Ulster Med J 2019;**88(2):**133-135

Abstracts

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

Wednesday 3 April 2019, Wellcome-Wolfson Institute for Experimental Medicine

OVERVIEW

QUB Scrubs hosted the Student Research Symposium providing a forum for medical and dental students to present research conducted during student summer studentships and intercalated degrees. Fourteen students submitted abstracts for moderated poster presentations that were judged by Professor Roy Spence and Professor Peter Maxwell. Speakers at the symposium discussed mentoring (Professor Jayne Woodside, QUB), intercalated degrees (Mr Sagar Kanabar, Final Year Medical Student, QUB), career paths (Professor Peter Maxwell, QUB) and clinical academic training (Dr Gerard Walls, ICAT fellow). The four prize winning abstracts were presented by medical students Michelle Doherty, James Cutlan & Rachael Allen, Chris Madden-Kee and Patrick McAleavey. 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

Trends of Prostate-Specific Antigen (PSA) testing in a UK region

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Background: The increase in prostate cancer incidence in Northern Ireland has been linked to a rise in the use of PSA testing despite this test not meeting the standards for cancer screening.

Aim: To determine the trends and patterns of General Practice use of PSA testing in Northern Ireland (NI) using population-based data.

Patients and methods: Data were collected on PSA tests in NI 1993 to 2016. Annual rates of PSA testing were calculated for age, test result and source. A sub-analysis of patients tested 2010-2016 by source, first tests and PSA result was performed.

Results: Over a million (1,391,509) PSA tests were performed in NI 1993-2016, increasing from 44 in 1993 to 93,108 in 2016. Over the past decade (2007 – 2016) PSA tests with levels <4ng/ml have increased 1.37 fold. Between 2010-2016, 608,036 PSA tests were performed on 190,755 patients. Over two thirds were requested from GP. Of first tests 39.2% ordered in GP occurred in men under 50 with 29.9% over 80 years. The majority (87.3%) of patients having a first PSA test requested by their GP had a result <4 ng/ml.

Conclusions: PSA testing has increased significantly in N. Ireland since 1993 with findings indicating testing in asymptomatic males and those considered outside the advised age ranges. The majority of demand for PSA testing is originating from primary care, mainly those receiving a PSA test for the first time. Consequently, prostate cancer is now being detected at earlier stages however with no change in mortality rates there is potential to create a large burden on men's health and wellbeing and also on the Health Service.

SECOND PRIZE

The use of a digital learning platform in improving medical student clinical skills in prescribing fluids

Rachael Allen, James Cutlan, Alexander Davey

Queen's University Belfast and Belfast HSC Trust

Objectives: To pilot and assess the potential educational value of a high-fidelity education tool for prescribing intravenous (IV) fluids with Medical Students.

Introduction: Currently, IV fluid prescribing is a routine task in clinical practice but remains poorly understood by Medical Students and Junior Doctors alike. There is an unmet need to redesign the way that this complex topic is addressed in undergraduate teaching. We are aiming to introduce an online, case-based learning environment as a widely available method of education in fluid management. Improving knowledge and experience in IV fluids will help improve clinical outcomes and patient safety.

Methods: Forty Queen's University Belfast Medical Students in years 3, 4 and 5 were invited to attend a fluid prescribing teaching event hosted by the Scrubs society.

The event included a brief presentation, followed by three clinical case studies accessed via the digital learning platform "Efluid chart", developed by a Consultant Anaesthetist. The case studies included hypotensive shock, small bowel obstruction and pancreatitis. The platform allows users to view a clinical synopsis, observation chart and fluid balance chart for each case, then create a fluid management plan. Once submitted, immediate and individual feedback is given on the prescription made based on the rate, volume, type of fluid used and additives. Summaries of the relevant clinical guidelines are also included.

The students that took part were invited to fill out surveys before and after the session. The questions in the pre-teaching survey focused on knowledge, experience and confidence in making fluid management plans and the methods by which students have attained their current knowledge of fluid prescribing. The post-teaching survey asked about knowledge, experience and confidence again, as well as if they felt that the session had improved their knowledge in the area.

Results: *Pre survey:* Prior to the event, 57.89% students said they had 'room for improvement' in their prescription of IV fluids. *Post survey:* Following the event, 73% of students reported that the event improved their knowledge of prescribing IV fluids.

Case examples: In relation to the severe, acute pancreatitis case, students showed a 10% positive improvement in reported lack of knowledge and/or experience in prescribing IV fluids.

Discussion: E-learning is a still developing area that has the potential to make learning resources widely available. The use of case-based learning with immediate constructive feedback can bridge the gap between theoretical study and clinical practice for Medical Students and Junior Doctors. This could be a useful tool in preparing the clinical community for digital transformation.

