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- Bariatric Surgery Tourism
- NI Healthcare Crisis
- Modern Slavery and Healthcare

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Ulster Med J 2024;**93(1):**1-2

Editorial

Cure sometimes, care always

David J Armstrong

Cure sometimes, treat often, comfort always. If not directly from Hippocrates himself, then certainly recorded by those who worked with him as a distillation of his attitude to being a doctor, as well as being reclaimed by others over the years, not least in the 19th century by Sir William Osler. And at a time when pharmacology and surgery were unknown, it is a testimony to the patient-centred care and integrity of Hippocrates and other doctors of the ancient world that Medicine became established as an honourable calling. Galen, working over 500 years later and facing the pullulating masses of Antonnine Plague times, managed to further confirm the bone fides of the medical profession by his constant visiting, even living with patients for periods, detailed attention to their diets, and genuine care for his charges (albeit in his specific case with an occasional eye on self-promotion and a decent fee). When almost all a doctor could do was care, caring was important.

Is it fair to say that the advancement of science and the development of evidence based drugs increased the risk of the central place of comfort and caring in the role of the physician becoming at best atavistic, at worst obsolete? Penicillin cured the infection whether given with humility or hauteur, and the perception that the doctor was now someone of actual power over disease can have done nothing for his or her humility.

But in the current healthcare climate, the chief danger to care in the surgery or ward is not supercilious belief in the power of science, but the pressures of burnout, stress, tiredness and despair facing many doctors. Taking one's time with the slightly deaf or slightly confused patient takes a little longer, adds a little stress to the day, pushes lunch a little further into the afternoon. Doctors who have prided themselves for years on always putting patient before self, who are known for their genial manner and bottomless patience with septuagenarian and medical student alike, suddenly find themselves reaching the very limit of their tolerance. Working every day in a service holding on by its fingertips, feeling undervalued, being demonstrably underpaid and then refused leave to attend a wedding or funeral, can easily push conscientious physicians into the zone where an encouraging word for a junior, or five minutes spent chatting to a frightened or lonely patient can seem an unnecessary waste. What difference does it make? Who notices? Who cares?

Most doctors will admit that, when starting out as students, the perhaps naïve desire to help people, and the satisfaction of being part of a historically respected profession motivated by the very best motives, were strong factors in choosing medicine as a calling. But we are not made of bronze. Professionalism is often described as what you do when no-one is watching. And ultimately no-one will know just how many times you explained the same thing to the confused patient, or whether you took enough time to break bad news to a relative, or whether you phoned the colleague out of politeness to say thanks for a favour done. Caring, patience, taking time, simply being a nice person, can be early casualties in a failing system, or in a failing psyche.

Last year, while seeing patients at a clinic running three quarters of an hour late, with new patients incorrectly booked in review time slots and a terrible headache, I was reflecting that at least, on that one morning, the medical student hadn't turned up to slow down progress further. Just on cue, the nurse came to the door and announced said student's arrival, almost two hours after the start time, with the inquiry as to whether or not I could accommodate their presence. And on that morning, I decided I could not, as my head was sore, the first patients irritable and the afternoon's teaching session already looming. And of course, at least the patients and I had managed to turn up on time.

If that student was you, I apologise. There were some excellent teaching cases, the patients were (so to speak) surprisingly patient and I was almost caught up by lunchtime. I took no time to ask if there was a good reason for your tardiness. I was stressed, tired and rather fed up, and did not fulfil my obligation to pass on my learning to you, as I promised to do when taking the Hippocratic Oath.

A few years previous, during the height of the COVID pandemic, I sat with another student in my clinic, she, I and the patient wearing full PPE, and I automatically helped the elderly man get dressed after the examination, even taking time to tie his shoelaces, which he would have struggled to do at the best of times without mask, gown and visor. I thought little of the act, as it is something I have often done. Later the same morning, I left the student with a patient as I went off to find the elusive tendon hammer, (of which all large teaching hospitals possess around one for every 50 doctors) and returned to find she had helped the patient undress, removing shoes and socks and assisting them on to the couch. When I thanked her afterwards, she told me that she had instinctively felt it was the thing to do, but had only done so after seeing my example, as she was still relatively new to the culture of the UK and the world of medicine, and unsure of exactly what the doctor's role was perceived to be.

Would it ever not be the doctor's role to help a patient tie their shoes if they were unable to do so? Would I have taken the time to do so at the recent clinic when I felt very acutely the stress of practicing while exhausted in the midst of a chaotic service? Do we remember the difference a single act can have on a patient, a colleague, a student?

There are some occasions when care, in the sense of sympathy, politeness and patience, must take second place to action, with every moment precious in the resuscitation room or managing the operating theatre haemorrhage. But it is vital that such relegation of the human side of medicine, the 'Art' as well as the 'Science' of the profession, does not become the default setting. If we ever fully recover from the effects of the COVID-19 pandemic on our service, if we ever see proper funding and leadership again in the health service in Northern Ireland, then let us all see to it that we still practice – and teach by example – comfort and care before all else. It might be the last aspect of our practice Hippocrates would recognise.

Ulster Med J 2024;**93(1):**3-4

Northern Ireland Healthcare Crisis

Continuing our series offering a platform to a wide range of doctors across Northern Ireland, reflecting on their current role, and the ongoing crisis in healthcare provision related to the COVID pandemic and political instability in the province. In this issue, three experienced general practitioners working outside Belfast give personal views on their careers and the challenges they face.

David J Armstrong, Editor

Having trained in Queens & completed my hospital years in Belfast I made the decision to return to my home county of Fermanagh in 2005. I always knew I wanted to live and practice rurally and during my GP registrar year my passion for family medicine was nurtured. My GP trainer, Dr Michael Smyth, was one of a few remaining single-handed GPs and instilled in me a true respect for the value of continuity of care. Patients of the small village practice were equally appreciative of seeing a Doctor who knew them and their families 'inside out'. Those halcyon days had sacrosanct 'whole team' tea-breaks around a cosy kitchen table and lunchtime home visits to farms - reminiscent of an episode of All Creatures Great and Small! Long before the advent of GP Federations Dr Smyth and his colleagues had recognised the importance of collegiality when they established the Fermanagh GP Association. This fostered close links between primary and secondary care and lunchtime hospital educational meetings allowed GPs and Hospital colleagues to learn together. Many clinical problems were often solved by a quick telephone call to a colleague for advice rather than a referral letter.

I have been a GP partner in Irvinestown now for fifteen years and have witnessed a lot of change in that time. With retirement of GPs and inability to recruit younger GPs maintaining continuity of care is being tested by the demise of smaller single-handed practices, practice mergers into large 'super-practices' and the necessary use of alternative 'rescue' contract holders. Out of 17 GP Federations in NI 7 areas have greatly benefitted from expansion of the Primary Care Multidisciplinary team (MDT) to include First Contact Physiotherapists, Social Workers and Mental Health practitioners. It is disappointing however that further roll out has stalled creating an inequitable divide between practices with and without MDT support. GP Federations have been instrumental in Primary Care workforce development. GP Pharmacists are now firmly embedded in all practices and are making a huge contribution to improving the efficiency, quality and safety of prescribing. Many Practices have also taken on the training of additional Practice Nurses & Advanced Nurse Practitioners(ANP). I am a GP trainer and within my practice we currently have two GP trainees, an ANP trainee and two year 3 University of Ulster medical students attached. Despite the workload and workforce pressures rural GPs are prioritising educational activities as they recognise the benefits of improved team morale and that it is essential to sustaining the primary care workforce.

I am fortunate over the years to have maintained close links with my secondary care colleagues in Southwest Acute Hospital. Gone are the days that we have time to travel into Enniskillen for lunchtime meetings but once a month we do make a commitment to get together virtually via the 'Mind the Gap' Project ECHO network. I co-chair this zoom meeting with Professor Max Watson and network participants across the primary-secondary care interface co-design an educational curriculum every year, sharing through case-based learning and providing peer to peer support and encouragement. Through the COVID pandemic this network moved to weekly meetings and became a lifeline for us all.

COVID indeed triggered a lot of change within primary care in that most patient contacts are now triaged on a daily basis with queries then more appropriately navigated to a range of healthcare professionals and admin staff. The role of the GP therefore has adapted to a more supervisory and leadership role mentoring colleagues, trainees& students. Another consequence of this filtering of demand is that the complexity of the GP caseload has increased. We are seeing frailer patients with multiple comorbidities in conjunction with polypharmacy, complex social problems and end of life care To reflect the fact that GPs are working at the top of their game some have advocated for a re-branding to 'Primary Care Consultant'. With so many other specialities becoming so sub-specialised I wonder if this could re-invigorate General Practice as the truly holistic speciality it is and encourage more new Doctors to enter GP training?

Irvinestown, the town in which I both live and practice, is a small town on the border of Fermanagh and Tyrone. Despite being an area of deprivation it has a very strong community ethos and we are fortunate to have the ARC Healthy Living Centre embedded at its core. Not long after moving home I was invited to sit on the board of this community organisation. I admit I was naïve about what this would entail. I had read about Michael Marmot and his teachings on social determinants of health but didn't realise how formative this journey would be. Working at the grass roots community level gave me a true grasp of health inequalities and population needs assessment and

spurred me to take up roles on the Local Commissioning Group and later Integrated Care Partnerships. Through the ARC I saw how problems such as addiction, post-natal mental health issues and food poverty were translated into local solutions of outreach clinics, Surestart programme, and Food banks to name just a few. Early exposure to such community organisations at student and GP trainee level has the potential to embed and normalise social prescribing into the consultation.

We are constantly hearing about cuts to the health budget but forget that so much of the activities that contributes to good health and wellbeing are provided by our colleagues in the community and voluntary sector and widespread cross-departmental budget cuts are having severe impact here too, particularly with regard to early intervention and preventative activities. I welcome the tentative steps that are being taken currently to move towards an Integrated Care System for Northern Ireland. This will bring together a range of partners to take collective responsibility for planning health and social care services with the aim of improving health and wellbeing and reducing health inequalities. There is no doubt that in the current financial and political environment this will be a challenging task but I look forward with enthusiasm to see the outworking's of this new way of working.

Ten years from now I envisage that Primary Care will look somewhat different. We may have to accept that there may not be a GP practice in every small village or town but the service we receive will be of high quality, outcome focused, delivered by a team of motivated multidisciplinary professionals and led by GPs (or Primary Care Consultants). There will be better integration of care with our community and voluntary partners. With more medical students having spent a greater proportion of their training in primary care there will be a greater research focus and a blurring of the primary/secondary care interface aided by joint multi-morbidity outreach clinics. This supportive learning environment will nurture trainees of all disciplines while providing care for our complex ageing population.

Dr Laura McDonnell

GP Partner
Irvinestown, Co Fermanagh

NI Health Care Crisis –A General Practice View – "A plague on all our houses?"

I have been a GP for over 30 years and for me it remains an exciting, stimulating and fulfilling job. When asked what GP's do I usually say GP's are **ACE** in that we manage the **A**cute, the **C**hronic and **E**verything else. No two days are the same and I still do (a few) out of hours sessions. Medicine and General Practice in particular is a career choice that I would absolutely recommend. That having been said it is clear that in recent times our health service is facing challenges, perhaps even a crisis, that potentially presents an existential threat to the NHS as we know it. The NHS was set up to provide comprehensive universal health care, free at the point of delivery, for everyone in society whatever their need. It has been said that to accomplish this "ranks as one of the greatest achievements of civilisation."[1]

General Practice has a national profile but local delivery. Almost every community has their local practice and people relate to that. General Practice is, or perhaps was, the front door and the shop window of the NHS. Much of what General Practice does is intangible and often hard to measure or quantify but the management of undifferentiated, undiagnosed, and often undiagnosable patients who are ill or who perceive themselves to be ill is the core skill and involves managing uncertainty and carrying a level of risk that makes a health service that is truly free at the point of delivery possible. There is ample research to demonstrate a direct correlation between the strength of a nation's primary health care system and enhanced health outcomes and a more cost-effective system as a whole.

Over the last 30 years, in my view, we have seen a loss of partnership working. We are struggling to hold on to core skills, attitudes, values, and behaviours. For a variety of reasons, our health service is less cohesive and there are real divides between and within secondary care, community services and primary care services. Even primary care itself is now splintered into "In Hours" and "Out of Hours" care. There are very real difficulties accessing General Practice and patients do genuinely feel that the NHS is less caring than it once was.

The situation will not be improved by fragmented thinking or by criticising individuals or specific groups. It is our NHS whether we are patients, politicians, policy-makers or indeed the professionals working in it. We need to find common cause and thereafter work in partnership to agree a clear vision that creates a "landing ground" agreed by all. We need to create systems that promote a continuum of care where patients move backwards and forwards along seamless pathways according to their need, aiming to make the idea of "teams without walls" [2] a reality. The demands of managing the pandemic demonstrated many successes that stemmed from a focus on partnership working.

Patients need to have a realistic expectation of what a service can and cannot provide. Politicians must provide leadership and articulate reality avoiding the temptation of a short term populist approach. Policy- makers need to ensure finite resources are used to optimum effect and champion evidence based long term strategic thinking. The professions must accept that while they are busy they may be busy doing the wrong things and that additional resources must come with enhanced productivity and consistency of outcome.

By way of illustration consider the unintended consequences of a strategy that was ill considered - "Free prescriptions". The outworking of this policy is

that every day practices are issuing prescriptions for items such as paracetamol, which can easily be bought in a local shop at a cost of a few pence. However, when processed through the mechanisms of a practice, issue of a prescription, pharmacy involvement and dispensing of the drug it results in a cost to the health service of perhaps £40-50.

In reality this means that for every 250 paracetamol scrips issued we could instead fund a total hip replacement operation. So simply stopping so –called "free" prescriptions for paracetamol would allow the NHS to provide 200 -300 more total hip replacements in Northern Ireland each year at no additional cost.

So what is the future for General Practice and by extension the NHS? I believe that General Practice and the wider NHS can have a bright future and that GPs can still be **ACE** if our focus is on providing **A**ccess, **C**ontinuity and **E**quity for our patients.

As a health service we are sometimes so busy doing the urgent, we miss the important. We must develop partnerships and proceed with vision, purpose, and courage. The degree to which we succeed could be a defining issue for our generation. As Abraham Lincoln said: "The best way to predict your future is to create it." As a society we must do better and we can do better if we all work in partnership to create that future because in the words of the song, "You don't know what you've got till it's gone."

Dr David J Johnston OBE
GP partner Cullybackey and Ahoghill
Clinical Director Dalriada Urgent Care

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A View from the Coalface

We have been cancelled.

Patients complain. ('She won't see me')

Appointments ('She sent me to a physio / pharmacist').

Waiting times ('He wouldn't do me a letter even though the secretary said it would help') Prescription shortages ('The HRT you gave me wasn't available').

PIP rejections ('They said your letter wasn't strong enough').

Too many antibiotics leading to resistance. ('She just throws antibiotics at you')

Not enough antibiotics ('She says everything is a virus')

Too many anti-depressants handed out 'willy-nilly'('She just looked at me and wrote a script')

Too many being people being sent for 'talking therapies' instead ('He gave me nothing')

Just as the remit of the GP is seemingly endless so too is the list of things we are seemingly responsible for.

The NHS is on its knees and we are all morally injured. We need to do the work on that collectively and revisit the simple act of collegiality and respect. We need to stop criticising General Practice - to each other, to our patients, to medical students.

So what is GP like for me?

I still love it and love my patients.

I love the continuity.

I am at the coalface and have agency.

Maybe it's that agency that encourages the discord.

I'm not wedded to a clipboard yielding manager.

I am lucky to have many Secondary Care colleagues as social contacts - this is what keeps me from professional despair - every time I ask for advice / support I feel their connection to my concern, my worry, my patient - it keeps me sane in these dark times.

I feel for the junior doctors – there are poor training environments, unstable teams, exhausted team leads, and ward round 'safaris' where education must be compromised. I can appreciate the issues my colleagues experience but I don't feel this is always reciprocated.

So, to be blunt, don't blame General Practitioners for all the ills of the NHS. Let's do the work folks, step up and look after each other. Doctors in conflict is exactly the narrative that enables the constructive dismantling of the NHS.

Be curious about my job, not judgemental!

Dr Nicola Duffy
GP Partner
Oakleaf Medical Practice, Derry

Ulster Med J 2024;**93(1):**6-11

Clinical Paper

Bariatric surgery tourism in the COVID-19 era

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Key words:
Bariatric surgery, Socioeconomic deprivation

ABSTRACT

Background

Since the start of the Covid-19 pandemic primary and secondary health care services in Northern Ireland have observed an increase in the number of patients who have had bariatric surgery outside of the UK. This study sought to estimate the frequency of bariatric surgery tourism and to audit indications, blood monitoring and medical complications.

Methods

All primary care centres within the Western Health Social Care Trust (WHSCT) were invited to document the number of patients undergoing bariatric surgery between January 1, 2017 and December 31, 2022. For one primary care centre, patients who underwent bariatric surgery were assessed against the National Institute of Health and Clinical Excellence (NICE) guideline indications for bariatric surgery. In addition, the blood monitoring of these patients was audited against the British Obesity and Metabolic Surgery Society (BOMSS) guidelines for up to two years following surgery. Medical contacts for surgical complications of bariatric surgery were recorded.

Results

Thirty-five of 47 (74.5%) GP surgeries replied to the survey, representing 239,961 patients among 325,126 registrations (73.8%). In the six year study period 463 patients had reported having bariatric surgery to their GP. Women were more likely to have had bariatric surgery than men (85.1% versus 14.9%). There was a marked increase in the number of patients undergoing bariatric surgery with each year of the study ($p<0.0001$ chi square for trend). Twenty-one of 47 patients (44.7%) evaluated in one primary care centre fulfilled NICE criteria for bariatric surgery. The level of three-month monitoring ranged from 23% (for vitamin D) to 89% (electrolytes), but decreased at two years to 9% (vitamin D) and 64% (electrolytes and liver function tests). Surgical complication prevalence from wound infections was 19% (9 of 44). Antidepressant medications were prescribed for 23 of 47 patients (48.9%).

