH INTERPOSED FLEXOR HALLUCIS LONGUS TENDON; A SURGICAL TIP TO AID TENDON REDUCTION

Editor,

Controversy still exists in the treatment of Os Calcis fractures. However, if surgical fixation is indicated the extended lateral approach is commonly used but an incarcerated flexor hallucis longus (FHL) tendon can block reduction of medial fracture fragments. We describe a simple, novel technique to aid reduction and help prevent FHL tendon interposition.

INTRODUCTION:

Os Calcis fractures typically occur in young, working-age adults after a fall from height[1]. They make up 1-2% of all fractures[2]. These injuries are often associated with extended recovery periods and can result in long-term morbidity including residual pain and loss of function.[3] Controversy still exists with regards to operative vs conservative management for these complex fractures.[1, 4, 5] A recent large, pragmatic, randomised controlled trial concluded that operative treatment compared with non-operative care showed no symptomatic or functional advantage after two years in patients with displaced intra-articular fractures.[2] However, many foot and ankle surgeons believe that with careful patient selection open reduction internal fixation (ORIF) of these fractures can restore mechanical alignment and restore subtalar articular congruity. In particular, fractures with incarcerated tendons are considered to be an indication for surgical treatment. The extended lateral approach is commonly used for ORIF but an incarcerated FHL tendon can block reduction of medical fracture fragments. We describe a simple and novel technique to aid reduction and help prevent FHL tendon interposition.

PRESENTATION

A 25 year old male was admitted with a displaced intra-articular calcaneal fracture following a fall from height. (Fig. 1) An incarcerated FHL tendon was suspected on the CT scan preoperatively. ORIF using a contoured locking plate was carried out through a standard extended lateral incision. Intraoperatively it was noted the fracture was difficult to reduce and the FHL tendon interposition was confirmed, from the lateral side, as the cause. To extricate the tendon from the fracture a small medial skin incision was made (approx. 3-4

Fig 1. Injury Radiograph, showing a communicated os calcis fracture

millimetres) and a MacDonald's dissector was introduced through the incision and used to manipulate the FHL tendon. See Fig. 2 for pre insertion of the MacDonald and Fig. 3 for the reduced tendon. As a result of this simple technique the fracture was easily reduced with no significant intraoperative delay or operative morbidity.

FOLLOW –UP

At a 3 month review the patient was pain free with reduced subtalar movement. Radiographs were satisfactory. At this stage he was allowed to wean out of his aircast boot and into normal footwear.

At a review 8 months post-surgery making a very good steady progress. Alignment is maintained and function is improving. There is no subtalar movement, however this was expected given the fracture pattern.

CONCLUSION

The MacDonald's dissector is a versatile surgical instrument. For this case if open reduction of the FHL tendon was considered there would have been an extensive lateral

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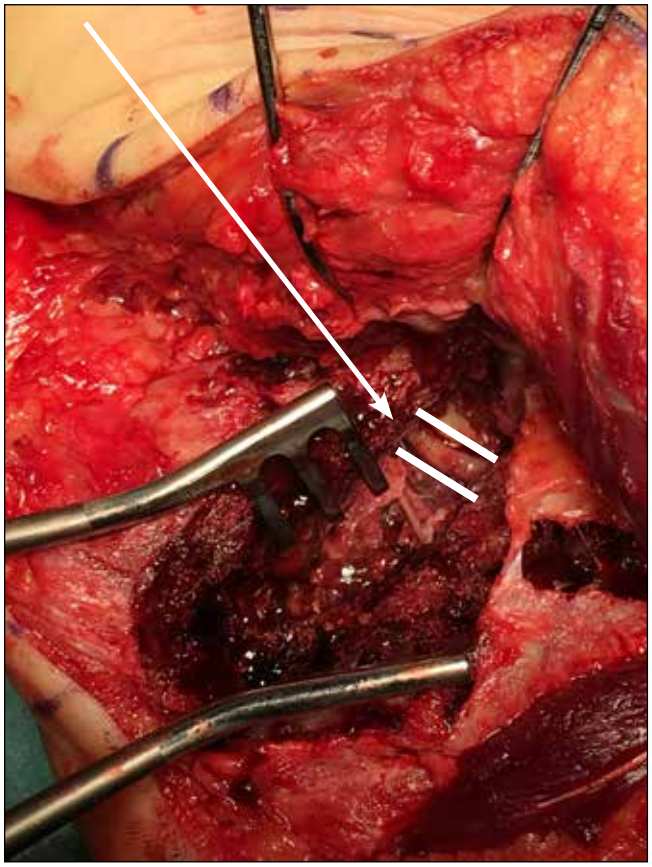

Fig 2. Interposed FHL tendon causing difficulty in fracture reduction

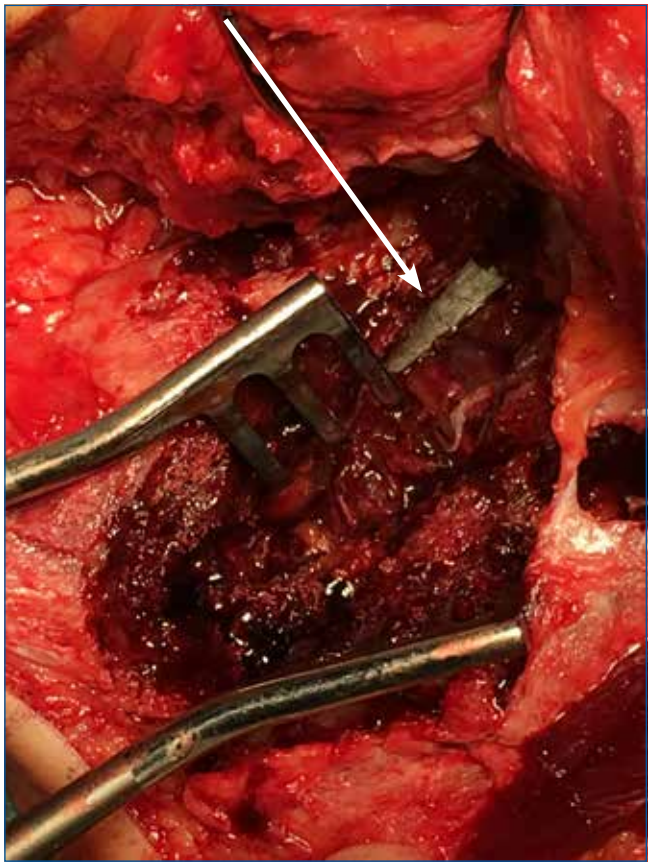

Fig 3. FHL now reduced using a MacDonald's Dissector with a minimally invasive approach

wound (for fracture fixation) and a significant medical would for open tendon reduction. We have shown that a small percutaneous incision can be utilised to great affect with no additional operative morbidity.

We would advocate the use of this method for those who encounter this or similar surgical dilemmas.

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Key words: Os Calcis; Calcaneus; Fracture; Trauma; Flexor hallucis longus; FHL; MacDonald Dissector

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Ulster Med J 2018;**87(3):**203-204

So you want to be a

Teaching Fellow in Northern Ireland?

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Accepted: 17th June 2018
Provenance: internally peer-reviewed.

"The successful teacher is no longer on a height, pumping knowledge at high pressure into passive receptacles...He is a senior student anxious to help his juniors."

Sir William Osler

INTRODUCTION

The word 'Doctor' stems from the latin verb docēre, meaning 'to teach.[1] Whilst this role was traditionally adopted by senior physicians, the publication of the General Medical Council's *Doctors as Teachers*, has led to a paradigm shift. Emphasising the need for medical education to be considered the responsibility of all physicians, this guidance has necessitated junior doctors act as educators for medical students and colleagues alike.[2] Correspondingly, clinical teaching is now considered a priority within junior doctor training, and fundamental for career development.

That being said, the ability to function as an effective clinical teacher is not intuitive yet formal teacher training is not commonplace within current undergraduate and postgraduate curricula.[3] As such, physicians looking to strengthen their teaching ability must do so through supplementary courses. For some, engagement in medical education is merely an obligation and one for which there is little time for in a busy clinical schedule, resulting in inferior quality teaching for students.

Consequently clinical teaching fellowships have become increasingly popular in recent years, with fellows regarded as an effective means of delivering high quality and reliable teaching.[4] Correspondingly fellows, themselves junior doctors, are afforded the opportunity to develop their teaching prowess, gain involvement in managerial roles and enhance leadership and communication skills.[5] Principally, these schemes offer trainees the chance to garner experience in medical education alongside their clinical training. At present, teaching fellowship programmes exist within several trusts in Northern Ireland, with one such programme currently in Altnagelvin Hospital.

Founded in 2014, the Western Trust teaching fellowship is now in its third year. Starting with a single fellow, the scheme has grown steadily, recruiting 12 participants this academic year. The current fellows represent trainees from a variety of medical and surgical specialities, based at both the Altnagelvin and South West Acute Hospital sites.

TEACHING FELLOW PROGRAMME

The teaching fellowship is a 6-12-month programme for trainee doctors at the level of ST3 and above. Potential applicants must complete a competency-based application, demonstrating their previous undergraduate and postgraduate teaching experience alongside their professional and personal motivations for applying.

The role of the teaching fellow is designed to run synergistically alongside trainee clinical commitments, with the fellows receiving 4 hours per week of protected time to design and deliver teaching. Undergraduate curriculum delivery encompasses the majority of the workload, with specific importance placed on third and final year students. Fellows are advocated to provide additional postgraduate level training within their speciality for junior staff. Predominantly teaching is delivered through didactic lectures, small group tutorials and clinical experiential bedside learning however fellows are afforded access to novel teaching techniques such as simulation, and their use is highly encouraged.

In addition to the provision of teaching, fellows are involved in organisation of undergraduate QUB Final MB and postgraduate PACES exams. Principally this is through the sourcing of patients and the overseeing of the examination. Moreover, fellows aid the FY0 apprenticeship programme, acting as mentors to the forthcoming foundation doctors as they transition from undergraduate students to NHS doctors.

In return, fellows are remunerated through funding for medical education related courses. This helps facilitate further teacher training and as such, enhance the ability of the fellows to function as effective educators. Presently, several of my colleagues are completing their Postgraduate Certificate in Medical Education and I myself (EK) intend to train further in simulation.

BENEFITS OF A TEACHING FELLOW

In extorting the virtues of a teaching fellow programme, one must consider the benefits to both the educators and students alike.