While the results of the survey have shown an improvement in the students perceived skills in fluid management, more development of the Efluid chart platform is required to maximise the learning potential. A larger and more varied case base would make the platform more accessible and useful to a wider range of healthcare professionals and undergraduates. Future development with nursing staff and clinical biochemists could make the platform useful for inter-professional learning.

Fig 1. SCRUBS Research Symposium Prize winners (L-R) Chris Madden-Kee, Patrick McAleavey, Michelle Doherty, Rachael Allen and James Cutlan

JOINT THIRD PRIZE

Use of Progestins in BRCA1 mutation carriers – are we increasing the risk of breast cancer?

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Background: Hormonal contraceptives containing synthetic progestins are routinely prescribed at a young age in women carrying mutations in the breast cancer susceptibility gene-1 (BRCA1). Progestins have been associated with increased breast cancer risk in BRCA1 mutation carriers but the biological mechanism of this association is poorly understood. The aim of this study is to investigate the effects of progestins on malignant transformation in BRCA1 heterozygous breast cells.

Methods: A BRCA1 heterozygous MCF10A normal breast epithelial cell line was treated with the progestin R5020 along with oestrogen for 12 weeks and monitored for changes in cellular proliferation, anchorage-independent growth, mutational status of TP53 and PTEN, DNA damage and cellular morphology.

Results: BRCA1 heterozygous cells had a significantly higher ($p<0.001$) number of double-strand break foci after 12 weeks of hormone treatment versus wild-type controls. There were also differences in cellular proliferation, anchorage-independent growth and cellular morphology but no features of true malignant transformation.

Discussion: This study provides further evidence that BRCA1 heterozygous cells are haploinsufficient for DNA damage repair. Better models are required to investigate the effects of progestin signalling on malignant transformation in BRCA1 heterozygous breast tissue, especially with regard to both RANKL signalling and androgen receptor interactions.

JOINT THIRD PRIZE

Haemophagocytic Lymphohistiocytosis-like syndrome reduces survival in patients with ARDS

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Table 1.

** p <0.05 compared to control*

Group	Control (n = 416 [81.4%])	High ferritin (n = 58 [11.4%])	High IL-18 (n = 54 [10.6%])
SOFA score	8.0 [6.0 - 10.0]	9.0 [8.0 - 12.0]*	11.0 [8.5 - 13.0]*
Ventilator-free days	15.0 [0.0 - 22.0]	0.0 [0.0 - 14.5]*	7.5 [0.0 - 21.0]
Mortality at 28 days	21%	38%*	35%*
Mortality at 12 months	32%	52%*	44%

Background: Haemophagocytic Lymphohistiocytosis (HLH) is a rare hyperinflammatory condition. Ferritin and IL- 18 are elevated in cases of HLH, however their role in the pathogenesis of HLH is not understood. Plasma ferritin and IL-18 are recognised biomarkers for HLH. In patients with sepsis, an HLH-like syndrome (HLH-LS) has been reported [1]. However, it is unknown if a similar HLH-like syndrome co- exists in patients with ARDS, and if it modifies outcomes in patients with ARDS.

Hypothesis: We hypothesised that an HLH-LS occurs in patients with ARDS, and that its presence is associated with increased mortality.

Methods: A post-hoc analysis of the HARP-2 clinical trial was undertaken. HARP-2 was a randomised, controlled clinical trial evaluating simvastatin in 540 patients with ARDS. Baseline plasma samples obtained were analysed for ferritin and total IL-18 using an enzyme-linked immunosorbent assay. Ferritin >4000 ng/mL or a total IL-18 >2500 pg/mL have been reported to have a high sensitivity and specificity for the diagnosis of HLH-LS. Patients with high ferritin or high IL-18 values were compared to a control group with normal ferritin and IL-18 values.

Results: 511 patients where baseline samples were available were included. High baseline ferritin was present in 58 (11.4%) patients. These patients had a higher baseline SOFA score, fewer ventilator free days (VFDs) and higher 28-day and 12-month mortality. High baseline IL-18 was identified in 54 (10.6%) patients. These patients had a higher baseline SOFA score and higher 28-day mortality. Although these patients also had fewer VFDs and higher 12-month mortality, these findings were not statistically significant (Table 1).

Conclusion: This post-hoc analysis demonstrates that an HLH-LS, identified by high ferritin or high IL-18, occurs in patients with ARDS. Furthermore, the presence of an HLH-LS with ARDS is associated with worse clinical outcomes. Identification of this co-existing HLH-LS might offer an opportunity to improve outcomes for this group of patients with ARDS.