Conclusions

The WHSCT has experienced a growing population of patients availing of bariatric surgery outside of the National Health Service. In view of this and the projected increase in obesity prevalence, a specialist obesity management service is urgently required in Northern Ireland.

Introduction

Obesity, defined as body mass index (BMI) greater than 30 kg/m^2, is becoming more prevalent and is the cause of an increasing burden of disease.[1] Obesity is associated with increased risk of type 2 diabetes mellitus, hypertension, obstructive sleep apnoea, certain cancers, fatty liver disease, gallstones, gastro-oesophageal disease, pregnancy complications[2] and idiopathic intracranial hypertension.[3] Individuals with obesity often experience stigma and bias, leading to increased risk of psychological and psychiatric morbidities. In addition, cultural blame, shame and assumptions about personal responsibility may influence the quality of health care for individuals living with obesity.[4] Worldwide age-standardised prevalence of obesity increased from 3.2% in 1975 to 10.8% in 2014 in men, and from 6.4% to 14.9% in women.[5]

In the UK, where a quarter of the adult population is obese there are four levels of tiered pathway in the management of obesity. Tiers 1 and 2 focus on population and preventive measures. Tier 3 is a multidisciplinary weight management service,[6] which may then result in referral to a tier 4 service for consideration of bariatric surgery.[7]

Bariatric surgery involves procedures such as gastric banding, gastric (Roux-en-Y) bypass and sleeve gastrectomy. Benefits of bariatric surgery include sustained weight loss, resolution or improved outcome from metabolic comorbidities as well as improved life expectancy.[8] It has also been associated with improved employment prospects.[9] Benefits are not equally distributed however; individuals who experience social isolation,[9] immigrants and urban populations achieve less weight reduction than others.[10]

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In the UK the National Institute of Health and Clinical Excellence (NICE) guideline on obesity management recommends that surgery is the option of choice for adult patients who have not responded to other measures and have a BMI of 40 kg/m2 or more, or have a BMI between 35 kg/m^2 and 39.9 kg/m^2 with other significant disease such as hypertension or type 2 diabetes mellitus.[11] Detailed guidelines for perioperative care to enhance recovery after surgery have emerged to reduce perioperative stress and maintain postoperative physiological functioning.[12]

The NICE guideline on obesity also recommends that for a minimum of two years the bariatric surgery team provide a follow-up care package which should include regular post-operative dietetic management and blood monitoring.[11] The National Bariatric Surgery Registry, which was established in 2009 facilitates the audit of bariatric surgery outcomes.[11]

There is no commissioned bariatric service in Northern Ireland, i.e. no tier 3 or 4 specialist obesity management service, which is a requirement of the NICE clinical guideline for obesity. As patients have increasingly learned of the weight loss potential of bariatric surgery, many have sought bariatric surgery outside the UK, finding cheaper alternatives to private procedures that are available in the UK. After bariatric surgery, these patients may return to the NHS primary care services seeking follow-up or, if required, emergency care. We and others have observed an increase in the number of Northern Irish patients returning from Turkey following bariatric surgery particularly since 2020.

We were interested in measuring the level of bariatric surgery tourism within the Northern Ireland Western Health and Social Care Trust (WHSCT), a geographically defined area with a stable population. In a service evaluation we surveyed primary care centres in the WHSCT to record annual bariatric surgery frequency over six years. For one urban primary care centre within the WHSCT, we assessed the NICE indications for bariatric surgery among patients, who had this surgery.[11] For the same primary care centre we also measured the quality of care as recommended by the British Obesity and Metabolic Surgery Society (BOMSS) guidelines for management of patients who had undergone bariatric surgery.[13]

Methods

Part A

Patients

A short survey was sent via e-mail to each practice manager of the 47 primary care centres in the WHSCT, inviting them to search their databases to abstract the annual number and sex of patients who had bariatric between January 1, 2017 and December 31, 2022. The General Practice list size was also requested. A reminder was emailed after two weeks. The survey closed after four weeks. Annual temporal trends were calculated using the total number of GP registrations in the WHSCT recorded in 2020.

Part B

Patients

To learn more about bariatric surgery patients, a single urban primary care centre with a population of 11,372 was studied in further detail. The primary care centre was chosen because two of the authors (DM and AML) work there. The population has been previously described.[14 15] The inclusion criterion for this part of the study was having a bariatric surgery procedure performed between January 1, 2015 and August 31, 2022. A search for patients who had bariatric surgery was performed on EMIS web, a clinical system widely used in primary care in the UK.[16] If bariatric discharge letters were not available in the primary care centre notes, these were requested directly from the relevant patients. Demographic details, pre-operative BMI and whether patients were prescribed antidepressant medication were recorded. Socioeconomic deprivation scores for different areas in Northern Ireland were derived from a ranking score based on multiple deprivation measures.[17] This ranks the super output areas in Northern Ireland from 1 (most deprived) to 890 (least deprived).[17] Surgical complications which required primary or secondary care management were documented.

NICE indication for bariatric surgery

The indication for bariatric surgery was measured against the most recent NICE guideline – BMI >40 kg/m^2 or BMI >35 kg/m^2 with co-existent hypertension or diabetes mellitus when other interventions have not been effective.[11]

Blood monitoring for bariatric surgery

The BOMSS guideline recommendations[13] assessed adherence to blood monitoring. The BOMSS guidelines were updated in 2020 and included good practice points of annual serum copper and zinc measurement for sleeve gastrectomy patients.[18] In the 2020 guidelines, measurement of parathyroid hormone was changed from annual to baseline checking. For each patient the medical record was reviewed to document the blood monitoring performance against the BOMSS guideline standard.

Statistical analysis

Descriptive analyses were used. Chi square for trend was calculated from Open Source Epidemiologic Statistics for Public Health (http://openepi.com/Menu/OE_Menu.htm).

Ethics

The study was approved as a service evaluation by the WHSCT Quality Improvement and Audit department.

Results

Part A

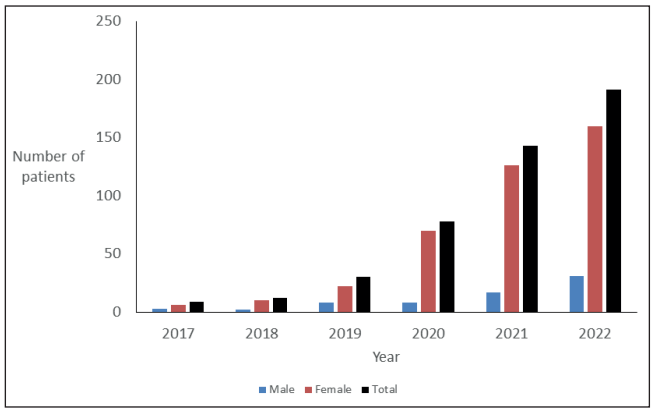

Figure 1. Bariatric surgery in Western Health and Social Care Trust 2017-2022 (N=463)

Thirty-five of 47 primary care centres (74.5%) in the WHSCT responded and reported the number of patients who had undergone bariatric surgery for the period between January 1, 2017 and December 31, 2022. This represented a surveyed population of 239,961 of the total GP registrations of 325,126 (73.8%) in the WHSCT.[19] From the surveyed population, 463 patients had reported bariatric surgery to their GP (Figure 1). More women (394 or 85.1%) than men (69 or 14.9%) had bariatric surgery. The frequency of bariatric surgery increased between 2017 and 2022 with a 10-fold increase in bariatric surgery in men (chi square for trend p<0.0001) and more than a 25-fold increase in bariatric surgery in women (chi square for trend p<0.0001).

Part B

The primary care centre study recorded bariatric surgery in 47 patients between January 1, 2015 and August 31, 2022. Forty-five patients had sleeve gastrectomies, one patient had gastric banding and one patient had a gastric balloon insertion. Only two of the 47 patients had their surgery performed in Northern Ireland, both in a private hospital.

The baseline characteristics of these 47 patients are highlighted in Table 1. There was a steep increase in the number of patients undergoing bariatric surgery from 2020 onwards (Figure 2), reflecting the pattern seen throughout the Trust. Similar to the overall Trust population study, the majority of the patients were women (n=40 or 85.1%). The mean age at the time of surgery was 39.2 years (SD 10.3), range 21.0 to 64.0 years. Thirty-two of the 40 women (80%) were under 50 years of age at the time of bariatric surgery.

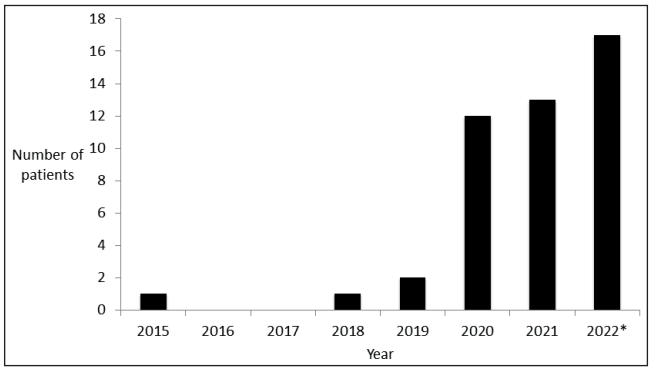

Figure 2. Annual number of patients undergoing bariatric surgery in one General Practice 2017-2022 (N=47, *until August 2022)

Table 1. Baseline pre-operative characteristics of bariatric patients in one primary care centre in the Trust

Patients	Number	Percentage
Number	47	
Female:Male	42:5	89:11
Mean age at surgery (SD) years	39.2 (10.3)	
Mean BMI (SD) kg/m^2	41.8 (7.8)	
Median multiple deprivation measure (range)	130 (6 to 808)	
Number with BMI>50 kg/m^2	7	14.9
Number with BMI≥40 and BMI<50 kg/m^2	13	27.7
Number with BMI≥35 and <40 kg/m^2 with hypertension or a diagnosis of diabetes mellitus in previous 10 years	1	2
Number fulfilling NICE criteria for bariatric surgery	21	44.7

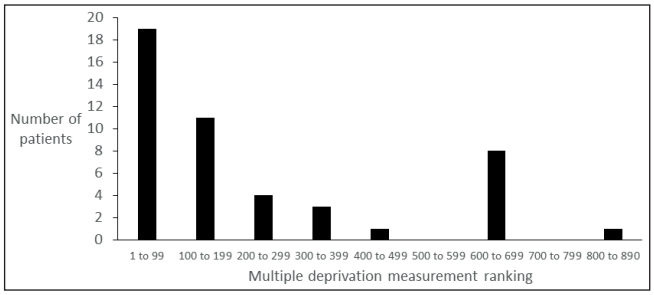

Figure 3. Ranking of multiple deprivation measurements for bariatric patients in one General Practice (N=47)

The median ranking for a multiple deprivation measure was 142 (range 6 to 808, Figure 3). Twenty-one of 47 patients (44.7%) fulfilled current NICE indications for bariatric surgery.

Blood monitoring

After bariatric surgery, patients were followed up for a mean of 1.3 years. Monitoring of blood investigations was analysed for patients who had sleeve gastrectomy (n=45) using the BOMMS guideline standard. All patients had at least some blood monitoring during the follow-up period. The proportion of appropriate blood monitoring decreased with time from surgery and common blood tests were more frequently monitored (Table 2).

Table 2. Blood monitoring adherence after sleeve gastrectomy in one General Practice (N=45)

Investigation	3 months	6 months	12 months	24 months
Full blood count	37/45 (82%)	14/31 (45%)	15/21 (71%)	8/11 (73%)
Electrolytes	39/45 (87%)	17/31 (55%)	15/21 (71%)	7/11 (64%)
Liver function tests	34/45 (76%)	13/31 (42%)	14/20 (70%)	7/11 (64%)
Ferritin	35/45 (78%)	14/31 (45%)	12/21 (57%)	3/11 (27%)
B12 & Folate	37/45 (82%)	15/31 (48%)	11/21 (52%)	5/11 (45%)
Bone profile	30/45 (67%)	13/31 (42%)	7/21 (33%)	4/11 (36%)
Vitamin D	10/45 (22%)	3/31 (10%)	0/21 (0%)	1/11 (9%)
Zinc			2/21 (10%)	1/11 (9%)
Copper			0/21 (0%)	1/11 (9%)
PTH		7/44 (16%)		

Complications of bariatric surgery

Nine of the 47 bariatric surgery patients (19%) from the primary care centre had a wound infection. One patient required 15 GP encounters and 28 Practice Nurse attendances (Table 3). Three (6%) patients required hospital admission.

Twenty-three of 47 patients (48.9%) were prescribed an antidepressant at the time of surgery.

Table 3. Bariatric surgery complications and use of post-operative healthcare in one General Practice

Complication/Health care contact	Number of patients N=47 (%)	Number of consultations
Wound issues including infection	9 (19%)	
GP consultations	26 (55%)	56
Treatment Room Nurse consultations	10 (21%)	55
Out of hours attendances	2 (4%)	2
Emergency Department attendances	4 (9%)	5
Hospital admissions	3 (6%)	

Discussion

Study findings

This study has demonstrated that among the WHSCT population of Northern Ireland a growing number of patients are having bariatric surgery abroad, with more than a 20-fold overall increase in the six years from 2017 to 2022. In one urban primary care centre in the WHSCT more than half of the patients who had bariatric surgery did not fulfil current NICE guideline criteria for the surgery. Wound infections were the most frequent immediate complications, occurring in almost 20% of patients. Nearly half of bariatric surgery patients had been receiving prescriptions for antidepressant medication, more than double the proportion of the population prescribed an antidepressant in Northern Ireland. The rapid rise in the popularity of bariatric tourism has coincided with the emergence of the Covid-19 pandemic.

Bariatric surgery tourism

Medical tourism is unregulated in the UK. In 2010 at least 63,000 individuals travelled abroad for medical treatments.[20] Postcode lottery services within the NHS have been just one factor cited among UK patients seeking bariatric surgery outside the UK. Globally the lack of affordable health care and long waiting lists are leading to greater levels of bariatric tourism.[21]

A national registry can provide data on important variables such as complications, long-term outcomes and the benefits of surgery in individuals over 60 years of age.[22] Although the NICE guideline for obesity recommends participation in the UK National Bariatric Surgery Registry,[11] patients undergoing bariatric surgery abroad are unlikely to be captured by this audit tool.

Patients may have undergone surgery without being aware of the UK NICE guidelines and the importance of having follow-up monitoring. The lack of any commissioned service in Northern Ireland may have prompted our patients to seek bariatric surgery abroad. Even when guidance exists, many patients still travel to circumvent regulations such as the strict BMI cut-off point required to qualify for publicly-funded surgery,[23] a feature that would have applied to more than half of the primary care centre patients in our study. Although not studied in the current study, social media appears to play a pivotal role in making people aware of, and promoting bariatric surgery.[24]

Surgical complications of bariatric health tourism have been previously reported in Northern Ireland.[25] Bariatric surgery tourism also poses important patient safety issues for many health care professionals from obstetricians involved in pregnancy management to pharmacists advising on non-steroidal anti-inflammatory medications. Bariatric surgery is also associated with an increased risk of epilepsy, emphasising the importance of learning more about long term outcomes.[26]

Blood monitoring is important for bariatric patients both within the first two years of bariatric surgery and beyond.[27] In our study, blood monitoring was not complete. NICE guidelines which recommend follow-up be co-ordinated by the operative centre for the first two years after surgery require "a structured, systematic and team-based review".[28] As longer-term follow-up (beyond two years) may default to the primary care provider, some have questioned whether GP appointments are the most appropriate follow-up pathway.[27] Dietitians embedded within primary care teams may provide the most appropriate long-term follow-up care.[27]

The National Confidential Enquiry into Patient Outcome and Death report from 2012 found that just 29% of bariatric surgery patients had psychological input for care.[29] It is not known if any of our patients had psychological assessment prior to surgery. There is limited guidance on the follow-up psychological and social wellbeing of bariatric patients. Even among patients in publicly-funded National Health Service hospitals, feelings of abandonment and isolation were common in accounts of follow-up care.[30]

Our discussions with patients who have undergone bariatric surgery also suggested that the Covid-19 pandemic may have played a role in different ways. Potential factors include weight gain during this period and the emerging medical information that obesity was a risk factor for a poor outcome from Covid-19 disease.[31] Importantly, the lower cost of bariatric surgery abroad compared to private bariatric surgery in a UK institution may have been a major influencing factor.

Strengths and limitations of the study

Nearly three quarters of primary care centres responded to the survey request, a high response rate likely driven by recognition of the importance of the issue in primary care. If applied to the whole of Northern Ireland, the data suggest that there may be at least 2,700 patients who have had bariatric surgery between 2017 and 2022. Since there may have been incomplete ascertainment even for participating GP surgeries, our data possibly underestimate the scale of bariatric surgery in the population. Any ascertainment bias for the outcome of bariatric surgery was most likely a non-differential misclassification, present throughout the study period.

Despite an increase in bariatric surgery frequency during the first three years of the Covid-19 pandemic compared to the three years prior to the pandemic, the association may not be causal. While there are temporality and plausibility factors favouring a causal role for Covid-19 disease, not all of the recognised criteria for causation have been fulfilled.[32] Confounders may have at least partially contributed to the association.