For students, the use of teaching fellows is viewed favourably, with fellows often considered more reliable and approachable.[6] This is important twofold as it allows informal discussion regarding students concerns and difficulties, with the fellow providing a pastoral role. Moreover, students consider the fellows more accessible and as such, report feeling more comfortable in asking questions, seeking clarification and discussing areas of difficulty. In my experience (EK), this improved level of communication between educator and pupil has helped empower students

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to express their learning needs, placing greater emphasis on student centred teaching. Accordingly, a recent study by Woodfield & O'Sullivan (2014), reported students favoured fellow led teaching over that of consultants, given that fellows tended to pitch teaching at a more appropriate level.[6]

Similarly, a plethora of benefits exist for teaching fellows. Most notably, the aforementioned funding allows fellows to pursue additional qualifications in medical education, thus affording them the opportunity to develop understanding of theories and practical elements underpinning medical education. Additionally, fellows are encouraged to participate in educational research projects. As such, they can garner greater understanding of research methodologies whilst also generating results suitable for conference abstract submission and potential publication.

As teaching fellows, there is increased access to a myriad of teaching resources, including contemporary techniques such as simulation. Fellows are therefore able to generate a dynamic and contemporary portfolio of teaching experiences, indispensable for CV enhancement. Equally, student feedback is documented after each session, allowing for personal reflection on the teaching provided. Potential weakness in teaching techniques can thereby be addressed by the fellow, with positive student reviews acting as a source of encouragement.

Working as a member of a fellow team has additional benefits. Observing the teaching of fellow colleagues is constructive as it enhances awareness of alternative teaching styles, promoting self-comparison and reflection on one's own teaching. Such engagement in collegial teaching is further advantageous through the provision of formal and informal peer feedback in a supportive environment. Peer collaboration and the sharing of ideas can enhance opportunities in relation to collective quality improvement and research projects.

Organisational and management skills are strengthened as a teaching fellow. Whilst protected teaching time exists, fellows must continue to manage their role as physicians with its associated stressors, necessitating skills in time management, prioritisation and teamwork. Additionally, leadership skills are augmented through the mentoring role a fellow assumes, supporting students in both their clinical and personal/ professional development.

Perhaps the greatest benefit of being a teaching fellow is the ability to improve as a teacher. Regular engagement in teaching helps establish a sense of confidence in public speaking, ultimately leading to a more personal and effective teaching style. For me (EK), I have developed a better understanding of core clinical topics, essential in order to explain difficult concepts in an understandable manner to students. Moreover, I believe this has enhanced me as a physician and improved my communication with patients. Furthermore, the opportunity to engage with students and their enthusiasm for learning, has encouraged me to challenge myself in creating new ideas and more innovative ways to teach.

CONCLUSION

Working as a teaching fellow is a wonderful opportunity for trainees wanting to enhance or develop as a medical educator. It is both a rewarding experience for the fellow and plays an integral role in enhancing the training of future doctors. Inevitably the varied nature of the role means it extends beyond simply "teaching," offering a myriad of opportunities for a trainees personal and professional development.[5]

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Ulster Med J 2018;**87(3):**205-215

Abstracts

Annual Trainee Doctors' Prize Day, Thursday 19th November 2017.

Postgraduate Centre, Belfast City Hospital

ORAL PRESENTATION

Triage Bloods QIP

Lorraine Bouzan, Elaine Quigley, Emma Wilkinson

Introduction: Blood tests are one of the most common investigations which are undertaken in Emergency Departments. We suspected that our Emergency Department was undertaking unnecessary blood tests.

Aims: We aimed to undertake a quality improvement project to reduce the amount of inappropriate blood tests and standardise indications for doing them.

Methods: We first targeted coagulation screens. We were performing an average of 409 per week. On a sample audit of twenty of these, only one was clinically indicated. Of the 8 were abnormal, none were repeated or changed management. We defined criteria for coagulation screen testing according to guidelines. Our first PDSA Cycle involved removing coagulation screens from inappropriate blood bundles.

Results: We reduced the number of coagulation screens by an average of 100 per week saving our department approximately £37260 per year. Further PDSA cycles are now complete including daily staff education and we have also begun targeting other blood tests.

Discussion: We would like to share our learning so that this can be replicated by other hospitals

We will explain the methods behind each of these PDSA Cycles and how we were able to achieve a significant change through staff education, engagement and motivation.

ORAL PRESENTATION

Assessment of Junior Doctor Confidence in Chest Drain Management Introduction

Emma Keelan, Nicholas Magee

Chest drains are inserted for pleural effusion and pneumothorax management. British Thoracic Society guidelines state patients with chest drains should be managed by experienced individuals.Yet, junior doctors are expected to manage chest drains, often without previous training.

Aims: This study aims to establish junior doctors' level of competence with chest drain management.

Method: An on-line questionnaire-based study was conducted involving foundation and core trainees (n=20) assigned to a Belfast respiratory ward from August 2016 - February 2017. Information was sought regarding junior doctors confidence in chest drain management; specifically indications and contraindications to insertion, understanding of 'swinging' and 'bubbling' and knowledge regarding drain clamping and flushing.

Discussion: Post registration trainees (post FY1) accounted for 65% (13/20) of respondents. Average confidence level regarding chest drain management was 2/10. Doctors felt further education was required on indications and contraindications for drain insertion (55% and 70% respectively). Drain swinging/bubbling could not be assessed by 80% of respondents.

Procedurally, only 20% were of respondents were capable of clamping a drain and 15% flushing. Junior doctors felt most comfortable (35%) reviewing drain position on chest radiographs.

This study supports the need for further education of junior doctors regarding chest drain management.

Insulin Signalling in Vascular Endothelial Cells is Suppressed by CITED2

Sam Lockhart, Xuachun Wang, Thomas Rathjen, Ditte Sorensen, Susan Dunwoodie, Lars Rassmussen, Christian Rask-Madsen

Aims: Endothelial cell insulin signalling regulates vascular inflammation and angiogenesis. Because hypoxia—inducible factor (HIF) regulates insulin signalling. We studied the role of CITED2, a negative regulator of HIF activity, on endothelial cell insulin signalling.

Methods: Cre-Lox technology was used to generate mice with endothelial cell specific knockout of CITED2 (EC--CITED2--KO).

Results: In cultured endothelial cells, loss of CITED2 selectively enhanced Akt--dependent insulin signalling,

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increasing pAkt/tAkt almost 3--fold (P<0.05, N=4),potentially via a 3--fold upregulation of IRS2 (P=0.056, N=3). Consistent with a role for CITED2 as a pathogenic factor in endothelial insulin resistance, CITED2 mRNA was upregulated 2--fold in FACS-- sorted cardiac endothelial cells from obese mice (P<0.05) and CITED2 protein was elevated 3.8--fold in arterial tissue from patients with type 2 diabetes versus controls (P<0.05). Importantly, aortic Akt--phosphorylation after in vivo treatment with insulin (5U) was significantly upregulated in EC--CITED2--KO mice compared to controls (P<0.01), demonstrating that CITED2 regulates vascular insulin signalling in vivo.

Conclusion: CITED2 is a novel modulator of endothelial insulin signalling. Inhibition of CITED2 is a potential approach to selectively improve IRS2/Akt signalling in endothelial cells and modulate vascular function in diabetes.

Aspirin Use Does Not Improve Survival in Two Independent Population-Based Cohorts of Oesophageal and Gastric Cancer Patients.

Andrew D Spence; John Busby; Brian T Johnston; John A Baron; Carmel M Hughes; Helen G Coleman; Chris R Cardwell

Introduction: Pre-clinical studies have shown aspirin has anti-cancer properties and epidemiological studies suggest it could prolong survival in cancer patients.

Aims: We conducted the first investigation of the association between aspirin and cancer-specific mortality in oesophageal and gastric cancer patients using two large population-based cohorts.

Methods: Cohorts of newly diagnosed gastro-oesophageal cancer patients were identified from English and Scottish cancer registries. Aspirin prescriptions were identified from the UK Clinical Research Practice Datalink (England) and the Prescribing Information System (Scotland), and deaths from national mortality records. Time-dependent Cox regression models were used to calculate hazard ratios (HR) and 95% confidence intervals (CIs) for cancer-specific mortality. Meta-analysis was used to pool results.

Results: The combined English and Scottish cohorts contained 4,654 oesophageal and 3,833 gastric cancer patients. There was no association between post-diagnosis aspirin use and cancer-specific mortality among oesophageal (pooled adjusted HR 0.98, 95% CI 0.89, 1.09) or gastric (pooled adjusted HR 0.96, 95% CI 0.85, 1.08) cancer patients.

Discussion: In these two large UK cohorts, post-diagnosis aspirin usage was not associated with improved survival for patients diagnosed with oesophageal or gastric cancer.

Temporal Bone Dysplasia in Coffin-Siris Syndrome: Case Report Case Study

JEA Wauchope, CG Leonard, K Trimble

We report a child, diagnosed with Coffin Siris Syndrome (CSS), with right otorrhoea. Examination confirmed the presence of cholesteatoma. CT temporal bones was performed to investigate for this and determine relevant surgical anatomy. CT was assessed and measurements were compared with previously published data for normal temporal bone anatomy.

These comparisons demonstrated multiple anomalies in the temporal bone of the child with CSS. Genetic testing confirmed a recognised genetic abnormality (ARID1A anomaly) but with a significantly different phenotype to those previously published with this mutation.

DISCUSSION

CSS is a rare disorder with a number of diagnostic features of facies. The natural history of the condition sees frequent reports of hearing impairment with the ARID1B mutation being most strongly linked to hearing impairment. Despite these associations between CSS and hearing loss, there are no previous reports of temporal bone anomalies with the above genetic mutation.

This case highlights the importance of considering temporal bone abnormalities in all children with CSS or dysmorphia, when they may require mastoid procedures. The risk of a loss of orientation and iatrogenic damage to structures of the temporal bone are increased due to their altered orientation.

POSTER PRESENTATIONS

CLINICAL RESEARCH

Patient Outcomes Following Periprosthetic Femoral Fractures.

Dr Nick Black, ST6, Anaesthetics

Introduction

Periprosthetic fractures are a serious complication of joint arthroplasty. Approximately, 1.7% of total hip replacements and 1.3% of total knee replacements will suffer a periprosthetic fracture within 10 years.

Aims: To characterise the patient population. To ascertain patient outcomes.

Methods: The Fractures Outcomes Research Database collects information regarding all fractures patients admitted to the Royal Victoria Hospital, Belfast and was used to identify patients with periprosthetic femoral fractures from 2007-2015. All patients over 60 years old were included. T-tests and chi-squared tests were used to assess significance.

Results: 261 patients were admitted from 2007-2015, 23 patients were excluded leaving 238 patients. The 30-day and one-year mortality were 2.94% and 13.45% respectively. Those dying within one year were significantly older, p=0.004, than the overall cohort. Only 24.12% (n=48) of the 199 patients admitted from home were initially discharged there.

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Discussion: In the 2016 NHFD report our institution reported a crude 30-day mortality of 6.2%. Periprosthetic fractures have a much lower mortality than hip fracture patients. Over 75% of patients admitted from home did not initially return there. This provides insight into the perioperative course which includes challenging anaesthesia, major blood loss and prolonged rehabilitation.

Right Ventricular Strain Imaging with Cardiac Magnetic Resonance Following Lung Resection Introduction

Dr Adam Glass, ST3, Anaesthetics

Previously our research group demonstrated that following lung resection right ventricular ejection fraction (RVEF) decreases with an imbalance between RV contractility and afterload (decreased coupling).

Aim: To determine if changes in RV contractility (strain) can explain the deterioration in RVEF and coupling.

Methods: A post-hoc analysis of our previous study; 20 patients underwent lobectomy and CMR imaging of the heart pre-operatively, two days (POD2) and two months post-op. Longitudinal strain of left (LVLS) and right ventricles (RVLS) were calculated and compared to RVEF, coupling and afterload (wave reflection index (WRI)).

Results: RVLS was reduced from pre-op at two months ($p=0.02$) and was associated with impaired coupling ($r=-0.53$, $p=0.02$). LVLS was unchanged throughout ($p>0.39$). Increased WRI was associated with increased RVLS at POD2 ($r=-0.51$, $p=0.03$) but with decreased RVLS at two months ($r=0.66$, $p<0.01$).

Discussion: This is the first CMR myocardial strain analysis following lung resection and demonstrates isolated right ventricular dysfunction. On POD2 global strain increases (improved contractility) with increased WRI, potentially compensating for acutely increased afterload. By two months this relationship is reversed, potentially indicating RV decompensations secondary to prolonged increased afterload.

Renal Failure Parathyroidectomy – is Preoperative Imaging Beneficial?

Mr Robert Spence, ST6, General Surgery

Introduction: A combination of ultrasound and isotope preoperative localisation imaging is accepted as useful in parathyroid surgery for primary disease. Their role in parathyroid surgery in renal failure patients is uncertain.

Aims: To compare imaging outcomes in two series' of parathyroid surgery – primary and tertiary.

Methods: All data were collected prospectively over a 10-year period (2003–2013). Most patients had both USS and isotope (MIBI) preoperative imaging. Preoperative imaging was correlated with operative findings.

Results: 90 patients (M:F 60:30; mean age 52.8 years) were included (49 primary, 41 tertiary). In the primary group, 32 underwent USS with 19 (59%) successful identification, 42 underwent MIBI with 27 (64%) correctly identified.

In the tertiary group, 34 patients underwent USS with only 4 (11%) having all glands correctly identified (18 patients (52%) had some glands correctly localised by USS). 35 patients underwent MIBI with only 3 (9%) having all glands correctly identified (14 patients (40%) showed some gland activity).

Comparison using ordinal regression confirms these imaging techniques are significantly more accurate in primary than tertiary parathyroid surgery ($P=0.022$).

Discussion: While combined USS and MIBI imaging are essential in unilateral neck exploration for primary disease – we believe that these imaging techniques have limited place in renal failure parathyroidectomy.

Octaplex use in the Southern Health & Social Care Trust

Dr Ross McMullan, F2, Academic Foundation Programme

Introduction: Haemorrhage is the most serious adverse effect of vitamin K antagonists such as warfarin. It is a leading cause of morbidity and mortality. Rapid reversal of anti-coagulation with prothrombin complex concentrate (PCC) is critical in bleeding patients or those requiring emergency surgery.

Trust Guidelines: Southern Trust Guidelines state that in cases of emergency surgery or major haemorrhage if the INR is >4 then 30units/kg must be used whereas if the INR is <4 then 15 units/kg must be used.

Aims: This project aimed to establish if the correct dose of PCC was being administered. Due to the importance of octaplex in the critical care setting all patients should receive the correct dose.

Methods & Results: Data was collected from Craigavon and Daisy Hill Hospitals over 2 months, during which there were 17 cases of octaplex use. 14 patients required warfarin reversal; 3 required apixaban reversal. Correct dose was administered in 15 cases.

Discussion: This audit demonstrated that the appropriate dose of octaplex is not being used in all cases. Interestingly, this project highlighted the role that PCC can perform in reversing the anti-coagulant effects of oral anti-Xa anticoagulants.

Loop-Mediated Isothermal Amplification Pcr (Lamp) for the Rapid Identification of Invasive Meningococcal Disease In The Emergency Department.

Dr Thomas Waterfield, ST7, Paediatrics

Introduction: Meningococcal disease (MD) is the leading infectious cause of septicaemia and death in children in the UK. The diagnosis of MD is notoriously difficult and current "gold standard" confirmatory tests typically take 48 hours.

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Aims: The aim of this study is to assess the performance of a rapid point of care DNA test (LAMP) for the diagnosis of MD against the current gold standard (TaqMan PCR).

Method: The LAMP and TaqMAN PCR assays were compared using N. meningitidis genomic DNA spiked over a range of concentrations and including all serotypes (A, B, C, W, X and Y).

Results

- The LAMP-MD analyser is suitable for ED use
- The mean time for detection of Meningococcal DNA was 14.01 minutes.
- Detection of meningococcal serogroups A, B, C, W, X and Z was confirmed
- The LAMP-MD assay was 100% sensitive and specific relative to real-time TaqMAN PCR.

Discussion: LAMP-MD is a practical, rapid point of care test that can reliably detect all Meningococcal serotypes in less than 15 minutes. LAMP-MD has the potential to redefine the standard of care for diagnosing potential MD.

Outcomes of Direct Current Cardioversion in Atrial Fibrillation

Dr Seán Esmonde, ST3, Cardiology

Introduction: Atrial fibrillation can be converted to sinus rhythm (SR) with direct current cardioversion (DCC) to improve symptom control. Success rates have been reported as 75-93%.

Aims: This audit aimed to assess success and complication rates of DCC. Secondary aims included the effect of age or the presence of bi-atrial dilatation.

Methods: We retrospectively collected data from electronic records and medical notes of all patients who underwent DCC over 3 months. Previous echocardiogram results were used to determine left atrial dilatation size. The primary outcome was SR at 6 week review.

Results: 68 patients underwent DCC (mean age 69 years [SD 9.12], range 48-86, 63.2% male), with 27 (39.7%) remaining in SR at 6 weeks. Successful DCC outcome was significantly higher in patients without bi-atrial dilatation compared to those with bi- atrial dilatation (risk ratio 2.6-fold; p = <0.01). There were no complications. Age (p = 0.07), and sex (p = 0.40), did not significantly affect outcome.

Discussion: The success of DCC was lower than reported in the literature. Elderly patients achieved SR with greater frequency, but this was not statistically significant. Bi-atrial dilation was associated with procedural failure. Guidelines may need changed.

Presentation, Referral and Management of Oropharyngeal Cancer in Northern Ireland - 2013

Dr Conor McKenna, CT2, Core Surgical Training

INTRODUCTION/AIMS: Oropharyngeal cancers include cancers of the tonsil, soft palate and base of tongue. This project audited the presentation and management of these cancers in Northern Ireland in 2013.

METHODS: Cases were identified from the Northern Ireland Cancer Registry using ICD-10 codes pertaining to oropharyngeal cancer. Clinical data were collected in Microsoft Excel and analysed using SPSS.

RESULTS: 77 oropharynx cancers were diagnosed in 2013 (57 males, 20 females). The largest subsite was tonsil (n=41). The most common presenting symptom was a neck lump (n=40). 50 cases were referred on a red flag pathway and ENT was the most common destination of initial referral (n=60). 50 cases had testing for p16 (p16+,33 and p16-,17). 93% of patients had active treatment. 27 patients had surgical management and reconstruction was used in 4 patients. 68 patients had radio/chemoradiotherapy (26 as post-operative RT/42 as primary RT). 35 patients received chemotherapy.

DISCUSSION: This study details the management of oropharynx cancers in Northern Ireland in 2013 and facilitates comparison with other cancer networks. Many patients present with neck disease indicating higher stage disease. Variability existed in testing for p16. Most patients were treated with curative intent with non-surgical treatment being the most frequent treatment modality.

ADRRAD trial initial results – novel combination androgen deprivation therapy (ADT), whole pelvis radiotherapy (WPRT) and radium-223 in metastatic hormone sensitive prostate cancer (MHSPCa).

Dr Philip Turner, ST5, Clinical Oncology

Introduction: MHSPCa has traditionally been managed with ADT until progression. Radium-223 is a bone-seeking radionuclide which extends survival in late castration resistant prostate cancer.

Aims: A phase 1/2 feasibility study to determine toxicity and any signal towards efficacy of the novel combination: ADT, early radium-223 and WPRT.

Methods: Eligible patients had MHSPCa, minimum 3 bone metastases, absence of visceral metastases and PS 0-1. Patients were treated with ADT, 6 cycles of radium-223 at 55kBq/kg and VMAT radiotherapy to pelvis aiming for 74Gy in 37 fractions to prostate and 60Gy in 37 fractions to lymph node bed.

Results: Median follow up is 29 weeks for first 10 patients treated. In total 168 AEs have occurred, 70.2% Grade 1, 25.6% Grade II and 4.2% Grade III. 9 patients had evaluable pairs of Whole Body MRI pre and post radium-223/WPRT. 1 showed progression, 1 showed mixed response, 7 showed partial response. Median time to PSA/ALP progression yet to be reached.

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Discussion: A strong signal of tolerability and marked radiological improvement on WBMRI is emerging from this entirely novel combination.

VTE incidence with neoadjuvant chemotherapy: Postop prophylaxis is too little, too late!

Dr Harry Acheson, Locum Doctor

Neoadjuvant chemotherapy is routinely given to OG (oeseophagael/gastric) cancer patients with proven survival benefit; local protocol advises VTE prophylaxis post operativly. However no guidelines for prophylaxis in neo-adjuvant period exist, despite higher VTE incidence with neo-adjuvant chemotherapy suggested by studies.

To establish incidence of VTE during neo-adjuvant therapy in OG cancer patients.

A review of patients receiving neoadjuvant chemotherapy for OG cancer 2013-16 performed using electronic clinical records. VTE incidence, date and site were recorded.