The findings of the primary care study indicating that patients undergoing bariatric surgery are more likely to be deprived and be prescribed antidepressant medication are from a centre that provides health care for an urban and socio-economically deprived population and may therefore not be generalisable to the whole Trust or Northern Ireland. Although a Trust-wide study of all primary care centres would be required to determine the specific associations with socio-economic deprivation, the close similarities in the trend in bariatric surgery rates and the sex ratio in the primary care centre and the other primary care centres within the Trust are striking.

Policy/service implications

The prevalence of obesity makes it a current and future medical and public health care issue. The UK has the highest prevalence of obesity among the European OECD countries. In Northern Ireland the WHSCT has the highest Primary 1-aged childhood obesity rate of all the Health Trusts at 6.2%,[33] with the highest District Council rate of 6.6% for Primary 1-aged children in Derry and Strabane from 2017/18 to 2019/20.[34] Among adults in Northern Ireland the prevalence of obesity has risen from 23% in 2010/11 to 27% in 2019/20.[35]

Management of obesity is required throughout childhood and adulthood. Socioeconomic deprivation is a known risk factor for obesity. Adverse factors within and across generations include gestational stress, poverty and financial insecurity, with weight gain and obesity adding further to the social stress and weight stigma.[36] In our primary care cohort, the patients who had bariatric surgery lived predominantly in socioeconomically deprived areas.

Northern Ireland has no bariatric surgery, obesity medicine multidisciplinary teams, or specialist weight management programmes, and there is no post-surgical or annual follow-up for individuals undergoing bariatric surgery abroad. Northern Ireland also remains the only UK nation not offering a primary or secondary care based multidisciplinary team comprising a minimum of a bariatric physician, a dietitian, a specialist nurse, a clinical psychologist, a liaison psychiatry professional and a physical therapist.[6] Clinical practice guidelines recognise the individual and comprehensive services beyond BMI measurement in managing individuals with obesity.[4]

Conclusions

Our study shows that patients in Northern Ireland have been seeking more bariatric surgery abroad. An NHS-funded specialist medical obesity management service alone would go a long way in helping to reduce the complications of obesity, improve monitoring, de-stigmatise obesity management and enhance patient safety and obesity education. A specialist surgical management service would also help the region meet NICE criteria for this population and would allow pre- and post-surgical support to be put in place to assist in preventing and managing the physical and psychological consequences of bariatric surgery.

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Clinical Paper

Immediate sequential bilateral cataract surgery (ISBCS): A single-site experience of 41 patients during the COVID-19 pandemic

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ABSTRACT

Background

The practice of immediate sequential bilateral cataract surgery (ISBCS) was more widely adopted in the UK during the COVID-19 pandemic, in response to limited surgical capacity and the risk of nosocomial infection. This study reports on a single site experience of ISBCS in Northern Ireland.

Methods

Data was collected prospectively between 17th November 2020 and 30th November 2021. The ISBCS surgical protocol, recommended by RCOphth and UKISCRS, was followed. Primary outcomes measures were: postoperative visual acuity (VA), refractive prediction accuracy, intraoperative and postoperative complications.

Results

Of 41 patients scheduled, 39 patients completed ISBCS and two patients underwent unilateral surgery (n=80 eyes). Mean age at the time of surgery was 71.6 years (standard deviation (SD) ±11.8 years). Median preoperative VA was 0.8 logMAR (range: PL to 0.2 logMAR). Seventeen (20.9%) eyes were highly myopic and 9 (11.1%) eyes were highly hypermetropic. Median cumulative dissipated phacoemulsification energy was 15.7 sec (range: 1.8 sec to 83.4 sec). Median case time was 10.4 min (range: 4.3 min to 37.1 min).

One eye (1.3%) developed iritis secondary to a retained tiny cortical fragment. Four eyes (5.0%, n=3 patients) developed cystoid macular oedema, with full resolution. On wide field imaging, an asymptomatic unilateral peripheral suprachoroidal haemorrhage was noted in two highly myopic patients (axial lengths of 27.01mm and 25.05mm respectively). The posterior pole was spared, and both resolved spontaneously without any visual impairment.

Conclusions

In our initial experience, ISBCS was found to be a safe approach to cataract surgery. Our patient cohort included eyes with dense cataracts and high ametropia. Further studies are required to assess patient reported outcome measures and the possible economic benefits of ISBCS in our local population.

Introduction

Cataract surgery is one of the most commonly performed procedures worldwide, with over 486,000 publicly funded operations taking place in England during the 2021 NHS year.[1] The surgical techniques and perioperative care for patients undergoing cataract surgery have evolved significantly over the last century.[2] The current standard approach for the treatment of visually-significant bilateral cataract in the United Kingdom (UK) and Ireland is delayed sequential bilateral cataract surgery (DSBCS), where each eye undergoes surgery on sequential dates. The alternative approach is immediate sequential bilateral cataract surgery (ISBCS), where surgery is performed on both eyes sequentially during the same theatre session.[3]

The practice of ISBCS varies worldwide and it poses controversial ethical concerns for both the patient and the ophthalmologist despite compelling benefits. A survey of ophthalmologists in the UK in 2020 found that 13.9% were currently performing ISBCS.[3] The historical reason for the low uptake of ISBCS is concern regarding the serious risk of irreversible bilateral blindness, especially from endophthalmitis.[3,4] However, a large cohort study has demonstrated a lower risk of postoperative endophthalmitis with ISBCS than previously published BDSCS rates.[5] Refractive surprise and lack of option to adjust IOL selection for the second eye has also been cited for a reluctance to adapting this approach.[3] However a large cohort study showed

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similar rates of VA improvement and targeted refraction between DSBCS and ISBCS patients.[6] As a departure from the traditional practice of DSBCS, medicolegal concerns were also purported as a disincentive despite acceptance by recognised local and international regulatory bodies.[3,7] The availability of surgical opportunities for ophthalmologists in training also needs to be considered.[3]

The challenge which COVID-19 pandemic posed to the national healthcare systems of England and the devolved nations (Northern Ireland, Scotland and Wales) prompted an examination of the public health policy surrounding cataract surgery in the UK.[8] The concept of ISBCS offered the potential benefits of reduced hospital visits and a shorter period for binocular visual rehabilitation. Economic analysis in Finland has demonstrated both healthcare and non-healthcare related savings associated with ISBCS compared to DSBCS.[9] A recent study taken from the same national population as this study had demonstrated that one-fifth of patients awaiting cataract surgery were 'clinically extremely vulnerable' to COVID-19.[10] ISBCS reduces clinical contact time per patient, therefore reducing COVID-19 transmission risk.[8]

In conjunction with the UK and Ireland Society of Cataract and Refractive Surgeons (UKISCRS), the Royal College of Ophthalmologists (RCOphth) published rapid guidance regarding best practice for ISBCS.[11] This document provided guidance for the safe delivery of ISBCS. We implemented this and designed a surgical pathway as ISBCS was rolled out. We aim to report the clinical outcomes of a cohort of patients undergoing ISBCS during the COVID-19 pandemic.

Methods

A case series of patients scheduled for ISBCS between 17th November 2020 and 30th November 2021, along with subsequent clinical follow-up is reported. All cataract operations were carried out at the Downe Hospital (South Eastern Health and Social Care Trust, Northern Ireland), under a single Ophthalmic surgeon. Ophthalmology specialist trainees (OSTs) performed surgery for cases of suitable complexity as judged by the supervising consultant.

Inclusion criteria

Careful selection of patients followed full ocular examination and informed consent. Patient choice and family/support member engagement was key. Bilateral significant cataracts with low risk of intra and postoperative ocular complications were considered. There were no age limitations.

Exclusion criteria

Ocular exclusion criteria included concomitant active eye disease such as diabetic retinopathy, ongoing intravitreal anti-VEGF treatment, Fuchs corneal endothelial dystrophy, pseudoexfoliation, shallow anterior chamber, and previous laser refractive surgery. Patient factors included high risk of infection (e.g. recurrent infective exacerbations of COPD) and cognitive impairment. Axial length extremes were not a set as an exclusion criteria, as exclusion of patients with shallow anterior chambers was felt to minimise the risk associated with short axial lengths.[12]

Patient consultations and assessment

Each patient referred to the cataract service underwent an initial consultation and surgical preassessment. This process included a full ocular examination and biometry. Optical biometry was performed where possible (IOLMaster 500 or IOLMaster 700, Carl Zeiss Meditec AG), with contact biometry (EchoScan US800, NIDEK) reserved for cases of dense cataracts where optical biometry was not possible. IOLMaster 500 or IOLMaster 700 biometers were used depending on availability at the clinical site of preoperative assessment.

Surgical procedure

The ISBCS surgical protocol, recommended by RCOphth and UKISCRS, was followed.(11) Following completion of the first eye operation, patients were given the opportunity to reconsider second eye surgery. Should a significant intraoperative complication occur during first eye surgery then second eye surgery would be deferred to a later date.

All patients underwent day case surgery. Topical anaesthetic (oxybuprocaine hydrochloride 0.4% v/w) with adjunct subconjunctival anaesthetic (1% lidocaine v/w) was used bilaterally without sedation. Each patient received 1mg intracameral cefuroxime intraoperatively. Postoperatively, topical prednisolone acetate 1% (4 times daily for 4 weeks) and chloramphenicol 0.5% (4 times daily for 7 days) were administered. Patients left surgery with a clear plastic shield applied to each eye. Cases were either completed by one surgeon (trainee or consultant), or a team of two surgeons (trainee and consultant).

Post-operative review

Each patient had a telephone review on postoperative day one, then a clinical review at approximately four weeks postoperatively, followed by a community optometry review approximately six weeks postoperatively for a final subjective refraction.

Data collection

Data was collected prospectively at the time of surgery. Descriptive statistics only have been applied to describe the outcomes of the included patients. Descriptive statistics analysed using R (v.4.2.0). Data was assessed for parametric or non-parametric distribution using the .hist function. If data was parametric, mean and standard deviation were reported and if non-parametric, median and range were reported. Not all data points were retrievable and the proportion retrieved

is displayed for each data point (Table 2).

Results:

Forty-one patients attended for planned ISBCS and 39 patients completed ISBCS. Two patients underwent unilateral surgery only; reporting anxiety and wished to defer second eye surgery to a later date. In total, 80 eyes underwent phacoemulsification and intraocular lens (IOL) implantation.

Mean age at time of referral was 69.5 years (standard deviation (SD) ±11.4 years, range: 46 to 91 years) and mean age at time of surgery was 71.6 years (SD ±11.8 years, range: 46 to 94 years). There were 16 (39.0%) male patients and 25 (61.0%) female patients. Ophthalmic comorbidities included: 2 (4.8%) patients with amblyopia, 5 eyes (6.1%) with dry AMD, 17 eyes (20.9%) with high myopia (<-6 dioptres (D)) and 9 eyes (11.1%) with high hypermetropia (>+4 D). General health comorbidities included: 16 (39.0%) patients with diabetes mellitus, 5 (12.2%) patients on oral anticoagulant medication, 3 (7.3%) patients with chronic obstructive pulmonary disease (COPD) and 3 (7.3%) patients concurrently taking alpha-adrenoreceptor antagonists.

Mean time from referral to surgery was 23.0 months (SD ±11.8 months, range: 3 to 58 months), and surgery to final follow-up was 48.1 days (SD ±40.1 days, range: 8 to 253 days) (Table 1). All patients completed clinical follow-up but 5 (12.2%) patients did not attend their community optometrist for a final subjective refraction.

Mean preoperative visual acuity (VA) was 0.8 logMAR (SD ±0.5, range PL to 0.2 logMAR). The mean axial length was 23.18mm (SD ±1.6, range 20.08 to 27.01mm). The mean spherical equivalent (SE) refractive error preoperatively was -1.31 D (SD ±5.39 D, range +9.63 to -16.63D). The mean SE postoperatively was -0.62 (SD ±0.77, range +2 D to -2 D) and mean SE prediction error was +0.03 D (SD ±0.73, range +1.56 D to -1.88 D). In total 5 (9.4%) patients who completed ISBCS and attended postoperative refraction had a first eye with a SE prediction error of more than ±1D. For patients who attended for postoperative refraction, there were no cases of significant anisometropia between eyes (>1D) (Table 2).

Median cumulative dissipated phacoemulsification energy (CDE) was 15.7 sec (range: 1.8 sec to 83.4 sec). Median case time was 10.4 min (range: 4.3 min to 37.1 min). Forty-seven (58.8%) eyes were operated on by the consultant (OE) and 33 (41.3%) eyes by senior trainees (OST4-7). In total 20 (51.3%) complete ISBCS cases were completed by the consultant (OE), 6 (15.4%) as a team and 13 (33.3%) complete ISBCS cases by senior trainees. One eye (1.3%) developed iritis secondary to a retained cortical fragment. Four eyes (5.0%) of 3 patients developed cystoid macular oedema (CMO), with full resolution. There were two cases of unilateral, peripheral, acute intraoperative suprachoroidal haemorrhage (AISH). There were were subclinical at time of surgery and only noted on wide-field imaging at clinic follow-up. A unilateral peripheral limited suprachoroidal haemorrhage occurred in two highly myopic patients (preoperative axial length of 27.01mm and 25.05mm), but posterior pole and postoperative vision were not affected (Table 3).

Discussion

This study is the first to report patient outcome data from ISBCS patients in Northern Ireland and to the authors' knowledge, one of the first to report outcomes in the UK since the beginning of the COVID-19 pandemic, along with the RCOphth national audit database cataract audit.[1] We demonstrate safe practice and reduced patient exposure during the COVID-19 pandemic, while supporting OST training.

Similar studies have been conducted during the COVID-19 era examining patient experiences following ISBCS. The largest of these, a study of 406 patients who underwent ISBCS in Canada between July 2020 and December 2020 found a 25% increase in surgical volume and a 50% decrease in patient visits was achieved when compared with DSBCS, within COVID-19 restrictions.[13] Public familiarity with the concept of ISBCS is low and patient's concerns about safety over convenience needs to be addressed. A preoperative patient perspective study of 267 patients on a cataract surgical waiting list found that just 45% agreed strongly with opting for ISBCS.[14] A study of 24 postoperative ISBCS patients in the UK reported that, following surgery, 79% of patients would recommend this procedure to friends and family.[15] Regarding surgical outcomes of ISBCS during COVID-19, one study of 22 eyes found a mean SE prediction error of <0.5 D in 77% of patients and statistically similar intraoperative and postoperative complication rate when compared with DSBCS.[16]

In the UK, ISBCS does not stand alone in delivering bilateral ocular surgery; laser refractive, lid and squint surgery are all routinely performed bilaterally. Bilateral intravitreal anti-VEGF injections for macular pathology are also performed regularly. Intravitreal injections may be viewed as the most relevant comparator to cataract surgery – they are both intraocular procedures and similarly carry a risk of endophthalmitis.[17] The use of ISBCS in the UK has been demonstrated to have increased from 238 reported patients in the 2018/2019 RCOphth National Ophthalmology Database report to 1463 reported patients in the 2021/2022 report, There was a corresponding decrease of general anaesthesia use from 57.1% to 7.3% of patients.[1,18] This lower use of general anaesthesia may be considered as a surrogate marker of a changing demographics and medical need in the cohort of patients being selected for ISBCS. There was also a decrease in the proportion of patients between the 2018/2019 and 2020/2021 reports recorded as being unable to lie flat or cooperate during the procedure (15.9% vs. 7.5%

respectively).[18,19] Subsequent reports will show if this change in surgical practice will persist or revert to DSBCS.

The rate of CMO in this study was higher than pre-pandemic published incidence rates (1.2% - 3.4% vs. 5.0% in this case series). It was comparable (4.9% - 6.9% vs. 5% in this case series) with a UK-based study published in 2022.[20,21] It may be due to the increase rate of dense cataracts presenting as an indirect consequence of the COVID-19 pandemic; of note the mean presenting vision acuity in this case series was 0.9 logMAR units (6/48 Snellen). Additionally, this rate may be due to small sample size variability.

There were two cases of assumed acute intraoperative suprachoroidal haemorrhage (AISH). The previously reported rate by the British Ophthalmological Surveillance Unit is 0.04%.[22] Both of these cases of unilateral, peripheral suprachoroidal haemorrhage were only noted on wide field imaging which was part of clinic follow-up for each patient. These cases involved myopic eyes (axial length 27.01mm and 25.05mm), however they had no risk factors (pre-operative increased IOP, posterior capsular rupture, concurrent glaucoma or age >90) as identified by a recent RCOphth report.[23] The rate of subclinical suprachoroidal haemorrhage identified incidentally on wide field imaging postoperatively is not well reported in the literature.

The rate of significant SE prediction error (>1D) for 1st eye surgery was 9.4% and there were no cases of significant postoperative anisometropia (>1D). A prior study of 3561 ISBCS patients refractive outcomes had found a rate of anisometropia >2D of 1.4%; but they did not report 1st eye SE prediction error.(6)second-eye outcomes were no different than first-eye outcomes; (2 A previously published benchmarking study had reported a rate of 13.0% of patients with a SE prediction error of >1D.(24)between January 2003 and February 2006. The electronic medical record automatically recommends the formula to be used according to the College guidelines and allows A constants to be customised separately for either ultrasound or partial coherence interferometry methods of axial length measurement and for different intraocular lens models. Consultants and trainees performed routine phacoemulsification cataract surgery and new intraocular lens models were introduced during the cycles. Uncomplicated cases with 'in-the-bag fixation', achieving 6/12 Snellen acuity or better were included. Community ophthalmic opticians performed refraction at 4 weeks.\nRESULTS: The postoperative subjective refraction was within 1 D of the predicted value in 79.7% of the 952 cases in cycle 1, 83.4% of 2406 cases in cycle 2, and 87.0% of 1448 cases in cycle 3.\nCONCLUSIONS: On the basis of our data, using College formula, optimising A constants and partial coherence interferometry, a benchmark standard of 85% of patients achieving a final spherical equivalent within 1 D of the predicted figure and 55% of patients within 0.5 D should be adopted.","container-title":"Eye (London, England

The authors agree with the included absolute and relative contraindications included in rapid guidance published by RCOphth and UKISCRS.[11] In light of the two incidences of limited suprachoroidal haemorrhage in patients with axial myopia, additional consideration and patient counselling may be required for patients with a longer axial length if ISBCS is being offered. We do not feel longer axial length is an absolute contraindication to ISBCS, as these patients will likely experience significant anisometropia between first- and second-eye surgery for DSBCS and therefore will benefit from the rapid binocular visual rehabilitation of ISBCS. However, the presence of other risk factors for suprachoroidal haemorrhage, in additional to increased axial length, may be a relative contraindication for ISBCS.