196 patients identified (134 oesophagectomy, 62 gastrectomy). With oesophagectomy, incidence of pre-op VTE was 6.0%(8/134) and post-op incidence was 3.7%(5/134) With gastrectomy group incidence of pre-op VTE was 6.5%(4/62) and postop incidence was 1.6% Overall the VTE rate in patients undergoing neo-adjuvant chemotherapy in the pre-op period was 5.6%(11/196) and postop period was 3.1%(6/196) with combined incidence of 8.7%(17/196).

This shows significantly high incidence of VTE in neo-adjuvant period. It may be worthwhile considering prophylaxis on individual basis, given the impact on survival outcome for cancer patients associated with VTE

BASIC SCIENCE/RESEARCH

Trends in body donation at Queen's University 1967-2017.

Dr Lucy Kayes, CT1, Core Medicine

Introduction: Anatomy has been taught in Belfast since the 19th century. Cadaveric dissection is currently used to teach a range of postgraduate and undergraduate students.

Aims: This study aimed to identify key trends within the population of body donors at Queen's University over the past fifty years. It is hoped this will provide an insight into the demographics of donors within Northern Ireland.

Methods: All donors from 1st of January 1967 until 1st of January 2017 were included. Anonymous data was put into an SPSS database and descriptive statistics were generated. Graphs were generated using Microsoft Excel. Subgroup analysis was performed for each ten year period studied and excluding donors from outside Northern Ireland.

Results: There was a slight female predominance. Average age of donors increased throughout the study period. The most common religious group seen was Protestant. Cause of death was varied with the single most common cause of death being bronchopneumonia.

Discussion: The population of body donors within Northern Ireland is diverse and is representative of the general population in many respects. However, subgroups within the general population were under-represented. These included Roman Catholics and those from peripheral counties, particularly Fermanagh.

STUDIES IN MEDICAL EDUCATION

Implementing Emotional Resilience Workshops: before and after intervention study at Queen's University Belfast.

Dr Claire Potter, CT3, Psychiatry

Introduction: The GMC mandated that emotional resilience training be included in undergraduate medical education. We developed a targeted workshop to meet this need.

Aims: Primary aim was to assess impact on student's scores on the Connor-Davidson Resilience Scale (CD-RISC). Secondary aim assessed if there was any correlation between resilience scores and students' well-being or perceived stress.

Methods: Workshops were delivered to all first year medical students at QUB. Before each session students filled out CD- RISC, Perceived Stress Scale and Warwick-Edinburgh Well-Being scale. Students were re-tested three months later.

Results: 195 students attended the workshops and completed both the before and after questionnaire. 97.4% were 18-24, 57% Females and 68% were Undergraduates. There was a statistical significant decrease from pre to post scores on the CD-RISC only (Cohen's d = 0.191, p0.001). Correlation analysis demonstrated a negative relationship between changes in resilience and changes in perceived stress r(195) = -0.28:p<0.001. There was positive relationship between changes in resilience and changes in wellbeing r(195) = 0.29:p<0.001.

Discussion: The resilience workshop only had statistical impact on decreasing scores in CD-RISC scale but that this decrease was very small.

Physician-patient language concordance in assessing acute ischaemic stroke

Dr Dylan James MacLochlainn, CT1, Core Medicine

Introduction: Physician-patient language discordance is an independent predictor of a range of poorer outcomes. In acute clinical presentations with time-dependent interventions, it has the potential to delay and complicate treatment.

Aims: With reference to a clinical case, we aim to show how physician language skills can be beneficial in the assessment of acute ischaemic stroke and to highlight the role of language accreditation and relevant training opportunities.

Methods: We reviewed a recent clinical case with reference to relevant publications on physician-patient language concordance.

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Results: A 59-year-old monolingual Spanish-speaking woman presented with sudden-onset unilateral weakness. Clinical history and examination were carried out in Spanish by an F2 doctor with appropriate language accreditation under consultant supervision. CT head and angiogram were performed: no acute abnormality was detected. IV thrombolysis was administered. The patient made a full recovery and was discharged. The case was the subject of a reflective practice exercise, as part of which the trainee obtained NIHSS recertification in Spanish.

Conclusions: Trainees with language skills should be encouraged to avail of accredited training where appropriate, as such skills may influence outcome and improve patient experience, particularly in acute scenarios.

Investigating the low pass rate for the Membership of the Royal College of Physicians (MRCP) Part 1 examination in Northern Ireland.

Dr Philip Hall, ST7, Gastroenterology/GIM

Introduction: Core medical trainees who graduated from Queen's University Belfast and were working in the Northern Ireland Deanery had the lowest and second lowest pass rates in the UK respectively for MRCP Part 1 examination in 2014/15. This anomaly was not replicated for other specialties nor in MRCP Part 2.

Aims: To evaluate Northern Ireland specific factors leading to poor performance at MRCP Part 1.

Methods: Two focus groups with core medical trainees (n=13). Data was evaluated using Thematic Analysis. Results were interpreted in the context of recent relevant literature.

Results: The dominant themes highlighted by trainees included issues with their jobs (in particular a focus on service provision and problems with rota gaps), a lack of awareness about how to prepare for examinations and a perceived lack of exam specific support. Other prominent themes included career focus, foundation programme and undergraduate factors.

Finance and impact on social life were weak contributing factors.

Discussion: Low pass rates at MRCP Part 1 are influenced by multiple factors, both institutional and individual. The literature supports a variety of strategies to improve both an individual's chances of success and an institution's educational environment to maximise pass rates.

The human behind the doctor: a qualitative study exploring the emotions of medical trainees and their perception of support during the transition from student to doctor through cognitive interview technique.

Dr Claire Carson, CT2, Core Medicine

Introduction: The transition from student to doctor brings with it new responsibilities, triggering powerful emotions and stress which can result in psychological morbidity. It is therefore a time when support requirements are at their greatest.

Aims: This study aims to reveal the subjective lived experiences and emotions of doctors during this transition; and consequently their perception of support methods and barriers encountered.

Methods: Seven self-selected foundation year one doctors working in Northern Ireland undertook individual cognitive interviews and were asked to elaborate repetitively on a challenging event. Interviews incorporated imaginative variation techniques. Interpretative phenomenological analysis was used to condense qualitative data into meaningful form and offer deeper understanding of trainees' lived emotions and perceptions.

Results: The over-arching theme was the "doctor façade". The most commonly described emotion was guilt. The majority of encounters were negative and focused on dealing with death and dying. Exaggerated emotional response was provoked by the setting, intrinsic factors and human interactions. Barriers to support were predominantly related to a negative perception of interpersonal relationships.

Discussion: Doctors chose primarily discouraging experiences and thus associated emotions and perceptions of support were mainly negative. Additional training and improved awareness of support is likely to be helpful, particularly around the topic of mortality.

QUALITY IMPROVEMENT/PATIENT SAFETY

Improving Doctors' Handwriting

Dr Niamh Melby, ST5, Emergency Medicine

Everyone knows doctors' handwriting is notoriously poor. With increasing scrutiny on documentation, surely something can be done while awaiting electronic record-keeping.

Aims: In the Ulster Hospital, fracture patients are discharged to the 'Virtual Fracture Clinic', which reviews the patient's notes. If medical records are illegible, this results in a delay of the patient journey. It was hypothesised that the use of a fountain pen rather than the basic disposable ballpoint could improve the legibility of doctors' handwriting and therefore eliminates this delay.

Methods: Disposable fountain pens were circulated to Ulster ED doctors over a 6-month period. On 14th February 2017, a 'Fancy Pen Day' was held where there was nearly 100% compliance in use of fountain pens. A sample of documentation from this day was compared to a random sample and adjudicated on a scale of legibility from 1-4. Also, the number of failed referrals to the Virtual Fracture Clinic was reviewed.

Results/Discussion: There was a subjective improvement in legibility using the fountain pen. There was a 50% reduction in failed referrals. Compliance was the main issue, and as such this tool alone may not be the solution to the conundrum of how to improve doctor's handwriting.

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Promoting Patient Safety: Implementing and Sustaining Paediatric Protected Handover in District General Hospital

Dr Peter Mallett, Clinical Fellow, Paediatrics

Introduction: There are many potential barriers to effective handover including poor communication, unsuitable environment and lack of senior representation.

During Handover periods, we identified repeated interruptions by non-urgent bleeps as a significant barrier to effective communication, and thus potentially compromising patient safety.

Aim: Reduce the number of non-urgent bleeps received during handover, by implementing a protected paediatric handover scheme.

Methods: A daily log of in-hospital bleeps was recorded during handover. Bleeps were categorised as urgent & non-urgent. Subsequently, we engaged with Maternity & ED colleagues, and promoted respect of new protected handover times, unless an urgent issue arose. We displayed posters, located at strategic areas around the hospital and advertised on Trust computers.

Results: Total number of bleeps received reduced significantly from 28 to 8 bleeps. Non-urgent bleeps decreased from 25 to 6 bleeps. Six months later, we re-audited via the same method. 7 out of total 7 bleeps were non-urgent.

Discussion: The introduction of protected handover has reduced interruptions, leading to safer handovers. The benefits of good handover not only affect the patient, but they also are educationally of better value to the team.

Whilst a significant improvement has been made, challenges lie ahead in the continued promotion of a safe, protected handover culture.

Introducing the word catheter as an alternative to surgical management when treating a Bartholin's Abscess

Dr Michael Graham, ST4, Obstetrics & Gynaecology

Introduction: It was noted that patients presenting with a Bartholin's Abscess waited significant lengths of time for marsupialisation in theatre under general anaesthesia. This placed a significant burden on healthcare resources. Word catheter outpatient management has been shown to be as effective as surgical management.

Aims: To introduce the Word catheter for as an alternative to surgical management when treating a Bartholin's Abscess.

Methods: Prior to introducing the Word catheter the extent of the problem was audited. This revealed significant delays (average time of 43 hours from assessment until discharge) when undergoing surgical management by marsupialisation under general anaesthetic. Following this we introduced the Word catheter.

Results: Significant improvements were found when using the Word catheter with a shorter time from assessment until discharge (usually immediately) and fewer patients requiring surgery and an inpatient stay. There were good outcomes when using the word catheter with every patient reviewed having resolution of their abscess. A marked reduction in patients requiring surgery in theatre resulted in a reduction to patient risk and economic burden

Discussion: A low-cost, relatively simple intervention resulted in improved patient care, patient safety and reduced healthcare costs.

Translating statistical improvement to service improvement – are we measuring the right metric?

Dr Kevin McGarry, CT2, Core Surgery

Introduction: In December 2017 dedicated wound management teaching was incorporated into the Belfast Trust Emergency Medicine Induction. Despite producing statistically significant improvements in participants' objective and subjective ability, no improvement was demonstrated in minor injury waiting time. We discuss the complex issue of measuring improvement in dynamic systems and how to improve data capture in such environments.

Aims: Assessing the impact of induction teaching on the objective and subjective abilities of junior doctors' management of minor injuries. Assessment of impact on departmental minor injury waiting times.

Methods: A validated OSAT scale and novel Likert scale was used before and after the teaching intervention to assess objective and subjective changes in suturing ability respectively. Impact on service provision was assessed by analysis of 7 days of minor injury waiting times before and after the intervention.

Results: Highly statistically significant improvement was demonstrated in individual objective and subjective abilities ($P>0.005$). However, no statistical improvement occurred in waiting times.

Discussion: Despite improvement in individual ability there was no systems improvement in the selected outcome. Future projects may benefit from looking at long-term follow up of multiple sources of data capture.

Exploring patient perceptions of alternative outpatient review methods

Mr Joshua Clements, ST3, General Surgery

Introduction: The delivery of a safe and efficient outpatient (OP) service is complex. In a era of increasing waiting times and growing financial pressures, traditional face to face OP review models are becoming difficult to sustain. Virtual clinics, telephone and video consults have been trialled with varying success. A sustainable patient centred alternative is required.

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Aims: To identify patients knowledge and preference of alternative outpatient review methods.

Methods: A 6 question questionnaire was designed and distributed to consecutive patients attending a consultant led general urology outpatient clinic across 4 hospital sites during February 2017.

Results: 102 questionnaires were completed. 77 male and 25 female with a median age of 66 and 59 respectively. 93% attended by car with or without a relative. 70% of patients lived <10 miles from the hospital. 15% patients had heard of telephone review and 3% email review. 75% of patients had a mobile telephone and internet access. 45% of patients preferred outpatient review over other methods.

Discussion: There is a lack of knowledge of alternative review methods. The OP clinic is accessible to the majority and is the preferred method of review. Other means of review may be difficult to instigate in this older cohort despite good access to information technology.

Ensuring capture of patients with Cystic Fibrosis Related Diabetes (CFRD); The CFRD Database

Dr Suzanne Ringrow, ST5, Respiratory Medicine & Dr Pawel Boguaz, ST6, Endocrinology

CFRD is a common complication of cystic fibrosis in a population that is now surviving well into adulthood. It is crucial that these patients receive input from specialist diabetic services as poor glycaemic control leads to higher pulmonary exacerbation rates and decline in lung function. This project aimed to assess the capture and follow up of CFRD in Northern Ireland.

Using the joint care CFRD clinic list and input from specialist CF nurses we compiled a list of known CRFD patients. To capture patients not referred to specialist diabetic services we compared this to HbA1c and oral glucose tolerance results consistent with CFRD from Belfast Link Labs and the Northern Ireland Electronic Care Record.

304 patients with CF are registered in Northern Ireland. 32 patients were diagnosed with CFRD; our search revealed a further 5 with undiagnosed CFRD and 15 with impaired glucose tolerance.

Maintaining follow-up and capture of patients with CRFD presents many challenges. To promote ease of communication and multidisciplinary team working we developed a CFRD database to record all CF patients with impaired glucose tolerance and CFRD. This will be maintained by the specialist dietician for the CF team and reviewed at quarterly MDMs.

Improving safety, outcomes and service delivery in special care dentistry (SCD) using high flow nasal oxygen (HFNO).

Ms Kathryn McKenna, StR, Special Care Dentistry

Introduction: HFNO is a system that delivers heated and humidified oxygen at high flow rates up to 60 l/min, increasing positive pressure in the upper airways, reducing respiratory resistance and assisting ventilation while maintaining patient comfort. It may have particular benefits in SCD in patients for whom airway management is challenging, including obese patients, elderly patients, and those with co-morbidities, particularly where sedation is used. In SCD treatment may be carried out in a day procedure unit (DPU) or as an in-patient. DPU is preferable to ease pressures on in-patient services and improve cost-effectiveness.

Aims: To investigate the potential benefits of HFNO in SCD.

Methods: A literature review was conducted. Case examples and TMS data were reviewed.

Results: HFNO is superior in maintaining oxygen saturations than conventional oxygen delivery systems, resulting in less interruption to treatment, reduced recovery times, improved safety and outcomes for patients, and has decreased the need for in-patient treatment.

Discussion: In SCD, HFNO improves patient safety and outcomes, improves service delivery for patients and service providers, reduces barriers to care for patients and improves cost-effectiveness for Trusts.

Pilot study analysing emergency management of patients referred to Regional Plastics Trauma Clinic

Dr Clare Hutchinson, CT2, Core Surgery

Introduction: Patients attending the regional plastics trauma clinic in Dundonald are referred from hospitals and GP practices all over Northern Ireland. There is currently no regional guidance available for wound dressing on patients referred to their service and patients arriving for review had inconsistent primary wound care.

Aim: To take a snap shot looking at current practises of trauma wound care on a regional level. This data is intended to be evaluated and online guidance material produced for any healthcare professional involved in primary dressing of wounds referred to the plastic trauma clinic.

Method: For 50 patients attending clinic we recorded parameters from their initial management including reason for attendance, type of dressing, if X-ray was performed, whether tetanus was given (if needed), if the wound was washed and sutured and if antibiotics were given.

Results: Referrals came from Belfast and peripheral hospitals in almost even numbers. 17 wounds were dressed inappropriately, on one occasion requiring a general anaesthetic to remove. 1 patient did not receive tetanus, 6 wounds did not have essential imaging and 7 were not closed.

Discussion: There is too much variation in initial management, guidance could improve wound care.

'Transitions of Young People who turn 18 whilst Inpatient in NI Regional Child and Adolescent Mental

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Health (CAMHs) Unit'

Dr Bronagh McCarragher, CT1, Psychiatry

Introduction: Transition can be a difficult time for young people.

There is currently no policy guiding inpatient transition from CAMHs to Adult Mental Health services for acute transition.

Aims: Ascertain how many inpatients turned 18 over the previous three years, their diagnosis and outcomes of transition.

Methods: Retrospective study analysing weekly ward lists, paper and electronic case notes between August 2014- August 2017; as well as patient interview about their experience.

Transition process was audited against transition standards- TRACK study 2008.

Result: Eleven inpatients turned 18 over the period.

Average length of stay post 18 was 24 days, longest- 64 days. 45% had psychosis.

73% had multiple psychiatric comorbidities. All required transfer to Acute Care

-82% to inpatient

-18% to Home Treatment Team

TRACK standards:

-100% had transition planning and information transfer

-Only 45% had joint working

Discussion: The majority of young people did not meet all transition standards. Patient experience suggested need for joint working and a planned transition.

The results of this audit will be used to draw up transition guidelines with adult colleagues.

Postoperative prophylactic clexane adherence in Oesophagectomy and Gastrectomy patients in Northern Ireland: A Novel Patient Education Programme

Dr Harry Acheson, Locum Doctor

Oeseophagectomy/gastrectomy patients receive 28 days VTE prophylaxis post operatively. This improves morbidity and outcomes. This is usually completed in community. In this context patient education/compliance regarding administration is vital.

To audit prophylaxis prescription rates and patient compliance post discharge.

Discharge prescriptions of 25 patients over 6 months were audited. Then a follow up telephone survey checking education/compliance.

Interventions were then performed

Patient education leaflets + education session

Incorporation of VTE education into discharge goals by engaging with nursing staff. A second cohort of 25 was then reviewed post intervention similarly.

Of the 25 patients identified pre-intervention, 5 unable to be contacted. 100% of patients discharged on prophylactic clexane.

Follow up telephone survey - 95% compliance

15% didn't understand VTE prophylaxis necessity

Of the 25 patients identified post intervention, 10 were unable to be contacted. Post intervention follow up patients

100% compliance

5% didn't understand VTE prophylaxis necessity

Initially 100% of patients discharged on prophylaxis but this was not reflected in compliance, with survey suggesting lack of understanding.

Following intervention compliance increased to 100% and patient comprehension improved.

It seems that improved patients and staff education can improve compliance rates with VTE prophylaxis.

CASE REPORTS/SERIES

Pyroglutamic acidosis: a rare stroke mimic

Dr Dylan James MacLochlainn, CT1, Core Medicine

Case Study: A 67-year-old woman presented with severe dysphasia, ataxia, and right-sided facial droop outside the thrombolysis window. Her past medical history included chronic kidney disease, hypertension, and type 2 diabetes mellitus. Regular medication included co-codamol. No acute abnormality was detected on initial brain imaging; an old left lentiform nucleus infarct was noted. The patient was diagnosed with E. coli urosepsis, acute kidney injury, and a high anion-gap metabolic acidosis. Antibiotics and intravenous fluids were commenced; nephrotoxics were held. Laboratory lactate and ketone levels were normal, but three separate urine organic acid profiles showed increased levels of pyroglutamic acid. Paracetamol and antibiotics were discontinued and the acidosis resolved on sodium bicarbonate. The patient's neurological features had completely resolved by discharge.

Discussion: Pyroglutamic acidosis is a rare stroke mimic; neurological features in this case may also be attributable to decompensation of old stroke related to sepsis, or drugs. This patient had several known risk factors for pyroglutamic acidosis: female sex, renal impairment, paracetamol, sepsis, and antibiotics. Withdrawal of causative agents is the mainstay of treatment, although sodium bicarbonate and N-acetylcysteine are sometimes used. Early diagnosis is important as results may take several days.

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Ureteric Injury in Obstetrics and Gynaecology Surgery: Case Report

Dr Aarti Manohar Shetty, LAT1, Obstetrics & Gynaecology

Case Study: A 56y old postmenopausal woman underwent total abdominal hysterectomy and bilateral salpingo-ophorectomy for a uterine fibroid measuring around 11.4x10.1x9.6cm in Ultrasound scan. 3 weeks later, she presented with discharge from drain site and raised CRP. On suspicion of intra-abdominal collection, she underwent ultrasound abdomen, which showed a 7x2.3x3cm hematoma. A repeat scan, demonstrated persistent hematoma with moderate hydronephrosis. An urgent CT urogram reported moderate hydronephrosis and hydroureter secondary to extrinsic compression of distal ureter close to VUJ. An attempt for right ureteric stenting was limited due to tortuous nature of ureter, and hence, she underwent right nephrostomy. Antegrade follow up studies demonstrated free drainage of contrast down the ureter, followed by removal of nephrostomy and full recovery.