Now that post-pandemic service planning has begun, the future role of ISBCS in service provision, along with training, must be reconsidered. Although not examined in this study, the efficiency benefit has been previously demonstrated in both low- and high-volume cataract settings.[9,11]

The authors believe that one barrier to the implementation of ISBCS locally is that it could initially create inequality between patients, with a cohort of patients with ISBCS having a relative advantage over DSBCS who remain longer on a waiting list for second eye surgery. If ISBCS was adopted as a default option offered to patients, we postulate that there would be an initial inequality, but eventually a break-even point and subsequent shortening of the cataract surgery waiting list because of the increased efficiency that would ensue.

The authors acknowledge that this study was confined to the patients under the care of one consultant ophthalmic surgeon and is not reflective of all surgeons undertaking ISBCS in Northern Ireland. In addition, no efficiency or economic evaluation took place. Future studies may examine these aspects.

In conclusion, ISBCS was found to be a safe approach to cataract surgery. There were no cases of loss of best-corrected visual acuity and no cases of significant (>1D) anisometropia.

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Table. 1. Patient demographics, referral and follow-up. AMD = age related macular degeneration.

Patient demographics, referral and follow-up	
Time from referral to surgery (Mean ± SD, range)	23.0 ±11.8 months, range 3-58
Mean age at time of surgery (Mean ± SD, range)	71.6 years SD ±11.8, range 46 - 94
Female / male (n, %)	25 (61.0%) female / 16 (39.0%) male
Ophthalmic co-morbidities included (n eyes, %)	Amblyopia 2 (4.8%) Dry AMD 5 (6.1%) High myopia (<-6 D) 17 (20.7%) High hypermetropia (>+4 D) 9 (10.9%)
General medical co-morbidities included (n patients, %)	Diabetes mellitus 16 (39.0%) Anticoagulation 5 (12.2%) COPD 3 (7.3%) Alpha-blockers 3 (7.3%)
Clinical follow-up rate (n, %)	42 patients (100%)
Refractive follow-up rate (n, %)	39 patients (87.8%)

Table. 2. Pre- and postoperative visual acuity and refractive outcomes

Parameter	**Descriptive statistics**	**Data retrieved**
Mean preoperative VA	0.8 logMAR (SD ±0.5, range: PL to 0.2 logMAR)	All
High ametropia	Myopia 17 (20.9%) Hyperopia 9 (11.1%)	81 out of 82 eyes (98.7%)
Axial length (Mean ± SD, range)	23.18mm (SD ±1.6, range 20.08 to 27.01mm)	34 of 82 eyes (41.5%)
Postoperative SE refractive error (Mean ± SD, range)	-0.62D (SD ±0.77, range +2 D to -2 D)	53 of 80 eyes (66.3%)
SE prediction error (Mean ± SD, range)	+0.03 D (SD 0.73, range +1.56 D to -1.88 D)	53 of 80 eyes (66.3%)
Number of eyes with SE prediction error >1D	5 (9.4%)	53 of 80 eyes (66.3%)
Significant (>1 D) postoperative anisometropia	0.0%	39 patients (87.8%)

High ametropia = High myopia (<-6D), high hypermetropia (> 4D).

Table. 3. Cumulative dissipated phacoemulsification energy (CDE), case time, surgeon mix, post-operative complications.

CDE (Median, range)	15.7 sec (1.8 sec to 83.4 sec)
Median case time (Median, range)	10.4 min (range: 4.3 min to 37.1 min)
Consultant performed procedures (n eyes, %)	47 (58.8%)
Senior (OST4-7) performed procedures (n eyes, %)	33 (41.3%)
Postoperative complications (n eyes, %)	CMO 4 (5.0%) SCH 2 (2.5%)

CMO, cystoid macular oedema; SCH, suprachoroidal haemorrhage

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Review

Verbal Probability Terms for Communicating Clinical Risk - a Systematic Review

M Jawad Hashim [1]

Abstract

Verbal probability expressions such as 'likely' and 'possible' are commonly used to communicate uncertainty in diagnosis, treatment effectiveness as well as the risk of adverse events. Probability terms that are interpreted consistently can be used to standardize risk communication. A systematic review was conducted. Research studies that evaluated numeric meanings of probability terms were reviewed. Terms with consistent numeric interpretation across studies were selected and were used to construct a Visual Risk Scale. Five probability terms showed reliable interpretation by laypersons and healthcare professionals in empirical studies. 'Very Likely' was interpreted as 90% chance (range 80 to 95%); 'Likely/Probable,' 70% (60 to 80%); 'Possible,' 40% (30 to 60%); 'Unlikely,' 20% (10 to 30%); and 'Very Unlikely' with 10% chance (5% to 15%). The corresponding frequency terms were: Very Frequently, Frequently, Often, Infrequently, and Rarely, respectively. Probability terms should be presented with their corresponding numeric ranges during discussions with patients. Numeric values should be presented as X-in-100 natural frequency statements, even for low values; and not as percentages, X-in-1000, X-in-Y, odds, fractions, 1-in-X, or as number needed to treat (NNT). A Visual Risk Scale was developed for use in clinical shared decision making.

Keywords: probability, clinical reasoning, risk communication, medical decision-making

Introduction

Risk is an inherent part of healthcare that requires communicating the probability of future events in the clinical context.[1] For instance, osteoporosis is associated with a risk of fragility fractures which can be reduced using different treatment options.[2] Verbal expressions of probability such as 'probably' and 'likely' are commonly used to communicate uncertainty in diagnosis, treatment effectiveness as well as the risk of adverse events with medications and surgical procedures. Patient surveys indicate a high demand for information on the risk of clinical outcomes.[3] Hence, it is critical that physicians and other health professionals communicate risks clearly and unambiguously as discordant interpretations can lead to misunderstanding, undesired decisions and unwanted outcomes. While visual formats such as pictograms have been advocated for communicating probabilities,[4] verbal expressions are still used predominantly.[3] Plain language words are a natural choice in risk communication.

Previous research has elucidated certain recurring themes in the field of risk communication.[5–7] Probability terms are imprecise or vague by nature, yet people receiving information translate these into numeric values in order to make decisions.[8] There is a general preference for communicating risk to others using (imprecise) verbal terms while receiving risk information in (precise) numeric format.[8] The meanings of these terms are inherently vague and imprecise. Empirical studies with laypersons and health professionals have attempted measure the numeric interpretation of verbal terms. Verbal probability terms may be defined as words that communicate the numeric chance of an event. The aim of this review was to develop a standardized set of probability terms. An additional goal was to provide an overview of recommendations for risk communication in clinical medicine.

Methods

A systematic review was conducted. Inclusion criteria included original research articles (with empirical data) that studied the interpretation of probability terms by laypersons and health professionals. Review articles and studies that evaluated visual formats such as graphs and pictograms were excluded. PRISMA guidelines (http://prisma-statement.org/) were followed. PubMed MEDLINE, PubMed Central, ProQuest PsyArticles, Academic Search Complete, Cochrane Library, ClinicalKey Elsevier, Google Scholar, Education Resources Information Center (ERIC), Nature, and Web of Science were searched (Supplementary File). Search keywords included "probability terms" as well as "communicat* risk" (separately) using the Best Match (Relevance) sort order.

Terms commonly used in clinical settings for risk

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communication were identified from research studies that evaluated these terms. Numeric probabilities were collated from results of studies conducted with patients and health professionals. Terms with consistent interpretation across studies were selected based on their numeric ranges reported in empirical studies. Consistency was defined as numeric ranges that overlapped across studies. Verbal terms that showed a wide variation in interpretation across studies were excluded. A formal meta-analysis with weights based on sample sizes was not feasible due to heterogeneity of study designs. A visual scale was constructed by combining selected terms and their respective numeric ranges on a linear axis.

Results

The search yielded 647 studies of which 6 met the inclusion criteria for full-text review (Table 1). Study designs were heterogenous: from psychology experiments to large scale online surveys. Methodological quality and rigor were generally low (lack of blinding, control groups, randomization or retest validation). There were no randomized trials; hence, weighted meta-analysis, risk of bias, and grading recommendations to assess the quality of evidence could not be conducted. Both patients and health professionals have been surveyed to assign numeric estimates to verbal probability terms.

Table 1. Studies evaluating the interpretation of verbal probability terms

Study	Year	Country	Participants	Study design
Reagan et al.	1989	US	115 undergraduate students	Survey: assign numeric estimates to verbal terms, and vice versa
Shaw & Dear	1990	UK	100 mothers; 50 doctors and medical students	Survey: assign numeric estimates to verbal statements with probability terms
Mosteller & Youtz	1990	US	238 science writers	Mailed questionnaire survey: assign numeric probabilities to 52 probability expressions
Ness	1995	US	194 college students	Survey with 3 methods: Percentage Estimation, Successive Interval Transformed, and Rank Order
Fillenbaum et al.	1991	US	23 graduate students	Psychology experiment: comprehension and selection tasks
Wintle et al.	2019	US	924 participants	Online survey: numerical judgements from participants for each of the 7 verbal probability expressions

Patients vary in the numeric values they assign to terms; however, the relative meanings of these terms show stable groupings.[9,10] For example, based on results of 13 patient surveys, numeric probabilities for the word *probable* showed clustering around 70%, with most estimates between 60 and 90%.[11] Similar groupings emerged for other commonly used probability terms such as *possible* and *likely* based on published studies.[12] On the other hand, a wide variation in interpretation occurred with the use of *risk* as a verbal probability expression.[13] Expressions incorporating the term *risk* (as in *low risk, standard risk, high risk*) were problematic as laypersons tended to confuse frequency with the severity of a potential adverse event.[13] Phrases such as *negligible risk* were interpreted anomalous to their meaning.[13] Expressions with large modal peaks were the following: *even chance, always, never, impossible,* and *certain.*[14] Terms with wide interquartile ranges included *liable to happen, sometimes, not infrequent, not unreasonable, might happen* and *possible.*[14]

There was a preference among patients for using words over numeric estimates.[15] The use of verbal terms led to decisions more congruent with personal aims than numeric presentation of probabilities.[16] Furthermore, there was no association between numeric estimates of terms and respondents' age, educational level or health literacy.[17]

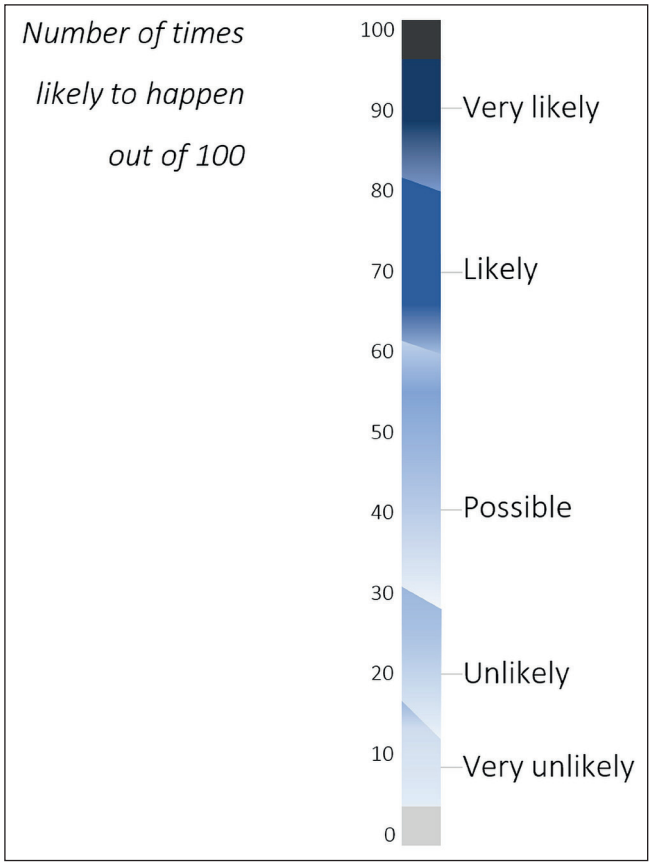
Health professionals' interpretation of verbal probability terms has also been studied using hypothetical clinical cases and assignment of numeric values to each term.[18] Results showed agreement in the interpretation of the probability terms. There was no effect of clinical context or physician specialty on the interpretation of verbal terms.[18] The term *likely* was interpreted synonymously with *probable.*[19,20] Residents interpreted verbal probability terms in a manner similar to experienced physicians.[18] There was no effect of contextual framing on numeric interpretation between experienced physicians and residents.[18]

Selected terms showing consistent interpretation across studies were compiled with their numeric estimates (Table 2). The numeric evidence suggested that study participants ascribed these terms into discrete identifiable ranges. Based on these findings, five terms with reliable numeric interpretation were selected (Table 3). Frequency terms corresponding to the respective probability terms were also collated . For example, *Often* is interpreted as 35 – 83%; this corresponds to the probability range for *Possible.*[17] A Visual Risk Scale was constructed using these probability terms (Figure 1).

Term	Study	Lower estimate	Central estimate	Upper estimate
Very Likely	Reagan pre-1989		87	
	Reagan 1989	80	85	90
	Shaw 1990, mothers	71	86	100
	Shaw 1990, doctors	86	91	96
	Mosteller pre-1990		82	
	Mosteller 1990	80	88	90
	Ness 1995	75	87	99
	Wintle 2019	77	85	92
	Mean	78	87	95
Likely	Reagan pre-1989		70	
	Reagan 1989	65	70	80
	Shaw 1990, mothers	49	66	83
	Shaw 1990, doctors	64	77	90
	Mosteller pre-1990		69	
	Mosteller 1990	63	71	78
	Fillenbaum 1991		72	
	Ness 1995	56	71	87
	Wintle 2019	57	67	77
	Mean	59	71	82
Possible	Reagan pre-1989		40	
	Reagan 1989	30	40	58
	Shaw 1990, mothers	45	62	79
	Shaw 1990, doctors	27	46	65
	Mosteller pre-1990		42	
	Fillenbaum 1991		43	
	Mean	34	45	67
Unlikely	Reagan pre-1989		17	
	Reagan 1989	10	15	20
	Shaw 1990, mothers	9	27	45
	Shaw 1990, doctors	6	16	26
	Mosteller pre-1990		17	
	Mosteller 1990	10	17	23
	Fillenbaum 1991		23	
	Ness 1995	15	27	39
	Wintle 2019	17	30	42
	Mean	11	20	32
Very unlikely	Reagan pre-1989		10	
	Reagan 1989	10	10	20
	Mosteller pre-1990		11	
	Mosteller 1990	3	5	10
	Ness 1995	6	15	24
	Wintle 2019	9	14	18
	Mean	7	11	18

Table 2. Numeric estimates of verbal probability terms from empirical studies

Figure 1. Visual Risk Scale



*All ranges are fuzzy estimates and should be interpreted as approximate with tapering and overlapping ends.

Table 3. Standardized terms for expressing probabilities

Probability term*	Frequency term	Probability (per 100 cases)	Range (per 100 cases)	Width of range (precision)
Very likely	Very frequently	90	80 – 95	Narrow (precise)
Likely / Probable	Frequently	70	60 – 80	Moderate
Possible	Often	40	30 – 60	Wide (imprecise)
Unlikely	Infrequently	20	10 – 30	Moderate
Very unlikely	Rarely	10	5 – 15	Narrow (precise)

* *Probable* can be used interchangeably with *Likely*. The prefix *Very* can be changed to *Highly*. Absolute referents such as *never*, *impossible*, *certain* and *always* should be avoided. Terms such as *high/moderate/low risk*, *negligible*, *uncertain, less/more/equally/not likely, even chance, not often* and *fifty-fifty* should not be used.

Discussion

Empirical studies involving patients and health professionals indicate that there is agreement in the interpretation of certain terms indicating a potential for standardization. The solution proposed in this article is to select five terms which are interpreted consistently for communicating risk.

Verbal expressions of probability are preferred in risk communication by physicians and patients.[21,22] Most experts agree that the use of verbal terms will continue in clinical settings despite variations in interpretation.[17] Instead of recommending against the use of these terms, a pragmatic solution is to standardize the meanings based on empirical findings. Indeed, Reagan et al, in their now classic paper on quantitative meanings of verbal probability expressions, found that "results agreed highly with others and were highly consistent across methods".[19] An elegant and eloquent rejoinder has been written in response to objections against using words to express probability, such as contextual factors and variability.[23]

Physicians and patients generally agree on relative ranges of the selected terms. For example, in one study of about 200 subjects, the concordance rates was .975 to .998, with identical ranking of terms in an ordinal sequence.[24] Thus, most terms show an ordered sequence with nominally overlapping ranges. The ordinal ranking of these terms was reliable across studies. For instance, the term *probable* was interpreted to mean a greater mean chance than *possible*. Terms that were distinct (in their numeric ranges) were selected. There was flexibility as certain terms such as *very unlikely* and *highly unlikely* were equivalent.[24] Numeric ranges proposed for these terms are based on empirical findings, as opposed to arbitrary standards by certain organizations.[25] Verbal expressions with ambiguous interpretation such as *negligible*, *uncertain* and *fifty-fifty* were excluded. With the use of standardized meanings of selected terms in the proposed Visual Risk Scale, more widespread concordance may eventually be achieved.