Discussion: The incidence of ureteric injury ranges from 0.2-1%, of these nearly 50% are attributed to be a complications from obstetric and gynaecology surgeries. This case report describes a unique presentation of Grade I ureteric injury and the challenges involved in diagnosis and management. The mechanism of hydronephrosis and hydroureter in this case is hypothesized due to chronic stretch of ureter caused by uterine fibroid, followed by post-operative recoil and twist causing pseudo obstruction, thereby making retrograde stenting difficult.

Blurred vision: an unusual presentation of pulmonary adenocarcinoma

Dr Stephen McAleer, CT2, Core Medicine

Case study: 60-year-old lady presented with blurred vision over several months. Retinal examination at eye casualty revealed right choroidal lesions, suspicious of metastatic disease. Subsequent CT scan of chest, abdomen and pelvis revealed a 4 cm soft tissue mass in the right upper lobe. There were also abnormal neck nodes at the left base of neck, measuring up to 14 mm in size.

The patient is an ex-smoker with a 45-pack year history and had a history of STEMI 4 months prior, hypertension and rheumatoid arthritis. There is no personal or family history for cancer. The patient had noticed an unspecified amount of weight loss during the past year. She denied any cough, recognised her energy levels were reduced but remained active and independent.

Ultrasound guided FNA of neck node was performed and cytology was consistent with metastatic pulmonary adenocarcinoma.

Discussion: Metastatic tumours are the most common intraocular malignancies, usually located in the choroid. Lung cancer has been demonstrated to metastasise to the eye, although rarely is this the first manifestation of the disease. Intraocular metastases are a significant clinical problem to consider.

Looking in vein; an unusual case of superior vena cava syndrome.

Dr Emma Keelan, ST4, Respiratory Medicine

Introduction: A 69 year old gentleman presented with a 3 month history of facial and upper limb swelling. Past medical history included tachy-brady syndrome requiring pacemaker insertion 6 months prior. Regular medications included Apixaban. Examination noted dilated neck and chest veins. Pemberton's sign was positive. Chest radiograph and CT chest were normal. An echocardiogram demonstrated no abnormalities. Urinalysis was negative for protein and renal function normal.

Autoimmune and myeloma screens were negative. A CT abdomen was completed, suggestive of amyloid yet rectal fat biopsies were negative.

The patient was commenced on dexamethasone and his Apixaban stopped after concern regarding oedema as rare side effect. The patient noted no symptomatic improvement. Subsequently a venogram demonstrated SVC obstruction secondary to clot formation around the patient's pacemaker wires.

Discussion: Superior vena cava (SVC) syndrome is a rare but serious complication following pacemaker implantation. Deposition of fibrin on pacemaker leads can result in vessel wall inflammation, fibrosis and thrombus formation. Most patients remain asymptomatic due to the formation of collateral vessels, however in those with venous occlusion facial and upper extremity swelling, exertional dyspnea, headache and visual changes are reported. Treatment options include percutaneous transluminal angioplasty, implantation of metallic stents, thrombolysis, mechanical thrombectomy, and venous grafting.

Small bowel obstruction secondary to Intragastric Balloon Migration: A case report.

Dr Wael Fadel, CT1, Core Surgery

Abstract: Due to the increasing prevalence of obesity in western society, we have encountered newly innovative methods and modalities used for treatment of obesity; unfortunately this also means increasing number of complications associated facing physicians.

The need for physicians to educate themselves and familiarize with these side effects and complications of each option and the presenting complaints and symptoms associated with each as well as differential diagnosis that should be easily missed.

Case Report: We report on a 27 year old female which presented with small bowel obstruction secondary to migration of an intragastric balloon. She presented to emergency department with crampy abdominal pain and post

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prandial vomiting for three days. The patient had undergone an Intragastric balloon insertion 7-8 months prior to her presentation.

After confirming diagnoses with investigations sure as abdominal X-rays, computed tomography (CT) scan; Mechanical small bowel obstruction secondary to impacted foreign body within the mid ileum and conservative management was felt appropriate for 48 hours. The patient later underwent a laparotomy and balloon extraction.

Discussion: Most medical literature and recommended guidelines from producing manufacturer's advise strict adherence to removal of intagastric balloon after 6 months to prevent complication such as acute pancreatitis due to over inflation, gastric perforation and balloon spontaneous deflate which leads to migration.

Furlow Palatoplasty versus Intravelar Veloplasty: Multicentre retrospective review of 5 year speech outcomes for submucous clefts and clefts of the soft palate.

Mr Tomas O'Neill, ST8, Plastic Surgery

Aims and Objectives: Our aim was to analyse the 5-year speech outcome data in patients who had undergone either Furlow Palatoplasty or Intravelar veloplasty (IVV), between 2004 and 2010 for sub-mucous (category S) and soft palate clefts (category D). We wanted to compare the outcomes for the two techniques in order to assess if one technique achieved better results or not, and if any difference was statistically significant.

Material and Methods: A retrospective review of the 5-year CAPS-A speech outcomes was collated when inclusion and exclusion criteria were applied. Syndromic and non-syndromic children were included. Data was included from four specialist cleft units across the UK. The speech outcomes were consensus listened as per normal departmental protocol.

Results: Excellent speech outcomes were achieved in the Furlow Palatoplasty group for both syndromic and non-syndromic children.

Discussion and Summary: Furlow palatoplasty is a safe and reliable method to repair sub-mucous clefts and clefts of the soft palate. It produces excellent speech outcomes and has been shown to be superior to IVV in the literature for these cleft types.

The management of benign and malignant strictures with Colonic Stenting.

Dr Sinead McNally, CT2, Core Surgery

Introduction: Colonic stenting is a recognised treatment of acute and subacute obstruction in benign and malignant strictures. We assessed the efficacy within our Health Trust.

Methods: A retrospective review of all colonic stents inserted between May 2005 - January 2017 in the Southern Trust N.I. was performed. The indication, technical success, and complications were analysed.

Results: 59 patients underwent 62 colonic stents. Nine were emergency procedures and 53 elective. The number of stents inserted for colorectal cancer was 54(87%), seven (11%) had benign strictures, and one(2%) had an invading ovarian tumour.

Stenting was indicated for palliation in 50 (81%) patients, and five (8%) patients had stenting as a bridge to surgery. The technical success rate was 96.6%. Complications included two (3.4%) perforations, six (10.3%) stent migrations, and three (5%) developed tumour overgrowth. 49 (79%) stents were successful and didn't require further intervention. 13 (21%) required further procedures either stenting or surgery, and two(3%) of these were performed as an emergency. There was no stent associated mortality.

Discussion: Within our department, colonic stenting has been shown to be an effective and safe procedure, reducing the number of patients requiring surgical intervention and providing successful palliation of colonic obstruction.

Bilateral Thigh Pain

Dr Keith McPartland, CT2, Core Medicine

Case: A 28-year-old lady was referred with bilateral thigh pain, difficulty walking, and dark urine 48 hours after participating in her first spinning class. Examination showed bilateral reduced knee flexion and extension, tense, tender thigh muscles, with intact pulses and sensation. Her renal function was normal, with a serum creatine kinase (CK) concentration of 609 700 U/L. She received aggressive rehydration, was referred urgently to the surgical team, and underwent emergency bilateral thigh fasciotomy

Discussion: Exercise-induced rhabdomyolysis has been linked to spinning, and the risk has been reportedly related to adequacy of physical conditioning of subjects and the duration and intensity of exercise (1). There is wide variation in patient presentation, but the majority have pain and reduced power and movement post-exercise. There is a recognised "first class" phenomenon, where the risk of rhabdomyolysis is higher in new spinning attendees (2).

Reliance on the presence of neurovascular compromise as a diagnostic criterion for CS can be misleading (4), as in this case, where the affected muscle groups had no major neurovascular component.

Conclusion: With the growing popularity of spinning, acute physicians need to be aware of this condition to avoid catastrophic complications.

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Ulster Med J 2018;**87(3):**216-217

Abstracts

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

Wednesday 11 April 2018, Wellcome-Wolfson Institute for Experimental Medicine

OVERVIEW

QUB SCRUBS hosted the Student Research Symposium providing a forum for medical and dental students across all year groups to present research conducted during student summer studentships and intercalated degrees. Twenty students submitted abstracts for poster or oral presentations. Speakers at the symposium included Professor Peter Maxwell, Clinical Academic Training Programme director and Dr Michael Corr, Academic Foundation Year 2 trainee. The three prize winning abstracts were presented by medical students Ger Mullan, Sinead Donnelly and Dharsshini Reveendran. The symposium was organised in collaboration with staff from the School of Medicine, Dentistry and Biomedical Sciences and was made possible by support from Queen's University Belfast, the Medical Defence Union and the Wesleyan company.

FIRST PRIZE

Inflammasome Expression in Healthy and Diseased CNS

Ger Mullan, Samara Fleville, Daniel Crooks, Denise Fitzgerald, Yvonne Dombrowski

Centre for Experimental Medicine, Wellcome-Wolfson Institute for Experimental Medicine, Queen's University Belfast

Background: Damaged and foreign material pose a threat to our body. The innate immune system can recognise these 'danger signals' and rapidly mount a response to eliminate that threat. Sensing danger causes the formation of the inflammasome, which generates and releases pro-inflammatory cytokines interleukin-1β (IL-1β) and interleukin-18 (IL-18) out of the cell. These cytokines stimulate the innate and adaptive immune response to the threat.

Inflammasomes are thought to be involved in Multiple Sclerosis (MS). MS is a chronic demyelinating disease that can cause serious neurological disability, often leaving patients wheelchair-bound within 20 years of diagnosis. Experimental autoimmune encephalomyelitis (EAE) is a mouse model used to study MS pathology.

The aim of this study was to characterise and compare the expression of inflammasomes in both healthy and diseased CNS in mouse models of MS.

Methods: Spinal cords were perfusion-harvested from adult healthy and EAE C57BL/6 mice. 14µm sections were prepared using a Leica CM1950 Cryostat. Sections were immunofluorescently stained for inflammasome markers such as AIM2 and NLRC4, and imaged using a Leica DMi8 inverted epifluorescent microscope.

Results: AIM2 is expressed in healthy CNS in both grey and white matter, however, expression was low and scarce, whereas NLRP3 is not expressed in healthy CNS. In contrast, inflammasome proteins such as AIM2 and NLRC4 are highly expressed in EAE tissue. Interestingly, NLRC4 is differentially expressed in white and grey matter in both healthy and diseased spinal cord tissue.

Conclusions: This work demonstrates differential expression of inflammasomes that may correlate with the role of inflammasomes in healthy and diseased CNS. Future work will involve identifying the role of inflammasomes in CNS homeostasis and demyelination using a lysolecithin-induced disease model, which allows distinguishing between stages of demyelination and remyelination.