The Visual Risk Scale presented in this study combines high-fidelity standardized probability terms with their empiric numeric ranges. An earlier risk scale was evaluated in a study of Dutch family physicians.[26] However, the scale used in the study contained terms such as *fifty-fifty, uncertain, certain, improbable* and *impossible* which are known to have wide variations in interpretation. The study found that more experienced physicians preferred a scale with verbal terms while their younger colleagues were more comfortable with a numeric scale. A large study of almost one thousand participants found that presenting a scale as opposed to a single term reduced variability in interpretation.[27] Thus, the Visual Risk Scale is a combination of words and numbers, as recommended for risk communication.[28,29]

Since absolute certainty is difficult to achieve and rarely encountered, terms such as *never*, *certain*, *always* and *impossible* should be avoided in clinical conversations. Other alternatives such as *almost certain* and *almost never* are ambiguous and should be substituted by *Very Likely* and *Very Unlikely*, respectively. Other terms to avoid include *confirmed*, *ruled out* and *ruled in*, except when indicated by a gold standard test such as tissue biopsy. The phrase *fifty-fifty chance*, should not be used in discussions with patients as it is interpreted as "uncertainty" rather than a numeric probability of 50%.[30] Comparative terms such as *more* and *less likely* as well as negations like *not often* are also inadvisable.[17] A standardized terminology can reduce incongruent use of verbal probability terms. For example, the term *common* has been used inappropriately to denote a 1 in 100 chance in a patient information guide.[31] Such an arbitrary assignment of numeric values to specific verbal terms may lead to continued ambiguity and miscommunication.

While verbal terms are convenient, numeric estimates should be provided whenever possible. This practice will reinforce the meanings of verbal expressions and is useful for patients with higher numeracy skills. Point estimates using whole numbers are easier to understand than ranges of values.[32] We propose that numeric estimates should be expressed as a

natural frequency statement with a fixed denominator of 100 (for example, 20 out of 100 patients): the X-in-100 format. Chance of a single event is easier to interpret as a natural frequency statement instead of a probability.[33] Hence, the term percentage (or percent) is not recommended.[34] Varying denominators such as 1,000 and 100,000 are also not advisable.[35] For consistency, a denominator of 100 should be used for extreme values as well, such as "less than 1 in 100", instead of denominators such as 1,000,000.[35]

Other formats of expressing numeric values are not advisable, such as decimal fractions (for example, 0.25), percentages (25%), simple fractions (1/4), simplified fraction expressions (3 out of 7), frequencies with unusual denominators (23 in 500) or odds (one in three).[34] Number needed to treat (NNT) and the 1-in-X format (for example, 1 out of 30 patients) should be avoided as they distort risk perception by patients.[35,36] Stating the absolute risk of outcomes (probability terms) is preferred over relative risk reduction (X% reduction in risk). Since a large proportion of the lay public have limited numeracy skills,[35] numeric estimates can be misinterpreted and should be accompanied by commonly understood verbal terms, as shown in the Visual Risk Scale.

Limitations of this review include variations in contexts and study participants, limited number of studies and heterogenous study designs. The methodological rigor and quality of studies was inconsistent. In particular, online surveys may produce unreliable data. Bias assessment and data synthesis were not conducted due to variations in study designs and outcome measures. The review may have missed studies that have not been indexed in research databases such as doctoral theses and conference abstracts. Many of the studies were conducted over two decades ago and the usage of these verbal terms may have changed.

Conclusions

The main contribution of this article is to identify five probability terms and codify their numeric meanings. This assignment of numeric estimates is based on empirical studies involving health professionals and laypersons. The resulting Visual Risk Scale follows the recommendation to integrate numeric estimates with verbal probability terms. Presentation of risk in a standardized format may improve comprehension over the long term. When discussing clinical risk with patients, clinicians can express the chances of different outcomes using these five terms. These probability terms should be used preferentially in professional communications such as case presentations, medical documentation and clinical teaching as well as in discussions with patients for informed consent. These terms may be useful in communicating and teaching evidence-based medicine, healthcare risk and safety, shared decision-making and clinical reasoning.

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Ulster Med J 2024;**93(1):**24-27

Abstracts

Winning Abstracts From The Queens University Belfast – Ulster University Academic Medical Symposium 2023

The first joint QUB-UU Academic Medicine Symposium was held in Belfast in 2023. The symposium was funded by the Academy of Medical Sciences and was the first one held jointly between the medical schools at Queens' University Belfast and the Ulster University.

The prize winners are listed below, together with the winning abstracts

Oral presentation Prize Winners	
Chris McKee	1st Prize
Hannah Kerr	2nd Prize
Aidan Murray	3rd Prize
Poster presentation prize winner	
Peter Johnston	
Inez Murray	
Maeve McAllister	
Christopher Armstrong	

Peter Johnston (QUB Medical Student)
Poster Presentation Winner
Category: Clinical Research

Authors: Mr. Peter Johnston MSc Medical Student, Queens University Belfast Centre for Medical Education, Belfast, Northern Ireland Prof. Dr. Gerard Leavey Director, The Bamford Centre for Mental Health and Wellbeing, Ulster University, Belfast, Northern Ireland

TITLE: A SYSTEMATIC REVIEW OF SECONDARY PREVENTION STRATEGIES OF CARDIOVASCULAR DISEASE IN LOW-AND-MIDDLE-INCOME COUNTRIES

Introduction: Cardiovascular disease (CVD) is a leading cause of mortality globally. Secondary prevention encompasses identifying and treating those with primary disease, with the goal of reducing disease progression.

Aims: This systematic review assesses the existing literature on secondary CVD prevention in LMICs. In addition, barriers to broadening the adoption of effective interventions in alternative LMICs are discussed.

Methods: This review follows the format outlined in guidelines published by PRISMA. Articles which discuss the results and effectiveness of interventions which aimed to reduce secondary CVD progression in LMICs were included. A variety of standard statistical tests were employed to determine the significance of each studies' relevant CVD outcomes.

Results: A total of sixteen studies were included in this review, seven of which were found to have a significant effect on secondary CVD outcomes. Pharmacology interventions were the largest grouping comprising eight articles, with five demonstrating significant results. However, three of these five studies compared their respective interventions against placebos, and not existing best standard of care. Four trials examined quality improvement interventions. Two of which, a primary care initiative and an intensive follow up procedure, demonstrated a significant effect. The remaining interventions were not found to be effective.

Discussion: This review found that interventions targeting dual antiplatelet therapy, follow up procedures and primary care initiatives were the most effective at improving secondary CVD outcomes. A limitation of this review was the lack of studies from low-income countries.

Inez Murray (QUB Medical Student)
Poster Presentation Winner
Category: Clinical Research; Basic Science;

Authors: Inez Murray[1]* Meenakshi Sharma[1], Arihant Jain[2], Raman Sharma[3], Pankaj Malhotra[2] Charlene M. Mcshane[1] 1Cancer Epidemiology Research Group, Centre for Public Health, Queens university, Belfast, UK. 2Dept. of Clinical Hematology & Medical Oncology, Post Graduate Institute of Medical Education and Research, Chandigarh,India [3] Department of Hospital Administration, Post Graduate Institute of Medical Education and Research, Chandigarh, India

Introduction: Multiple Myeloma (MM) is a malignant plasma cell disorder. Although cancer burden is increasing worldwide, data on the epidemiology of MM in India appears limited.

This scoping review aims to identify existing evidence on the epidemiology of MM in India.

Methods: Five electronic databases were searched from database inception through to 15/07/2022, using key words specific to MM and India. Titles and abstracts, and full texts were screened by two independent reviewers with conflicts mutually resolved. Local cancer registry reports were also reviewed. Following data extraction, findings were narratively compared.

Results: 20 studies met the inclusion criteria. Most studies were hospital-based (n=8) from Southern (n=6) and Northern (n=2) India, with small samples between 32 to 544 MM patients. Two studies reported on national cancer registry data.

Incidence was reportedly higher in males than females (age-standardised rate was 1.13 vs 0.81 per 100,000) and increased steadily with age, peaking between 60–69. Findings from registry-based studies highlighted higher incidence in the South of India. Information on quality of life (QoL) was limited; one study identified a negative correlation between QoL score and treatment side effects, while another identified higher QoL compared to a reference score.

This review is ongoing, with updated results available at the symposium.

Conclusions: Preliminary analysis revealed research focusing on the epidemiology of MM in India is limited. More must be done to investigate the scale and impact of MM in India, and robust observational studies are needed to investigate aetiology and factors associated with patient outcomes.

Maeve McAllister (QUB Dental Student)
Poster Presentation Winner
Category: Dental Research

Authors: Maeve McAllister, Neill Markey, Dr Ciaran Moore, Professor Gerry McKenna

TITLE: IMPACT OF COVID-19 ON HEAD AND NECK CANCER

Objectives: To assess the impact of the COVID-19 pandemic on Head and Neck (H&N) Cancer presentation in Northern Ireland by assessing patient-level data collected during 2019-2021.

Methods: All patients diagnosed with H&N Cancer in Northern Ireland are managed through a Multi-disciplinary Network (MDN). This network was used to collect prospective patient-level data during 2019, 2020 and 2021. In addition to demographic information, specific data on cancer diagnosis, tumour site, staging and treatment were collected prospectively.

Results: The total number of patients referred to the MDN in 2019 was 470 compared to 371 in 2020 (22.1% reduction, $p<0.01$). During this same period, the proportion of late-stage tumours (T3/T4) increased from 33.76% of all cases in 2019 to 41.47% ($p=0.015$) in 2020. In 2021, the data suggests a return to similar patterns recorded in 2019 with 436 cases managed in total, of which 36.70% were late-stage tumours. Treatments offered to patients during the period 2019-2021 remained similar with Surgery (34.1%) the most common modality followed by Radiotherapy (29.68%). In 2021, higher proportions of patients received Radiotherapy (30.5%) compared to Surgery (29.59%) with more patients receiving specialist palliative care. Additionally, the number of confirmed cases referred urgently ('red flag referrals') by GDPs decreased significantly in 2020 and 2021 ($p<0.01$) compared to 2019.

Conclusions: It is clear that the COVID-19 pandemic had significant negative impacts on Head and Neck Cancer in Northern Ireland including diagnosis, presentation and treatment modality.

Christopher Armstrong (QUB Medical Student)
Poster Presentation Winner
Category: Clinical Research

Authors: Christopher Armstrong, Dr Wendy McDougald, Dr Mark Muzi

TITLE: 3'-DEOXY-3'-18F-FLUOROTHYMIDINE PET IN THE ASSESSMENT OF EARLY RESPONSE OF BREAST CANCER TO NEOADJUVANT CHEMOTHERAPY

Introduction: Current response assessments fall short of predicting response to neoadjuvant chemotherapy (NAC) in breast cancer patients. Positron Emission Tomography/Computed Tomography (PET/CT) is a non-invasive imaging tool used to determine treatment responses. Whilst previous studies have outlined the efficacy of 18F-FLT-PET/CT as a therapeutic indicator, little evidence exists regarding its use following NAC.

Aim: To understand the effectiveness of 18F-FLT-PET/CT in predicting response to NAC.

Methods: Image data was analysed based on 18F-FLT uptake changes from pre-treatment to completion of one NAC cycle and potential correlations to pathological complete response (pCR). The relationship between 18F-FLT uptake and Ki-67 index was assessed using Spearman's correlation analysis for pre- and post-NAC treatment data.

Results: From the American College of Radiology Imaging Network 6688 study thirty patients were eligible for analysis. Percentage changes in mean standard uptake values (SUVmean) between before and after NAC therapy predicted pCR. Percentage changes in two-compartment model and Patlak flux were not predictive of pCR. Correlation between SUVmean and Ki-67 decreased after therapy (Pre-treatment:

rs=0.342; P=0.0642, Post-treatment: rs=0.221; P=0.278). Similar findings were observed between two-compartment flux and Ki-67 (Pre-treatment: rs=0.252; P=0.179, Post-treatment: rs=0.189; P=0.354).

Discussion: 18F-FLT-PET/CT predicted pCR outcome following NAC using SUV analysis but not using kinetic analysis in breast cancer patients. Correlation between 18F-FLT measurements and Ki-67 was weak and statistically insignificant. Overall, initial data supports 18F-FLT-PET/CT as an additional tool for evaluating NAC response in breast cancer patients.

Chris McKee
(QUB Medical Student)
Oral Presentation –
1st Prize Category:
Clinical Research

Authors: Chris McKee, Robert Espey, Adrian Curran, Amanda O'Halloran, Nagy Darwish

A Retrospective Evaluation and Review of Radiographic Outcomes for Anterior Cervical Discectomy and Fusion Procedures: Northern Ireland's Experience

Introduction: Anterior Cervical Discectomy and Fusion (ACDF) is the gold standard treatment for symptomatic cervical spondylosis refractory to analgesic medical management. Currently, there are numerous approaches and devices used, however, there remains no single implant that is preferred for this procedure.

Aims: The aim of this study is to evaluate the radiological outcomes of ACDF procedures performed in the regional spinal surgery centre in Northern Ireland. The results of this study will aid surgical decision making, specifically with regards to choice of implant. The implants that will be assessed in this study are the PEEK Stand-Alone Cage (Cage) and the Zero-profile augmented screw implant (Z-P).

Methods: A total of 420 ACDF cases were reviewed retrospectively. Following exclusion and inclusion criteria 233 cases were reviewed. In the Z-P group there were 117 patients, with 116 in the Cage group. Radiographic assessment was carried out at the pre-operative, day 1 post-operative, and follow-up (>3months) time-points. Measured parameters included: segmental disc height, segmental Cobb angle, and spondylolisthesis displacement distance.

Results: Patient characteristic features showed no significant difference between the two groups ($p>0.05$) and with no significant difference in mean follow-up time ($p=0.146$). The Z-P implant was superior in increasing and maintaining disc height post-operatively (+0.4±0.94mm, 5.20±0.66mm) compared to the Cage (+0.1±1.00mm, 4.40±0.95mm) ($p<0.001$). Z-P was also more successful in restoring and maintaining cervical lordosis in comparison to the Cage group as it had a significantly smaller kyphosis incidence (0.85% vs 34.5%) at follow-up ($p<0.001$).

Discussion: Results of this study shows a more advantageous outcome in the Zero-profile group as it restores and maintains both disc height and cervical lordosis; it is also more successful in treating spondylolisthesis. This study advocates cautious endorsement for use of the Zero-profile implant in ACDF procedures for symptomatic cervical disc disease.

Hannah Kerr
(QUB Medical Student)
Oral Presentation –
2nd Prize Category:
Clinical Research

Authors: Hannah Kerr, Tolu Olaniyan, Olanrewaju Alani Salako, Virginia George, Benard Engoru, Mary Mbukebam, Millie Kumwenda, Margaret Sipilon, Edward Shabangu, Thomas Karway, Rohit Shankar, Michael Kinney

A pilot-study questionnaire survey of healthcare provider perceptions of the management of epilepsy in pregnancy in Sub-Saharan Africa.

Background: The prevalence of epilepsy in Sub-Saharan Africa (SSA) is high with a significant treatment gap. In the SSA context, epilepsy presents substantial challenges to effective and safe reproductive and maternal healthcare.

Aims: To understand the key issues impacting reproductive healthcare for women with epilepsy in SSA

Methods: An online bespoke survey on managing reproductive health in women with epilepsy in SSA was developed by an expert panel (in accordance with STROBE guidelines) and was available for two weeks in early 2021. It was sent to healthcare professionals in SSA, who participated in an online series of lectures, then distributed it among their clinical networks.

Results: The survey was completed by 203 healthcare professionals working in SSA, including doctors (48%), nurses (36%), pharmacists (7%), midwives (1%) and clinical officers (3%). Over half (54%) of participants felt they have the necessary training to counsel women with epilepsy on reproductive health and pregnancy. Of the respondents, 40% reported they "always or often" discuss family planning. Carbamazepine was reported to be the most commonly used anti-seizure medication (ASM) for female patients of child-bearing potential. Qualitative reporting showed the key issues faced by healthcare professionals are; poor understanding of epilepsy among people with lived experience and their families, lack of information about the impact of ASMs in

pregnancy and access to a sufficient range of ASMs.

Discussion: Understanding the challenges faced by professions in SSA allows for better comprehension of the "treatment gap". This allows planning for appropriate educational and policy strategies.

Aidan Murray
(QUB Medical Student)
Oral Presentation –
3rd Prize Category:
Basic Science

Authors: Aidan Murray, Naphannop Sereesongsaeng, Dr Roberta E. Burden

TITLE: "CATHEPSIN V IN THE PATHOGENESIS OF LUMINAL BREAST CANCER: A BIMODAL APPROACH"

Background: Cathepsin V (CTSV) is a lysosomal protease selectively expressed in breast cancer (BC) and included in the Oncotype Dx® risk stratification tool[1]. CTSV is observed to promote GATA3 degradation, cell proliferation and tumour invasion in luminal BC, however its oncogenic role is not fully understood[2].

Aim: To elucidate pathways and genes associated with CTSV in luminal BC using a computational approach and explore these findings in vitro.

Methods: Gene set enrichment analysis was conducted using patient mRNA data from METABRIC[3] and TCGA Pan Cancer Atlas[4] datasets to identify associations with CTSV mRNA expression in luminal BC.

Protein arrays explored CTSV expression on receptor tyrosine kinase (RTK) phosphorylation and findings validated via Western blot. Cells transfected with CTSV-expressing plasmids investigated CTSV's impact on EGFR expression.

Results: In silico analysis suggested contrasting effects of low CTSV expression; luminal B cancers reported enrichment of anabolic pathways, yet luminal A cancers suggested enrichment of amino acid catabolism. However, both luminal A and B cancers displayed differential RTK signalling associated with CTSV.

Protein arrays suggested CTSV influences RTK phosphorylation, with attenuation of EGFR phosphorylation in CTSV knockdown cells; however, overexpression of CTSV boosted total EGFR expression via a non-proteolytic mechanism. Inhibition of extra cellular CTSV enriched GATA3 expression, implying a transmembrane, CTSV-mediated, signalling mechanism.

Conclusion: This study reports a high-throughput approach to exploring underreported proteins in cancer biology. The in silico phase identified CTSV's divergent effects in luminal A versus B subtypes, and in vitro assays imply a complex relationship between intracellular and extracellular CTSV and EGFR.

Word count: 248 (excluding references and titles)

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Medical Ethics

Modern Slavery In Healthcare Settings: Indicators and Recommendations

Adam Hewitt[1] and Tim Nelson[2]

An estimated 49.6 million people live in conditions of modern-day slavery, the most common forms of which are forced labour, domestic servitude, forced sexual exploitation of adults and commercial sexual exploitation of children, forced criminal exploitation, and forced marriage.

The best estimate for the number of victims in the UK is 122,000, though the nature of the crime means that far fewer people are actually identified and supported each year. For example, in 2022, the last full year with available statistics, 16,938 potential victims of modern slavery were identified and reported via the UK Government's 'National Referral Mechanism' system (547 of them in Northern Ireland). This was a 33% rise on the previous year's figure, continuing a nearly uninterrupted trend of annual rises since the current system launched in 2009. There were also 4,580 potential victims in 2022 referred via the separate 'Duty to Notify' process.

Under the UK's Modern Slavery Act 2015, modern slavery is an umbrella term encompassing the offences of slavery, servitude and forced or compulsory labour, and human trafficking. In practical terms, it means a person being controlled by another, usually through threats, violence, manipulation, deception and/or coercion. The exploiter's aim is usually financial profit, but it may also include sexual gratification or acting in line with a perceived cultural belief.

Human trafficking is distinct from people smuggling. While the terms are sometimes used interchangeably by journalists and politicians, they are not synonymous. Human trafficking is when someone is moved within a country or across a border specifically for the purposes of exploitation, and is a crime against a person, not the state.

Interaction With Health Systems

The nature of modern slavery means that victims are kept far away from the authorities and possible support systems. They may not present as (nor think of themselves as) 'victims' and will often feel an obligation towards their trafficker or appear completely dependent on them. As such, healthcare practitioners can be among the professionals most likely to come into contact with victims. They should therefore be trained in, and familiar with, the common indicators.

This means being aware of a vulnerable patient's presenting health condition, underlying health conditions, the impact of trauma, socio-economic background, and a possibly fragile conversation shaped by their experiences.

The vulnerable patient may only be present for a single episode of care and may fear reprisals from the trafficker and have a misplaced fear of the authorities and professionals. They may have been told they are a criminal (or have been forced to commit a crime and be being blackmailed) or told they will be deported. Some traffickers tell their victims that the authorities are corrupt and not to be trusted.

Victims of modern slavery will often lack access to their own documentation and connections to other services. A common scenario is that a victim is accompanied by a 'helpful' companion who will claim to be a friend or family member or intimate partner and will speak for them or claim to be interpreting. They will try to prevent the victim having time on their own with any professionals. They will have a scripted story or will have given the victim one to share, disguising the true cause.

Signs And Indicators

These are summarised in table 1. Victims often present as unkempt with untreated conditions and evidence of long-term multiple injuries, especially in the case of forced labour.

Selected physical symptoms associated with modern slavery victims	Other signs potentially indicative of modern slavery victims
• Sexually transmitted infections • Disordered eating or poor nutrition • Self-harm • Dental pain • Fatigue • Back pain • Stomach pain • Skin problems • Headaches and dizzy spells • Pelvic inflammation	• Not speaking the local language • Sound as if they have been coached, or someone speaking on their behalf • Inconsistencies with names, dates, addresses; vague medical history • Poor quality or ripped/torn clothing, general unkempt appearance • No registration with local services • Moving town or country frequently • Delaying seeking treatment • Little knowledge about the UK or their community • Tattoos or marks indicating ownership

There can be indications of mental, physical and sexual trauma, sexually transmitted infections, disordered eating or poor nutrition, and evidence of self-harm, dental pain or fatigue. Back pain, stomach pain, skin problems, headaches and dizzy spells are all common, as are generalised fear, anxiety and depression.

Systemic indicators include not speaking the local language; inconsistencies with names, dates, addresses and similar; no registration with local services; moving town or country frequently; delaying seeking treatment; and giving vague answers on medical history. While a reluctance to share personal details is more common, other victims may be emotional and raise concerns about their family or dependents. This is because many trafficking situations begin with an attempt to provide for family either in the UK or home country, and sometimes threats against family members are used by traffickers as a form of control.

The patient may have a lack of knowledge about the UK or the community where they now live. They often do not know their rights, and if they are not a British national, they may be vague about their immigration status or background. If they are alone, they may speak as if they have been coached on what to say.

Less common indicators include tattoos or other marks indicating ownership by exploiters.

For female victims who have been subject to sexual exploitation, common indicators include STIs, urinary or vaginal infections, pelvic inflammation, pregnancy or a recent forced termination. Indicators specific to pregnant woman can include late booking, non-attendance at appointments, poor preparation for the impending birth, presenting with non-specific symptoms, no GP, poor or no antenatal care and few personal effects.

One systematic review found that 63% of female victims of human trafficking had more than 10 concurrent health problems, and 39% had suicidal thoughts.

Trauma

Consider too the symptoms of complex trauma, which might come from a combination of their modern slavery experience and a pre-existing vulnerability or condition. This can include distrust or hostility, disproportionate responses, survival compliance, self-blame or shame, lack of recall of some incidents, and providing inconsistent information.

Trauma can also be induced by factors that are more likely to be experienced by trafficking victims compared to the general population, including injuries sustained through violence; exposure to infectious diseases; prolonged and repetitive physical, sexual and/or psychological abuse; chronic deprivation of food, sleep, medicine and safe shelter; and prolonged exposure to workplace hazards like poor ventilation and sanitation, chemicals, bacterial airborne contaminants, dangerous machinery, or a lack of protective equipment. Closely monitor the impact of your questions and be sensitive to indications like hypervigilance, mistrust, anxiety, numbing, or a dissociative state.

One study found that 78% of women and 40% of men who had been trafficked experienced high levels of depression, anxiety and post-traumatic stress symptoms. A US study found similar results: 71% of people trafficked had high rates of depression and 61% had Complex PTSD.

Also note that the vulnerable patient's worldview may inhibit engagement, due to their socio-economic background, experience of war, poverty or political unrest, or cultural motivators, shame or other beliefs. Traffickers twist these views with their toxic input, causing a traumatic clash for the victim, signified by avoidance of certain thoughts, a heightened sense of threat, and a loss of regulating emotion. When a person is distressed, confused, and distrustful of efforts to help, this can obstruct constructive engagement with authorities or support services, and complicate responses.

Other Barriers To Disclosure

The victim may be unwilling to disclose details of their experience for other reasons too, mostly centred on lack of awareness or agreement that they are in fact a victim.

Examples include dependency or 'Stockholm syndrome' with a false emotional or psychological attachment. Some may tolerate their situation because they see it as a stepping stone to a better future and compare it favourably to imagined alternatives or a chaotic/neglected upbringing. They may see their situation as a temporary 'bad job' rather than long-term exploitative trap. Others believe their traffickers' lies about the help they have been given and feel a real sense of obligation to repay them, financially and in other ways. Children may feel they are responsible for earning money for their family – they may see an exploitative situation as a sacrifice they are choosing to make.

Less commonly, some victims may believe they are under control through juju or witchcraft.

Methods Of Control

Members of the public first learning about victims of modern slavery often ask: 'If they are not locked up, why do they not run away?' This question is worth answering.

Traffickers gain and exert control using psychological and emotional manipulation, sometimes coupled with physical abuse and (rarely) locks and restraints.

Common methods include threats, beatings, violence, and sometimes death threats and threats against family members. Sometimes violence is meted out 'for show' against one victim in a household or group, as an example to the others of what could happen to them. Alternatively, small amounts of money and power can be given to certain victims in a

group who are told they are 'soldiers' or 'alphas' tasked with controlling and reporting on the others, fostering paranoia and compliance.

Playing on a victim's sense of shame is a frequent method of control, for example threatening to reveal the truth of their situation to family members, especially but not solely in the case of sexual exploitation. It is common that victims will want to hide the truth of their powerlessness from their families.

Financial control is extremely common. Grand promises are made and transport and accommodation are often provided for free or at a large discount at first, but as the exploitation deepens, the victim is told this was a debt all along, often alongside a finder's fee for the employment. This is usually a spurious debt that only ever grows (known as 'debt bondage'). The trafficker will control what and how the victim is paid, if anything, whether cash-in-hand or by controlling the address and cards associated with a bank account. This functions as another way to exert dominance, by offering occasional small sums of money from what should be a victim's own account.

Addiction is used as a tool, with the trafficker becoming the main source of a victim's alcohol, drugs or tobacco to fuel their habit and keep them compliant.

In rarer cases (in a UK context) debt bondage may have been passed down multiple generations, or a victim may feel 'bound' to their trafficker through the use of a ritual oath.

Recommendations For The Healthcare Professional

If you recognise indicators of modern slavery or believe a patient may have been trafficked, you should seek to maximise the encounter, offering as much care as possible – including other services. Respond in a non-judgmental way, be reassuring and make clear that it is safe for them to speak. The victim may find it difficult to remember details or make decisions, so allow them time to share their experiences.

Try to find out more about the situation and speak to the person in private without anyone who accompanied them. Keep your questions broad and open-ended, as these can encourage the potential victim to go off-script and bring up inconsistencies or warning signs. Examples of questions that have helped lead to a victim being identified are listed in table " and include:

Suggested questions for healthcare professionals to use during a consultation with someone displaying indicators of modern slavery:

- "Please describe how much you are in control of your choices."
- "You look very pale, can you tell me about your diet? What have you eaten over the last week?"
- "Can you tell me about your home and bedroom? Are you sharing with others?"
- "Can you tell me more about your work and the place where you were injured?"
- "Is this the first time or do you have other injuries?"
- "You are coughing a lot. I need to know about your home situation."
- "Can you leave your job or situation if you want to? Please describe what could happen to you if you left."

"Please describe how much you are in control of your choices."

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"Is this the first time or do you have other injuries?"

"You are coughing a lot. I need to know about your home situation."

"Can you leave your job or situation if you want? Please describe what could happen to you if you left."

Treat any immediate physical or medical conditions and ascertain whether the patient wishes to report to the police. Self-referral for a forensic medical examination without having to report to the police allows victims to have forensic evidence stored, in case they wish to report at a later date. Avoid calling the police or immigration services unless you have the informed consent of the patient or where the threat of danger to the patient or others is such that you need to do so. Do not make promises you cannot keep about what will happen next.

Limit invasive examination and assess the need for further testing in the case of STIs and/or pregnancy.

Offer as much information as possible about their health condition and treatment. Ensure they know they can access health services freely and provide information on support services. Be discreet if necessary, for example by offering helpline numbers on small slips of paper that can be hidden in clothing, rather than leaflets or brochures. If applicable and possible, provide a complete regime of prescribed medication in that single encounter, on the assumption they will not return for follow-up treatment and assessment.

Some victims or traffickers may imply that something about their situation is a cultural practice or something that a UK healthcare professional would not understand or be familiar with. Do not let this prevent you from making an informed assessment about their safety and what to do next.

Speak to your manager, colleagues or local safeguarding leads for support and advice.

Wider recommendations include pushing for modern slavery and human trafficking training at your organisation, seeking collaborations with partner organisations on this issue

(statutory or non-governmental organisations) or joining a regional Anti-Slavery Partnership if one exists.

Case Study

Kambili (name changed) was tricked into leaving his home country in West Africa by two men who made false promises and pretended they wanted to help him. Kambili was at a vulnerable point, having become separated from his wife and three children during conflict and fighting.

The traffickers promised Kambili safety and work in the UK and to pay for his transport, so he accepted. But when he arrived, they took away his ID, housed him in a crowded room and left him for five days without food. He was then subjected to forced labour for seven years, working on farms, often for 14 hours a day, and receiving no pay. He was trafficked internally all around the UK, and regularly threatened or beaten by his abusers. Kambili was also sexually abused.

When Kambili was injured at work, the situation was impossible to ignore and the trafficker took him to get medical attention. The medical worker recognised several indicators of modern-day slavery and managed to speak to Kambili alone without the trafficker. He was safeguarded and later entered into the National Referral Mechanism, with help from anti-trafficking charity Hope for Justice.

For Advice Or To Report A Concern

Modern Slavery Helpline (24/7) 0800 012 1700
help@hopeforjustice.org

About Hope For Justice

Hope for Justice is an anti-trafficking charity that was founded in the UK in 2008, and which now works internationally. Its programmes reach approximately 200,000 people each year, across four pillars of work: preventing exploitation, rescuing victims, restoring lives and reforming society. Hope for Justice has a wholly owned social enterprise, Slave-Free Alliance, which provides services to companies and public bodies seeking to protect their operations and supply chains against the risks of modern slavery and labour exploitation.

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Case Report

Extrapleural Haematoma following Percutaneous Coronary Intervention

Tunde Oyebanji[1], Peter Mhandu[1], Rory Beattie[1], Adesh Ramsewak[2], Jebrail Merza[2]

A 66-year-old patient was referred to our unit because of a 1-day history of sharp right-sided chest pain. A day before this, he had percutaneous coronary intervention (PCI) to the right coronary artery (RCA). The procedure was through the right radial artery, and a tortuous right subclavian artery was noted.

On review, there were no ECG changes, and acute coronary syndrome was ruled out. A month before the procedure mentioned above, he had PCI to the left anterior descending artery (LAD) because of a Non-ST Segment Elevated Myocardial Infarction (NSTEMI), after which he was commenced on dual antiplatelet therapy (Aspirin and Ticagrelor).

A CXR on admission showed a peripheral pleural opacity with smooth borders (figure 1). He subsequently had a chest CT scan, demonstrating an extensive right posterolateral extrapleural haematoma (EPH), including features of compression of the right upper lobe (figure 2). There was no contrast extravasation. Although his haemoglobin concentration fell to 8g/dl, he remained haemodynamically stable. He was, therefore, scheduled for Video Assisted Thoracoscopic Surgery (VATS) evacuation of the haematoma thirty-six hours after to allow the effects of Ticagrelor to wear off.

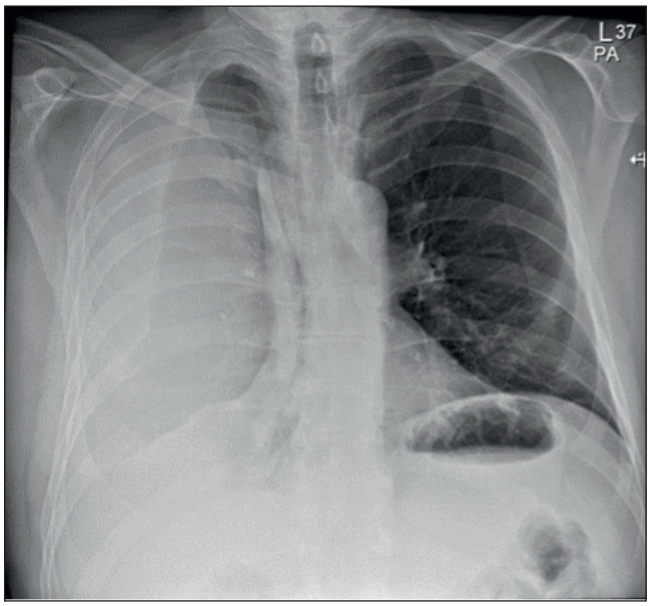

Figure 1. Chest X-Ray on admission, showing a peripheral pleural opacity with smooth borders

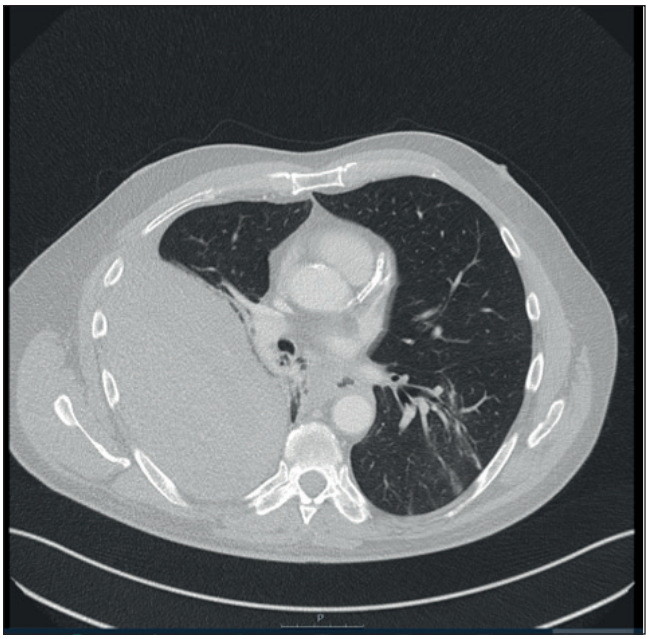

Figure 2. CT scan of chest, showing right posterolateral extrapleural haematoma

Intraoperatively, there was a large, clotted extrapleural collection with all the apical and lateral pleura stripped off the chest wall. There was a small defect in the pleura communicating with the pleural cavity and a small haemothorax. The extrapleural collection and haemothorax were evacuated using a 2-port VATS approach, the pleura opened widely and the pleural space copiously lavaged. Two chest drains were left in situ. Ticagrelor was restarted on the third postoperative day, and the patient discharged on the fifth postoperative day. Figure 3 shows the CXR on the twentieth postoperative day.