Acknowledgements: This study was funded by grants to YD (the Royal Society, the Fritz-Thyssen Foundation, the Leverhulm Trust).

SECOND PRIZE

The role of the Glucocorticoid Receptor (GR) in Triple Negative Breast Cancer (TNBC) in response to DNA damaging chemotherapy treatment

Sinead Donnelly, Paula Haddock, Niamh Buckley

Centre for Cancer Research and Cell Biology, QUB and School of Pharmacy, QUB

Background: Triple negative breast cancer (TNBC) is a type of breast cancer that does not express the oestrogen receptor (ER), the progesterone receptor (PR) and does not have amplification of the human epidermal growth factor receptor 2 (HER-2). It is an aggressive form of breast cancer which has poor clinical outcomes. Currently, the standard of care for TNBC patients is DNA damaging chemotherapy, which has a variable response rate. This study aims to evaluate the role of

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the androgen receptor (AR) and the glucocorticoid receptor (GR) in TNBC, and their ability to modulate DNA damaging chemotherapy and anti-microtubule agents.

Methods: GR expression was evaluated through in silico analysis using in house and external data sets. TNBC cell lines were modulated, using both siRNA (ARsi and GRsi) and pharmacological modulation (GR agonist Dexamethasone GR antagonist Mifepristone, AR antagonists Bicalutamide and Enzalutamide). Statistical analysis was carried out using Prism 5.

Results: *In silico* analysis showed that high GR expression was associated with improved clinical outcome versus patients with low GR expression. In TNBC cell lines treated with DNA damaging agents, the GR agonist Dexamethasone increases sensitivity to chemotherapy. Dexamethasone is used to attenuate chemotherapy related side effects in TNBC patients, and may therefore be modulating response. Conversely, in TNBC cells treated with anti-microtubule agents, Dexamethasone decreased sensitivity to chemotherapy.

Conclusions: This study recommends that TNBC patients receiving DNA damaging chemotherapy may benefit from the addition of Dexamethasone. Those receiving anti-microtubule agents should be given an alternative anti-emetic, as Dexamethasone reduced sensitivity to this chemotherapy.

Acknowledgements: Funding provided by CCRCB, Queen's University Belfast

THIRD PRIZE

Do nutrient and health claims have an impact on the perceived healthiness and the amount of food/meals eaten by adults on the island of Ireland? An experimental breakfast study

Dharsshini Reveendran, Sinead Watson, Tony Benson, Michelle Spence, Moira Dean & Jayne Woodside

Centre for Public Health and Institute for Global Food Security, Queen's University Belfast

Background: A previous study has demonstrated that when people thought they were eating a low-calorie milkshake (versus a high-calorie labelled equivalent though same product) their physiological satiety, as measured by the gut peptide ghrelin, was consistent with what they believed they were consuming rather than the actual nutritional value (Crum et al., 2011). If replicated and shown for different food types this finding could have implications for nutrient and health claims labelling and advertising. The aim of the current study was therefore to replicate this experiment using a different type of food.

Methods: On two separate occasions, with an interval of one week in between visits, participants (N=50) were asked to consume a 380 calorie yoghurt and granola breakfast product under the pretence that it is either a 500 calorie 'indulgent' breakfast (high in fat and sugar) or a 250 calorie 'sensible' breakfast (low in fat and sugar).

At each visit blood samples were collected at three time-points to measure acylated ghrelin: after a 20-minute rest period (baseline), after 60 minutes (anticipatory) and after 90 minutes (post-consumption). Participants were asked to complete self-reported appetite measures (visual analogue scales) 10 minutes prior to each blood sample. During the first interval (between 20 and 60 minutes) participants were asked to rate the breakfast label based on its appearance and perceived healthiness, and during the second interval (between 60 and 90 minutes) participants were instructed to consume the breakfast product in its entirety within 10 minutes while rating the breakfast's sensory appeal.

Results : From anticipatory to post-consumption participants reported a significantly higher mean change in self-reported fullness score (i.e. feel fuller) for the 'indulgent' breakfast than the 'sensible' breakfast (mean change difference: 7.19 [95% CI: -0.73, 13.6]; P = 0.030). This relationship was not observed between baseline and post-consumption time points, or for the other self-reported appetite measures (hunger, satiety, quantity could eat and desire strength to eat) at any of the time points. Mean change in acylated ghrelin was not significantly different between the breakfasts at any of the time points.

Conclusions: This experimental study demonstrated an increase in self-reported fullness after consuming the 'indulgent' breakfast compared to the 'sensible' breakfast. A physiological response, however, was not observed as mean change in acylated ghrelin was not significantly different between the breakfasts.

Acknowledgements: This study was funded by Safefood

Fig 1. SCRUBS Research Symposium Prize winners (L-R) Dharsshini Reveendran, Ger Mullan and Sinead Donnelly.

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Ulster Med J 2018;**87(3):**218-222

Abstracts

Ulster Society of Internal Medicine
96th (Spring) Meeting
Friday 18th May 2018

Altnagelvin Hospital

ROYAL COLLEGE OF PHYSICIANS AND SURGEONS OF GLASGOW

PROGRAMME

2.00 pm **Assessing the vitamin B12 status of adults with type 2 Diabetes Mellitus on metformin.**

GE Aldworth, JS Hamilton, JV Woodside. Belfast HSC Trust and Queen's University, Belfast.

2.15 pm **A Northern Ireland First**

J Growcott, N McKeag, L Campbell, N Divine, D McCall. Pulmonary Arterial Hypertension Service, Belfast Health and Social Care Trust

2.30 pm **Spontaneous Pneumothoraces as a Presenting Feature of Birt-Hogg-Dubé Syndrome**

R McMullan, D Eedy, R Convery. Craigavon Area Hospital, Southern Health & Social Care Trust, Northern Ireland, UK

2.45 pm **Guest Lecture: "Role of the Royal College of Physicians and Surgeons of Glasgow in Modern Medicine."**

Dr. Richard Hull, Hon Secretary, RCPSG.

3.15 pm **Afternoon Tea** and **Poster Viewing**

Refreshments sponsored by ***Pfizer*** **(Representative: Claire Stewart-Frew).**

Poster 1 **Right Antibiotic, Right Patient, First Time: Using quality improvement methodology to improve antibiotic prescription practice within acute medical unit.**

SL McKenna, C Gormley, S Prabhavalkar. Altnagelvin Area Hospital, Londonderry.

Poster 2 **Two cases of Dermatomyositis with a variable clinical course**

S McDonald, JA Henderson, R Friel, W Yau and P Gardiner. Department of Rheumatology, Western Health and Social Care trust, L'Derry, UK

Poster 3 **Epidemiological studies of idiopathic intracranial hypertension and national obesity prevalence.** Gavin McCluskey, Mark O. McCarron. Departments of Neurology, Royal Victoria Hospital, Belfast and Altnagelvin Hospital, Derry

3.40 pm **Grand Rounds: Cases from Altnagelvin Hospital.**

3 quick-fire cases

4.10 pm **Variable Diagnostic Accuracy In Reading ECGs In A Nurse-Led Primary Pci Pathway**

Canning A, McNeill AJ, Aleong G, Bond RR, Finlay DD, Peace A. Department of Cardiology, Altnagelvin Hospital and Ulster University, Belfast

4.25 pm **Pericardiocentesis in a tertiary cardiology centre**

PF Brennan, C McQuillan, J Crawford, NA Herity, MS Spence. Royal Victoria Hospital, Belfast Health and Social Care Trust, Belfast, UK

4.40 pm **Guest Lecture: "Cardiac MRI – what the general physician needs to know."**

Dr Monica Monaghan, Consultant Cardiologist, South West Acute Hospital.

5.10 pm Presentation of prize for the best abstract.

2PM ORAL

ASSESSING THE VITAMIN B12 STATUS OF ADULTS WITH TYPE 2 DIABETES MELLITUS ON METFORMIN.

GE Aldworth[1], JS Hamilton[1], JV Woodside[2], Clinical Biochemistry, Belfast HSC Trust, Belfast[1]; Nutrition Group, Queen's University, Belfast[2].

Peripheral neuropathy is common in diabetes and in the B12-deficient. There is no gold standard for laboratory assessment of B12.[1] Serum methylmalonic acid (MMA) and holotranscobalamin (HTC) are second line tests recommended by British guidelines.[2] The hypoglycaemic agent, metformin, causes B12 deficiency by reducing absorption.

The aim was to compare 3 methods for assessing B12 using samples from diabetes patients on metformin, to improve the detection of patients with metformin-induced deficiency.

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200 participants were recruited and samples frozen at -70°C within 24 hours. 60.6% were female. Ages ranged between 30 and 90 years. Average daily dose of metformin was 1.8g and average duration of the drug was 9 years. Immunoassay was used for serum B12 and HTC analysis and LCMS/MS (liquid chromatography and tandem mass spectrometry) for serum MMA. All methods validated before sample analysis.

10.6% were considered B12 deficient by serum B12, 8.9% by HTC and 12.2% by MMA.

Statistical analysis was by Kappa statistic and McNemar's Chi-squared. The tests did not always agree which patients were deficient. 50% of those with low serum B12 had low HTC, and 41.2% with low B12 had high MMA. 42.9% of those with low HTC had elevated MMA and 28.6% of high MMA samples had low HTC.

More people with B12 deficiency were diagnosed in this study using 3 tests than would have been by using one test alone. It may be beneficial to measure B12 as first line, then add in a second to confirm (HTC or MMA).

Yetley EA, Pfeiffer CM, Phinney KW, Fazili Z, Lacher DA, Bailey RL, et al. Biomarkers of vitamin-B12 status in NHANES: A roundtable summary. American Journal of Clinical Nutrition. 2011; 94 (suppl): 313S–321S.

Devalia V, Hamilton MS, Molloy AM. Guidelines for the diagnosis and treatment of cobalamin and folate disorders. British Journal of Haematology. 2014; 166: 496-513.

2.15PM ORAL

A NORTHERN IRELAND FIRST

J Growcott, N McKeag, L Campbell, N Divine D McCall.

Pulmonary Arterial Hypertension Service, Belfast Health and Social Care Trust.

Pulmonary arterial hypertension (PAH) is characterised by an occlusive vasculopathy of small pulmonary arteries. This process increases pulmonary vascular resistance and is associated with significant mortality due to right ventricular failure [1].

Heritable PAH has been described and may be linked to pathogenic mutations of the bone morphogenetic protein receptor 2 gene (BMPR2) [1]

We describe a brother and sister who within 12 months of each other had identical clinical presentations with PAH. The proband was shown to be heterozygous for a pathogenic mutation in BMPR2, a finding replicated in his sister. This is Northern Ireland's first family with PAH due to a BMPR2 mutation.