EPH is infrequent after PCI via radial artery access. The more commonly reported complications are mediastinal and cervical haematomas secondary to injuries to the subclavian artery[1,2,3]. Tortuosity of the subclavian artery could be the predisposing factor in our case, as well as dual antiplatelet therapy. Clinical distinction between EPH and haemothorax

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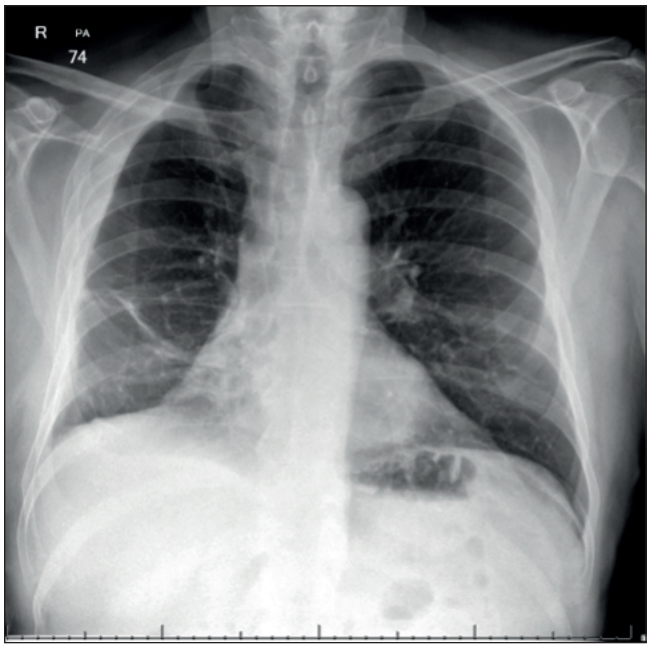

Figure 3. Chest X-Ray 20 days post-procedure, showing extensive resolution of changes

is mandatory, as the two have frequently been mistaken. EPH should be suspected if there is a peripheral pleural opacity on a CXR. However, this should be confirmed by a chest CT scan showing a biconvex extrapleural collection. As EPH is often not in continuity with the pleural cavity, routine chest drainage will not treat the condition[4]. VATS evacuation and drainage, possibly preceded by angiographic embolisation in scenarios of active bleeding, is the treatment of choice[5].

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Medical History

Vintage Anesthetics and Antiseptics: Sir. J.W. Browne's views on ether, chloroform, and iodoform (1880-1890)

Tracy Freudenthaler[1]

Key words: Sir J.W. Browne, iodoform poisoning, vintage antiseptics, vintage anesthetics.

Running Title: Vintage Anesthetics and Antiseptics: Sir. J.W. Browne's views on ether, chloroform, and iodoform (1880-1890)

Introduction

Globally during the late 1800's, surgeons argued their loyalty to ether or chloroform, the popular anesthetics of choice. At the same time, iodoform emerged as a surgical antiseptic, repeating the dilemma on the surgical table: efficacious agents also brought harm. Revered Ulster Medical Society (UMS) President Dr. John Walton Browne (later Sir) contributed to these discussions, lauding iodoform's versatility in his own practice as surgeon and ophthalmologist. This article presents an overview of Browne's views on ether and chloroform, and various historical uses of iodoform with its dangers in the late 1800's. The article also features an original handwritten journal entry circa 1890, where Browne describes symptoms of iodoform poisoning. There is continued interest in this vintage journal[1] for some of Ireland's great Doctors -Henry "Health" O'Neill Sir William Whitla, J. A. Lindsay, and Sir J. W. Browne all contributed entries here.

John Walton Browne (Figure 1) was born in Belfast in 1845; his father was the prominent surgeon and mayor, Dr. Samuel Browne. Educated first in a private academy with Dr. Russell, he then studied medicine in Dublin, London, and Vienna.[2] He joined practice at his father's Belfast Ophthalmic Institution at Great Victoria Street and has been noted among the "pioneers of Ophthalmic Surgery in Belfast"[3]. He was loved and respected in his practice by colleagues, students, and nurses[2,4] and remembered with the fondest regard.

Figure 1: Image of Sir John Walton Browne published with his November 1880 Presidential opening address to the Ulster Medical Society. UMS Archives.[9]

Sir John Walton Browne, MD (1845-1923)[2]

Browne was consulting surgeon at The Royal Victoria Hospital Belfast[2,4] and had various other appointments during his expansive career. Sympathetic to the cause of public health and that of the working man, he was an avid supporter of the Workman's Compensation Act.[5] He was also a member of various professional organizations including the Ulster Medical Society, where he was admitted June 1, 1868[6] and served as President from 1880-1881. Browne's accolades included an honorary degree, Doctor of Laws (LLD) from Queen's University in 1909[7], and he was awarded a Knighthood on June 22, 1921.[4,8]

When Browne passed away in 1923, colleague Dr. M'Cready wrote: "With the passing of Sir Walton Browne one of the oldest landmarks of the medical world in Northern Ireland has been removed. Every doctor knew Sir Walton and he knew all of them"[4].

The contest: Ether vs. Chloroform

Dr. Browne began his November 1880 UMS Presidential opening address with a discussion of the surgical anesthetic agents chloroform and ether, the first holding his highest regard. However, he indicated the literature of that time presented a strong preference for ether. He referred to one of these articles, "A surgeon who used chloroform in preference to ether, should a death occur in his practice, deserved to be tried for manslaughter."[9] Similarly, in 1875 he referenced a 'Mr. Carter' in *The Lancet* who noted chloroform poisoning was fatal in one out of every 2,500 cases, but ether had *never* taken a life.

Dr. H. C. Wood from Philadelphia called the discovery of antiseptics and anesthesia "epoch-making" in an 1890's version of *The British Medical Journal*.[10] He cautioned that with this knowledge came much responsibility, and deaths from chloroform and ether were far too common. Noting the carelessness of some physicians, he agreed with their

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sentences of manslaughter for patient deaths, and reflected "yet, the carnage continues".[10] Both agents ruled in surgery during the late 1800's, yet the price of efficacy included the fear of complications and fatalities.

The dilemma was not a new one, the advantages and disadvantages of ether and chloroform had been investigated by the Committee on Chloroform appointed by the Medico-Chirurgical Society[11] in 1864. The report indicates both served their purpose similarly to achieve a state of 'insensibility'; however, their action varies: chloroform depresses cardiac action, and ether impacts respiration.[11] In that manner, chloroform was more likely to kill, and often suddenly. The prevailing thought for many was that ether acted so slowly it was barely suitable to produce an unconscious state, and for that reason chloroform was the winner in the United Kingdom. The report also includes discussion of trials mixing ether and chloroform together in attempt to marry the desirable properties of both, neutralizing their hazards, without fatalities to the animal subjects. The given mixture ratios were one part chloroform to either two or four parts ether,[11] both of which were being used in the United States.

Browne goes on to say the alliance to ether or chloroform was no doubt dependent on a surgeon's own experience, but *also* nationality. Given America was the birthplace of ether, "the first attack on chloroform originated there as well".[9] Browne accounted for successful chloroform administration up to 7,000 times in Belfast with no deaths, and cleverly retorted there was "…little attempt to keep account of deaths to use of ether".[9] In his UMS Presidential address, Browne also stated prevention of complications from use of either agent required diligent attention to the heart. Morphine prior to the administration of chloroform would calm the patient; and should complications arise, and poisoning occur, the antidote was nitrite of amyl.[9]

Naturally, with the debate over the most efficient and effective anesthetics, one would assume similar discussions related to antiseptics. Browne identified the use of iodoform in his Presidential address but did not allude to any contest. Iodoform was piquing conversations among many medical men. Dr. Newell referred to iodoform's acceptance as an antiseptic in his 1888 work: *The best surgical dressing: How to prepare it and how to use it.*[12] He included various case studies, one being a gunshot wound to the abdomen. The surgical anesthetic of choice was "50 drops of laudanum and one ounce brandy", and the dressing used- iodoform. At the end, the original author 'Mr. Smart' stated "I merely bring this case forward in the hope that it may elicit the opinions and experience of others on the utility of iodoform as an antiseptic." Dr. J.W. Browne left some of his opinions in a most unanticipated fashion to be discovered over 130 years later.

Iodoform Poisoning—Sir J.W. Browne's journal entry

In 2021 the author acquired a vintage handwritten journal believed to be owned by Dr. Henry "Health" O'Neill.[1] While the purpose of the journal is not entirely clear, Doctors O'Neill, Sir William Whitla, J.A. Lindsay, and Dr. J.W. Browne each made entries into the journal, which spans from approximately 1889 until the autumn of 1899. The entries included diagnostic criteria, various remedies, medicinal preparations, and even hospital admissions and payments received. The physician entries widely vary in topic, from O'Neill's brain surgery[1] to Lindsay's insight on ailments of the heart and tonics[13] to treat them. It was during these years the colleagues were serving together in The Ulster Medical Society. In fact, the opening of Dr. Dill's Presidential address (as recorded in the Transactions of the UMS[14] where Whitla was secretary) called sharp attention to Dr. Browne's acclaimed surgical skills. The Transactions further record accounts of the other gentlemen's activities, with commentaries regarding one another's skills and case studies.

The randomness of the entries pique interest. They are not specifically ordered, and Dr. Browne's notes follow entries by Sir Whitla related to urticaria. Browne begins a new page describing "caries" (See Figure 2 for partial image): "molecular death of bone, similar to ulceration of the soft parts-disintegration of the earthy from the animal matter." Included on the page are unarranged names and addresses which are marked with enclosed lines, the author here has not been determined.

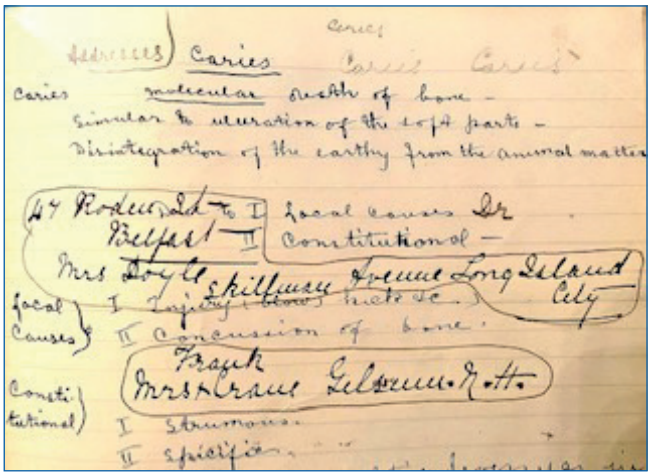


Figure 2: Partial image of Dr. J.W. Browne's 1890 handwritten journal entry on caries. Note the random addition of names and addresses circled. Journal owned by T. Freudenthaler.

The entry labeled "iodoform poisoning" stands alone as a single page in beautiful cursive. (See Figure 3). Table 1 provides a transcription of this handwritten journal entry. Browne begins with symptoms of poisoning, "high temperature, quick pulse, vomiting and delirium", which are consistent with referenced Bartholow, Bodecker, and Whitla (cited within this article, later). The delirium symptom is alarming, as Browne indicates it can become severe enough to appear "…maniacal; resembles that of typhus". Of all the experiential knowledge Browne could have recorded, interest is piqued why he would lay down important caution regarding iodoform, and to what extent this warning was needed in the late 1880's-1890's. Given the context of his

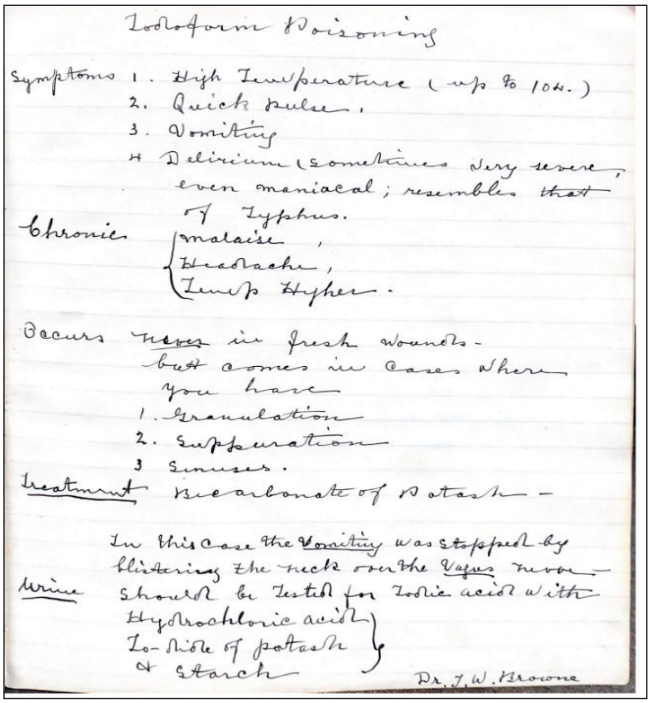
Table 1: Dr. J. W. Browne's Journal Entry: Iodoform Poisoning. Circa 1890.

Iodoform Poisoning: Transcript of Dr. J. W. Browne's handwritten journal entry
Symptoms 1. High temperature (up to 104) 2. Quick pulse 3. Vomiting 4. Delirium (sometimes very severe, even maniacal; resembles that of typhus)
Chronic Malaise, Headache, Temp Higher.
Occurs never in fresh wounds, but comes in cases where you have 1. Granulation 2. Suppuration 3. Sinuses
Treatment Bicarbonate of Potash In this case the vomiting was stopped by blistering the neck over the Vagus nerve
Urine Should be tested for Iodic acid with Hydrochloric acid Io-dide of potash & starch
Dr. J. W. Browne

UMS address a few years earlier, it appears iodoform was holding its place as the surgical antiseptic of choice, but with a similar caveat as the anesthetics-the potential for harm was great.

Iodoform: "*the* antiseptic for wound dressings"[12]

Iodoform (triiodomethane) is a yellow crystalline solid which belongs to the family of organic halogen compounds used as an antiseptic component for certain medications.[15] First discovered in 1822,[15,16] its antiseptic action was not widely known until around 1880.[15] Known for its sweet taste and strong odor, it was originally used in Vienna as a dressing in bone and joint tuberculosis[12] and diseased tissues.[9] Quickly the use expanded into dentistry and longer-term treatments post-surgery and for all sorts of wounds.[9,12] Newell broadened the use of iodoform as an antiseptic to include fresh, septic, and wounds and sores of specific natures following Lister's strong caution for sterile environments.


Iodoform Poisoning
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Chronic Malaise, Headache, Temp Higher.
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1. Granulation
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Treatment Bicarbonate of Potash -
In this Case the Vomiting was stopped by blistering the neck over the Vagus nerve
Urine should be Tested for Iodic acid with Hydrochloric acid, Io-dide of potash & starch
Dr. J. W. Browne

Figure 3: Image of Dr. J.W. Browne's handwritten journal entry: Iodoform Poisoning. Circa 1890. Journal owned by T. Freudenthaler.

Browne noted in 1881 iodoform was being used for "… joint diseases, caries, cold abscesses, diseased bone, fungal granulations, and other instances where tissues have been surgically removed". Also, "the cavity is to be thoroughly washed out with carbolic acid or thymol and entirely filled with iodoform".[17] Then, unless there is a discharge, the dressing applied should remain in place up to three weeks. Browne noted this treatment was effective enough to prevent amputation as opposed to other treatments. The iodoform "diminishes secretions, prevents decomposition, prevents formation of tubercle in the granulations, or destroys them if already present".[17] Another treatment for fungus infected tissues was by injecting iodoform directly into the joint or tumor. Iodoform was also tried for antiseptic use, by combining it with urine or animal matter, but not entirely effective for prevention of bacteria; rather it seemed to prevent the smell of the solution.[17]

According to Browne, the shift to iodoform was because it could be used in multiple areas as a disinfectant and antiseptic where carbolic acid would not be appropriate, such as the mouth, intestine, rectum, and vagina. [17] Newell also believed iodoform superior to carbolic acid, it "…won a place in surgery which it will retain until some better medium is discovered." He also declared iodoform "… is today *the* antiseptic for wound dressings."[12]

Iodoform's versatility in the late 1800's

The literature of the 1870's-1880's recorded various uses of iodoform. It was used in gynecological and obstetric ailments, tissue injury, and pruritus vulvae. Applications included ointments, powders, and sprays. *The Dublin Journal of Medicine* stated, "It produced no pain and was very rapid in its action."[18] Preparations included iodoform powders rubbed with Vaseline and iodoform combined with eucalyptus oil. In 1884 Bodecker, a New York dentist, published a work introducing the use of iodoform in dental surgery, hailing it's analgesic and anesthetic properties use across other medical practices. He used solutions of iodoform in ether for cavity treatment or when performing root canals.[16] Yet, he cautioned when iodoform was applied as a powder, there were recorded complications among children and women including mania and death.[16] Still today, iodoform is commonly used in dental practice as an antiseptic either alone, or in combination with eucalyptus oil or glycerin for the treatment of dry socket.[15]

Iodoform use in Ireland was recorded; Dr. Purdon addressed his "Irish brethren" in 1873 making "no apology"[19] for his

support of its versatility. At Belfast General Hospital he had used the agent for a variety of uses including neuralgic and chronic rheumatic affections, and a "disfiguring glandular enlargement on the neck".[19] It was also being used at the Belfast Hospital for Diseases of the Skin. Purdon noted the use had expanded to treating phthisis, rheumatism, chlorosis, anemia, and vaginal cystitis. *The Dublin Journal of Medicine* published a preparation in 1880 of "five grains iodoform, 10 minims of oil of eucalyptus, 35 grains of cocao butter".[18] Most commonly it seems iodoform was the primary choice for wound dressings. Henry "Health" O'Neill memorialized two cases of nerve damage in a forearm in 1880[20], both using iodoform gauze dressings.

The vintage literature records iodoform as an experimental treatment for sexually transmitted infections and reproductive health issues. Sir William Whitla's *Elements of Pharmacy, Materia Medica, and Therapeutics* from 1898 indicates it was used for a variety of "…antiseptic purposes, including treatments for gonorrhea, syphilis, and scabies." [21] Venereal disease patients that presented with open sores and chancres provided opportunity for physicians to examine iodoform remedies.

In cases of syphilis sores or eruptions on the tongue and mouth, iodoform could be used in a pastille[22] (e.g., lozenge). Another preparation was experimentally used for treatment of gonorrhea. Iodoform would be combined with eucalyptus oil and cocoa butter and applied to bougie at the urethra, followed by administration of zinc injections and sulphate.[18,22] After a week to ten days, pus discharge would decrease.[18] Newell indicated that disinfectant suppositories of iodoform, combined with cocao butter, gelatin (to hold the iodoform) and morphine could be used in cases of rectal, uterine, and vaginal cancers.[12(p.91)] Dr. Taylor, from the United States of America, noted iodoform was used not only for syphilis, but also herpes cases. However, he noted some colleagues considered iodoform to be absolutely poisonous to handle or administer to patients.[23]

Iodoform poisoning, mania, and intoxication

In the literature from the late 1800's, the chance of iodoform poisoning varied based on several factors, particularly patient age (*with the eldest being more susceptible)*, the extent of the wound itself, and the way the agent is used. Iodoform is distinctly blamed for problems and patient fatalities, as opposed to post-surgical complications with similarly presenting symptoms.

Browne said in 1880 that typically "…iodoform is not absorbed, with no toxic effects other than a bit of quickly terminating nausea."[9] While generally considered harmless, iodoform poisoning had been documented, the prevailing collection of symptoms including fever up to 104 degrees Fahrenheit, rapid pulse, and vomiting. This is consistent with Browne's handwritten journal entry. Yet, there was overarching concern over the unpredictable cognitive and behavioral impairment which followed some cases. Browne's journal entry warns a mania may ensue, similar to typhus. Bodecker warned of complete coma and "disturbances of the functions of the brain, appearing as phenomena of acute meningitis or actual brain diseases" and also "…symptoms of mental depression, and the taste of iodoform in the mouth."[16] Similarly, Dr. Wood warned other surgeons in 1890 to note there had been array of deaths due to "iodoform poisoning."[10]

In 1908 Dr. Roberts Bartholow described "iodoform mania"[24] as a host of cerebral symptoms including profound depression which could even lead to death. Note this is the infamous Bartholow, who in 1874 inserted electrically charged needles into 30-year-old Irish immigrant Mary Rafferty's brain, which led to her death three days later.[25] Bodecker and Bartholow both noted symptoms of high fever, loss of appetite (which would return once iodoform was removed), and rapid pulse up to 180.[16,24] Sir William Whitla noted iodoform in large doses "…produces disturbances of digestion, loss of appetite, rapidity of pulse, increase of temperature, and cerebral disturbance, not unlike some forms of alcohol intoxication, passing into melancholia, collapse, and possibly death."[21] P.J. Hayes, a Dublin surgeon, recorded "iodoform intoxication" in a similar manner as Whitla, adding the "…patient may even exhibit a disposition to commit suicide."[26]

In the event of complications, the prevailing response was the immediate cessation of administration of the iodoform e.g., removing the iodoform saturated bougies, bandages, and gauzes. Taylor documented several cases where removal and avoidance of iodoform was key to the elimination of symptoms: the eczema "…ceased on the discontinuance of the use if the drug."[23] Browne documented two treatments in the handwritten journal, first bicarbonate of potash and second blistering the neck at the vague nerve to stop the vomiting. Bartholow instead encouraged the "judicious use of stimulants and frequent small tinctures of opium."[24]

Evident in the literature from the time, there were accounts of a vast spectrum of symptoms which varied from patient to patient. While iodoform was reliable in its action as an antiseptic, its outcome was not as confident; a symptom resolved in one patient may very well carry another to death. Taylor spoke to this dilemma in 1883, as iodoform use grew in popularity "…the toxic action of iodoform being beyond dispute, the interesting question suggest itself, in what way does the drug act?"[23]

Summary

This article provided historical insight into Sir J. W. Browne's views on the ether versus chloroform debate; then explained how iodoform became the antiseptic of choice in the late 1800's. The literature examined provided various surgeons' accounts of iodoform's expanding use and subsequent risk of patient harm. Dr. Browne's original journal entry 'iodoform poisoning,' and related published works served as warnings. Browne served over 37 years while at The Royal Victoria Hospital Belfast[4] in addition to his other appointments in

Ireland during his prolific career as surgeon, ophthalmologist, and teacher.[27] There are accounts by colleagues of Browne performing over 7,000 surgeries in just one year[4], positioning him to have keen insight and experience with the anesthetics and antiseptics of his time.

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Game Changers

A GAME-CHANGER IN FREE-TISSUE SURGERY: THE FUTURE'S BRIGHT, THE FUTURE'S FLUORESCENT…

Microvascular free tissue reconstruction is the highest 'rung' of the reconstructive ladder and a well- established tool in the plastic surgeon's armoury. A resource intensive peri-operative course is often anticipated given the significant technical demands of free-flap surgery and the concentrated 'monitoring' period following successful restoration of perfusion.

Various intrinsic and extrinsic factors contribute to free-flap survival. Perforator angiosome is one of such factors responsible for most cases of partial flap loss and marginal necrosis, in addition to experience in clinical monitoring[1]. Advancing technologies are permitting reconstructive surgeons to augment the age-old, subjective clinical methods of flap assessment via capillary bleeding, blanching, temperature and Doppler pulse with real-time dynamic assessment of tissue perfusion. Indocyanine-green angiography (ICGa) is one such modality gaining

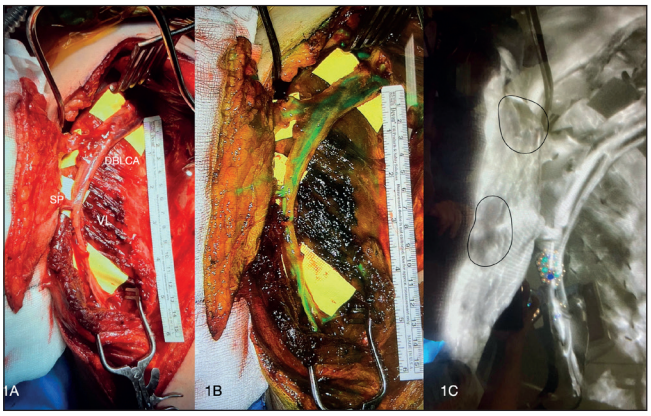

Figure 1A demonstrating an anterolateral thigh free flap prior to pedicle division. It is perfused by a single skin perforator (SP), dissected from its intramuscular course via vastus lateralis (VL) and adjoining to its parent vessel: the descending branch of the lateral circumflex artery (DBLCA).

Figure 1B highlights the effect of ICG a on the same intra-operative image, with fluorescence of the parent vessel and perforator system.

Figure 1C shows an alternate setting on the Stryker Hand-Held SPY-PHI camera used to refine the fasciocutaneous flap. Areas evidencing reduced fluorescence via SPY-Q scoring are deemed to have reduced perfusion and are trimmed accordingly.

traction in surgical literature with applications including perforator selection, angiosome definition and post-operative monitoring[2]. We have employed this technology effectively in the Regional Reconstructive Plastic Surgery Unit, Dundonald recognising reduced rates of marginal flap necrosis, partial flap loss and re-exploration since its

Figure 2A demonstrating a left antero-medial soft tissue defect of the leg secondary to debridement of unstable scar tissue in the setting of infected metalwork and associated osteomyelitis.

Figure 2B representing post-reconstructive appearances, with refined free anterolateral thigh flap in-situ demonstrating a highly aesthetic contour and homogenous perfusion following ICGa assessment.

introduction. Navigating perfusion issues intra-operatively is no longer a subjective effort and whilst ICGa is not a substitute for clinical acumen, it can provide significant aid in taking the decision to revise an anastomosis, re-orientate flap inset or discard poorly perfused regions, ultimately reducing costly interventions for avoidable morbidity[3].

With growing evidence for its efficacy, the adoption of ICGa as a 'standard of care' in free tissue surgery is surely a not-to-distant future…

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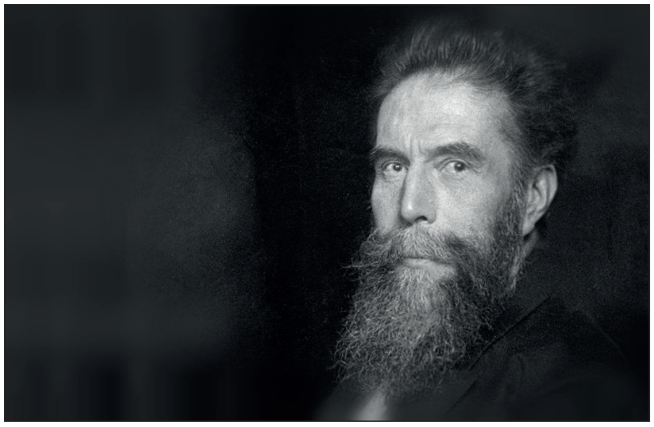
Curiositas

QUIZ 1



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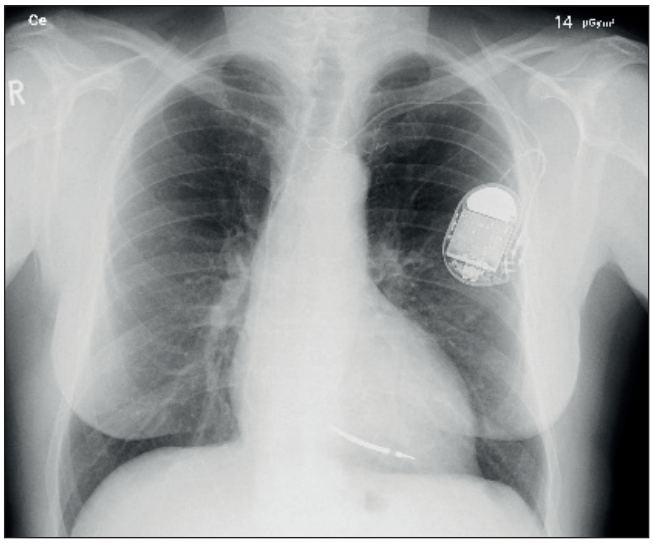
1. Who is this person?
2. What did they discover?

Aaron Vage (PhD Student, Centre for Medical Education, Queen's University Belfast), Andrew D Spence (Clinical Lecturer, Centre for Medical Education, Queen's University Belfast).

QUIZ 2



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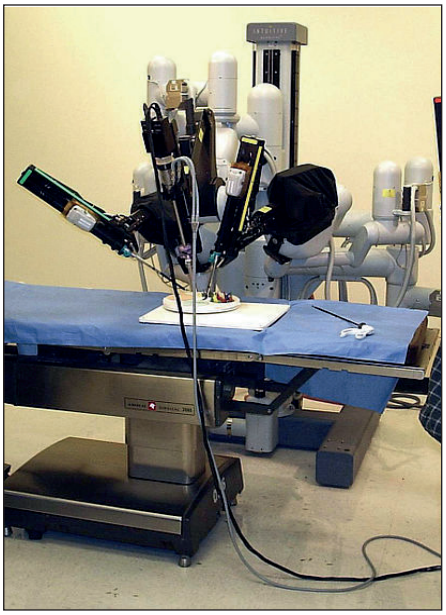
1. What is this device?
2. When was it first engineered?

Aaron Vage (PhD Student, Centre for Medical Education, Queen's University Belfast), Andrew D Spence (Clinical Lecturer, Centre for Medical Education, Queen's University Belfast).

QUIZ 3



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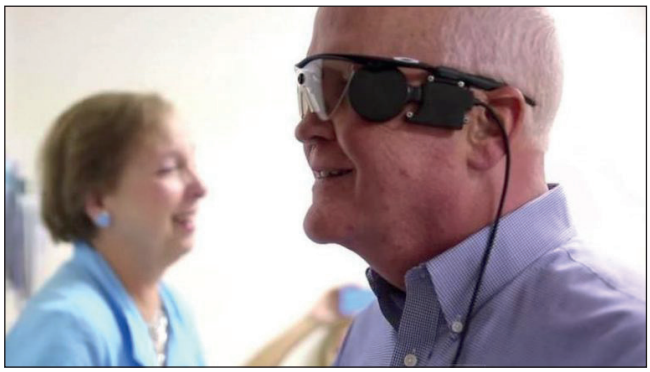
1. What is this machine?
2. What was the first of its kind called?

Aaron Vage (PhD Student, Centre for Medical Education, Queen's University Belfast), Andrew D Spence (Clinical Lecturer, Centre for Medical Education, Queen's University Belfast).

QUIZ 4



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1. What is this device?
2. What condition was it used to treat in 2015?

Aaron Vage (PhD Student, Centre for Medical Education, Queen's University Belfast), Andrew D Spence (Clinical Lecturer, Centre for Medical Education, Queen's University Belfast).

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Curiositas: Answers

QUIZ 1

1 & 2. In 1895, the German physicist, Willhelm Conrad Roentgen, accidentally stumbled upon X-rays whilst investigating the ability of cathode rays to move through glass panels.[1] During one such cathode ray experiment, Roentgen's attention was drawn to a green glow coming from a fluorescent screen at the other side of the lab. As the cathode tube was encapsulated in thick black card, Roentgen was mystified as to the origin of the glow. Finally concluding that the cathode rays colliding with a solid target was the cause, Roentgen decided upon the name "X-rays" to represent their then unknown capabilities.[2] Today we have a more complete understanding of both the beneficial and adverse effects of X-ray radiation – several radiographic protocols have been developed to lessen exposure time. Whilst X-rays continue to be a popular tool in the medical sphere, their advent has accelerated the development of a variety of other imaging techniques such as computed tomography, echocardiography, and magnetic resonance imaging.

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QUIZ 2

1 & 2. Dr. Albert Hyman developed the first iteration of a cardiac pacemaker in 1932. Hyman engineered his device with technical precision – an intricate system of centrifugal weights governing the velocity of a spring motor that ultimately delivered an electrical power source by turning a magneto-generator[1]. However, whilst Hyman's pacemaker was technically brilliant for its time, it encountered many issues in terms of efficiency and safety. One such example is that to deliver an external electrical current to the heart, Hyman insisted that a bipolar needle should be inserted into the right atrium of the heart by puncturing a patient's chest wall. This apparently outrageous idea did not gain traction with the American Medical Association, who dismissed Hyman's work as, "gadgetry" at best and the work of the devil at worst[2]. As Hyman's work slipped into obscurity, the Swedish duo of Ake Senning and Rune Elmqvist finally developed a transistor-based pacemaker in 1958, that could be placed within the epigastrium – leading to the first human transplant, occurring in the same year.

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QUIZ 3

1 & 2. Hailed as the first surgical robot, "Arthrobot" was created in the early 1980's by Dr James McEwen and Geof Auchinlek, of the University of British Columbia, to improve orientation accuracy of the femur for total hip arthroplasty[1]. Under the command of the orthopaedic surgeon, Dr. Brian Day, Arthrobot's first surgical foray was in 1983. The voice-controlled bot's ability to position a patient's limbs, select specialist equipment, and communicate with the surgical team took the medical world by storm – National Geographic went on to produce a robotics documentary starring none other than Arthrobot[2]. The landscape of medical robotics has changed considerably over the last four decades. Today the da Vinci surgical system, an advanced master-slave system controlled remotely by a surgeon from a console, is one of the most popular surgical robots on the market. As technology continues to advance, we could eventually see robots perform lab tests without human intervention, remove plaque from arteries, take tissue biopsies, or attack cancerous tumors[3].

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QUIZ 4

1 & 2. The first bionic eye transplant to treat age-related macular degeneration (AMD) occurred in July 2015, at the hand of Professor Paula Stanga – the term "bionic eye" is often used to describe the implantation of an artificial retina. Stanga used the "Argus II" implant, manufactured by the US company Second Sight, during his seminal procedure at Manchester Royal Eye Hospital [2]. Argus II had previously been used by researchers to restore limited vision to patients with retinitis pigmentosa, however, before 2015 it had never been used to tackle AMD [3]. Since Stanga's landmark procedure, ocular technology has seen a number of advances. For example, a recent study led by Michiko Mandai at the RIKEN Center for Biosystems Dynamics Research in Japan [4] has used genetic modification to enhance human-derived retina transplants grown in the lab. Researchers transplanted these modified retinal sheets into damaged mouse retinas and removed certain cells from the grafts at specific times. This allowed better connections to host retinas, resulting in more responsiveness to light in the damaged eyes. Since the retinal sheets were generated from stem cells of human origin, this represents one of the final steps necessary before this technique can be tested in human clinical trials for repairing retinal degeneration.

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James was born in Belfast, educated at RBAI and is currently reading Architecture at the University of Edinburgh. He produces original prints of architectural and landscape subjects, mainly from Northern Ireland and Scotland, but also undertakes commissions.
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