A further sibling (MME) presented with shortness of breath but resting 12 lead ECG, serum NTproBNP and transthoracic echocardiogram were all normal. In line with ESC/ERS guidelines[2], we concluded there was a low probability of PAH. However, this individual was shown to carry the familial BMPR2 variant and we proceeded to right heart catheterisation. Findings were consistent with PAH (Table 1). We initiated pulmonary vasodilator therapy with subsequent improvement in the patient's symptoms and 6 minute walk distance.

The availability of genetic testing in this family has provided a novel paradigm for early diagnosis of PAH which is beyond that outlined in recent international guidelines.

Table 1.

Right heart catheterization findings for patient MME.

Mean pulmonary artery pressure (mmHg)	28
Mean pulmonary wedge pressure (mmHg)	11
Cardiac Index (L/min/m^2)	2.6
Pulmonary Vascular Resistance (Wood Units)	4.4

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230PM ORAL

SPONTANEOUS PNEUMOTHORACES AS A PRESENTING FEATURE OF BIRT-HOGG-DUBÉ SYNDROME

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Birt-Hogg-Dubé Syndrome (BHDS) is a complex genetic condition classically involving the lungs, kidneys and skin. It is exceptionally rare with only 600 families worldwide identified. It is named after the three physicians who initially described the syndrome in 1977.

BHDS is inherited in an autosomal dominant manner and is caused by constitutional mutations in the *FLCN* gene. *FLCN* is a tumour suppressor gene which codes for the protein folliculin (1). Aberrant folliculin predisposes individuals to fibrofolliculomas in the skin, multiple lung cysts with associated spontaneous pneumothoraces and an increased risk of renal cancer.

Lung cysts are evidenced in approximately 67%-90% of patients with BHDS. It is estimated that 40% will develop a spontaneous pneumothorax; a significant number of these patients will experience recurrent pneumothoraces. Studies have identified a pneumothorax recurrence rate as high as 75% (2).

We report on two confirmed cases of BHDS who presented to our unit with pulmonary manifestations. Both patients presented with spontaneous pneumothoraces; one patient had a family history of BHDS, whereas the other was an

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index case. Due to the risk of recurrent pneumothoraces both patients elected to undergo pleurectomy, bullectomy and pleural ablation. Patients' family members have been referred for genetic counselling. Moreover, the patients have been referred for regular imaging of their renal tracts due to the increased risk of renal cancer.

Due to the significant clinical sequalae of this condition, it is important that a diagnosis of BHDS is considered in patients with cystic lung disease and spontaneous pneumothoraces.

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4.10PM ORAL

VARIABLE DIAGNOSTIC ACCURACY IN READING ECGS IN A NURSE-LED PRIMARY PCI PATHWAY

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The Electrocardiogram (ECG) remains as the crucial tool to diagnose acute ST-elevation myocardial infarction (STEMI). Activation of the cardiac catheterization team to perform Primary Percutaneous Coronary Intervention (PPCI) largely depends on the interpretation of the ECG at the time of first medical contact with the patient.

We sought to ascertain the impact ECG based decisions have on the PPCI pathway and specifically on clinical outcomes.

ECG and clinical data were retrospectively reviewed for consecutive patients referred to the PPCI pathway over a 12-month period as part of a continuous audit.

A total of 579 patients were referred to the PPCI pathway over the 12-month period. 383 referrals (66%) were turned down for PPCI, predominantly on the basis of lack of diagnostic criteria. All turndowns were considered appropriate. The ECG machine suggested an ischaemic diagnosis in 164/169 (Sensitivity=97%) of patients with STEMI and 174/302 (1-Specificity=58%, Specificity=42%) of the turndown cases (patients with a final diagnosis of ACS/angina were excluded from the turndown group when calculating machine specificity). The STEMI group were significantly younger that the turndown group (62 ± 13 vs. 67 ± 17, $p<0.01$) with higher mortality in the turndown group at 12 months (15.2% vs. 10.7%).

ECG interpretation by referrers in this nurse-led primary PCI pathway is sub-optimal. The high rate of false positives in ECG machine diagnoses in the turndown group could be an influencing factor in the human-decision making. There is a need to find ways to improve ECG interpretation, particularly in a time critical PPCI pathway.

425PM ORAL

PERICARDIOCENTESIS IN A TERTIARY CARDIOLOGY CENTRE

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Pericardiocentesis is an essential diagnostic and therapeutic intervention for both acute and chronic pericardial effusions and should be performed in a controlled environment with appropriate imaging guidance.

All 40 consecutive pericardiocenteses, performed in 2016 in our interventional cardiology unit, with on-site cardiac surgery, were reviewed.

60% (n=24) were performed during normal working hours with 40% (n=16) occurring out of hours. 75% (n=30) were performed within 24hours of referral. 90% (n=36) of patients had signs of cardiac tamponade prior to pericardiocentesis.

45% (n=18) patients had developed a pericardial effusion post either cardiac surgery or an interventional procedure. Recent cardiac surgery or complex PCI represented the majority of these cases (n= 7, 5 respectively).

Pre-existing use of oral anticoagulation (OAC) was associated with the largest effusion diameter at 35.9mm (overall mean 29mm, IQR 20-38mm).

22.5% (n=9) of patients had a neoplastic aetiology, confirmed by pericardial cytology, with lung cancer being the most commonly seen malignancy (n=5).

27.5% (n=11) of pericardial effusions were presumed to be inflammatory in aetiology although all effusion samples sent for microbiological or viral analysis were negative.

The mean amount of pericardial fluid drained initially was 563ml (IQR 250-750ml). Fluoroscopy and TTE was used for all patients.

One patient died after right ventricular perforation, despite attempted rescue cardiac surgery. There were no other major complications observed.

In conclusion, pericardiocentesis was performed safely, under appropriate procedural settings, in our centre with only one major complication. The majority of pericardiocenteses were performed with therapeutic intent, in patients with signs of tamponade.

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POSTER 1

RIGHT ANTIBIOTIC, RIGHT PATIENT, FIRST TIME: USING QUALITY IMPROVEMENT METHODOLOGY TO IMPROVE ANTIBIOTIC PRESCRIPTION PRACTICE WITHIN ACUTE MEDICAL UNIT.

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Antimicrobial agents are amongst the most commonly prescribed medications in hospital[1]. Their inappropriate prescription poses a significant risk to patients, increasing morbidity and mortality. It also leads to drug resistant organisms which can be challenging and expensive to treat[2].

Using the Western Trust's Antimicrobial Policy as a standard, we aimed to improve our antibiotic prescribing practice and achieve 100% compliance by June 2016. We adopted a multidisciplinary team approach to generate ideas and implement various quality improvement PDSA (Plan-Do-Study-Act) interventions.

Data was collected prospectively on the first Thursday of each month and included all patients receiving antibiotics on that day. A detailed review of case-notes and drug charts was made to check for compliance with the policy and a run-chart was used to display the trend of results along with various interventions.

A baseline compliance level of 58% was observed indicating a strong need for improvement. We subsequently introduced various PDSA cycles of interventions including weekly microbiology team ward rounds, periodic departmental education sessions and development of a check-list as part of the ward-round proforma.

Overall we observed a positive trend with each intervention and we found that incorporating the checklist on our ward-round proforma was most significant in consistently ensuring compliance above 80%.

This project shows that a multi-pronged approach is required to improve antibiotic prescribing practices.

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POSTER 2

TWO CASES OF DERMATOMYOSITIS WITH A VARIABLE CLINICAL COURSE

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Dermatomyositis and Polymyositis are an infrequent presentation with an incidence of two per 100,000 annually in the general population[1]. Our two simultaneous cases serve to highlight the heterogeneity of the disease in terms of aetiology and clinical course.

Case 1.

A 73 year old female was transferred from the Cayman Islands with a three week history of profound muscle weakness, impaired swallow and a rash. Creatinine Kinase levels were above 20,000. An MRI and muscle biopsy was consistent with an inflammatory myopathy. An extended myositis panel showed Mi2 antibody positivity. She had already been treated with intravenous methylprednisolone and commenced on 60mg prednisolone. She had persistent core and bulbar weakness, along with elevated creatinine kinase levels. She was treated with Rituximab. Ten days post treatment she developed clinical heart failure and chest sepsis. An Echocardiogram was unremarkable but her BNP was 3749. She was admitted to ICU requiring ventilator support.

Case 2.

A 78 year old man was admitted with a three week history of proximal muscle weakness and a rash. Creatinine Kinase levels were 2316. An MRI and muscle biopsy was consistent with an inflammatory myopathy. He developed type one respiratory failure and was commenced on optiflow. He received intravenous methylprednisolone and subsequently oral prednisolone 60mg. His respiratory function, rash and muscle weakness all normalised. A CTCAP showed a right upper lobe lung carcinoma. Further treatment is planned post bronchoscopy and histology. He was discharged on a reduced dose of prednisolone at 40mg until review.

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POSTER 3

EPIDEMIOLOGICAL STUDIES OF IDIOPATHIC INTRACRANIAL HYPERTENSION AND NATIONAL OBESITY PREVALENCE

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Background: Idiopathic intracranial hypertension (IIH) is positively associated with obesity, mostly in young women. The global increase in obesity may influence the burden of IIH.

Methods: Using PubMed, Embase, Medline and Web of Science databases a meta-analysis and systematic review of epidemiological studies of IIH was performed up to June 2017. Temporal changes in IIH incidence were measured and

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incidence rates of IIH were correlated with country-specific WHO obesity rates. Prevalence data and shunting rates of IIH were recorded. The quality of epidemiological studies was assessed using the STandards of Reporting Of Neurological Disorders (STROND) criteria.

Results: In 15 identified studies there were 889 patients (87% women), mean age 29.8 years. The incidence of IIH ranged from 0.03 to 2.36 per 100,000 per year. Pooled incidence of IIH was 1.20 per 100,000/year although there was very high heterogeneity (I^2 98%). The incidence rates of IIH were correlated with country-specific prevalence of obesity (Spearman's correlation 0.82, $p < 0.01$). Prevalence of IIH was rarely recorded. A shunting procedure was reported in 8% of patients. STROND criteria were variably reported, median of 26.5 of 43 (range 16 to 33).

Conclusions: IIH is a public health concern as increased obesity prevalence is associated with increased incidence of IIH. Better quality of epidemiological studies is required to improve understanding of IIH and inform health policy for IIH management and prevention.

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Volume 87 No. 3 **September 2018**
ISSN 0041-6193

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