

COMMENTARY

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ORIGINAL PAPERS

[CT AND MR CONTRAST IN BREASTFEEDING MOTHERS: IS CURRENT PRACTICE EVIDENCE BASED?](#)

Colleran et al addresses the issue of administering CT/MR contrast to breast feeding mothers. In a survey of 92 radiologists, two-thirds recommended ‘pumping and dumping’ for 48 hours. The authors state that this is unnecessary because negligible amounts of gadolinium are secreted in breast milk.

[IMPROVING OBSTETRIC DEBRIEFING: AN INTERVENTIONAL STUDY](#)

McCarthy and Russell measured the frequency of debriefing before and after a 2-session educational intervention. The debriefing rates increased from 24.6% to 59.6%.

[ACCURACY OF CARBOHYDRATE COUNTING IN PATIENTS WITH TYPE 1 DIABETES USING INSULIN PUMP THERAPY](#)

Keaver et al studied the carbohydrate counting (CC) in 19 patients with insulin dependent diabetes. The findings were that the patients showed poor competence in CC assessment. Continued education of diabetic patients is advised.

ORIGINAL PAPERS (Continued)

[NEGATIVE PAEDIATRIC APPENDICECTOMY RATES](#)

O'Sullivan et al studied paediatric appendicectomies over a 7-year period. There were 1315 appendicectomies, 423 (31.9%) were normal. The ultrasound, where performed, was inconclusive in 80% of cases. Among the normal appendix group there were other findings such as a fecolith, and lymphoid hyperplasia.

[MULTIMODAL PHYSICAL ACTIVITY PARTICIPATION RATES IN MIDDLE-AGED AND OLDER ADULTS](#)

Cooper et al studied the amount of physical activity undertaken by older individuals aged 50-64 years and 65-90 years. Only 51% achieved 150 minutes per week. The barriers included joint and muscle pain.

[THE ROLE OF PUBLIC HEALTH NURSES IN THE DETECTION OF DEVELOPMENTAL DYSPLASIA OF THE HIP](#)

McGlacken-Byrne et al reviewed 339 infants diagnosed with DDH. Among 86 late diagnosis cases, two-thirds were identified by Public Health nurses. The authors conclude that Public Health nurses provide an important safety net.

[FERTILITY PRESERVATION IN ADOLESCENT MALES](#)

Horan et al report on 15 male adolescent oncology patients referred for fertility preservation. Twelve attempted to produce sperm. Eight patients had sperm successfully cryopreserved.

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[PAEDIATRIC CYSTIC PARATHYROID ADENOMA](#)

Akhtar et al describe a 15-year-old male with vomiting, irritability and weight loss. The serum calcium was raised 4.56 and PTH 157.9. The ultrasound and scintigraphy showed a right sided parathyroid adenoma. The adenoma was successfully removed.

[AN UNUSUAL BURN INJURY CAUSED BY AN E-CIGARETTE](#)

Quinlan et al report a 60-year-old male who had been carrying an e-cigarette in his left breast pocket. The e-liquid leaked causing a full thickness burn which required a skin graft.

[THE IRISH PHINEAS GAGE: FRONTAL LOBE TRAUMATIC BRAIN INJURY](#)

Durcan et al describe a 46-year-old man who fell from scaffolding and sustained a penetrating injury to his left fronto-parietal and temporal lobes. He physically recovered but was left with a changed personality. He became paranoid, short-tempered, with poor social awareness. His neurological deficit was similar to that described in the Phineas Gage case report.

LETTERS TO THE EDITOR

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The Children of 2020

J.F.A. Murphy - Editor of the Irish Medical Journal

Many countries including Ireland¹, the US², and England³, have reported on how children have fared during this pandemic year 2020. All paediatric commentators concur. Fewer children become infected and they have a milder clinical course. When exposed to the infection, children under 12 years are less than half as likely to acquire the virus. They account for 6% of Covid-19 cases despite representing 25% of the population.

One explanation relates to the ACE2 (angiotensin converting enzyme) receptor site. The renin-angiotensin system originally known for its role in blood pressure control, is also a critical trigger of inflammation in various body organs including the respiratory tract. The SARS-CoV-2 spike protein binds to the cell ACE2 in the nasal mucosa, the first point of contact. This promotes internalisation of the virus into human cells. There is an age-dependant expression of ACE2. Its activity is lower in children compared with adults⁴. Another explanation is that coronavirus infections associated with colds in children is providing some protection. Coronaviruses account for 15% of colds. Children under 2 years have 5 or more respiratory infections annually. They have 44 days per year with mild URTIs. The activation of adaptive immunity may have a protective role.

These findings about Covid-19 are very different to children's susceptibility to influenza infection. Twenty-five per cent of children contract influenza each year compared with 5-10% of adults. During the 2018/2019 season, 1,245 children were hospitalised with influenza. For the forthcoming winter the HSE's National Immunisation Advisory Committee (NIAC) has recommended the influenza vaccine (LAIV) for all children aged 2-17 years inclusive⁵.

The restrictions and lockdowns, implemented last March, have had major educational and psychological impacts on children. It is the biggest sociological test since the second world war. From a young age, children spend a large proportion of their time in the school setting. It is where they are educated, make friends, and participate in social and cultural activities. School is the vehicle through which the State channels much of its investment in children.

In England 575 million school days were lost, the corresponding number for Ireland was 56.7 million school days. The academic progress of children was slowed down or halted during the school closure. The acute withdrawal from their teachers was both confusing and difficult for them to comprehend.

Christakis² recently pointed out that the virus will leave a long trail. Covid-19 has changed the beginning of life for many millions of children. Every child has only one childhood and it passes very quickly^{6,7}. The most notable deficits have been encountered in younger children. They have been denied the early building blocks of reading and early numeracy. One of the best markers of a good educational achievement is the child's reading skills at age 8-9 years. US data found that 23% of children with poor reading skills failed to graduate from high school. The problems are worse for disadvantaged children. In the UK, by time children reach GCEs, those from poor backgrounds are 18 months behind their middle-class peers. There are widespread concerns that the school closures will have further widened this gap. The crisis has exposed and amplified the existing inequalities facing children. If the schools had failed to reopen after the summer holidays, we would now be facing an intergenerational crisis.

The damage to children goes beyond education. They were denied contact with their grandparents and their friends. Children need to constantly mix with other children in order to develop their linguistic and social skills. There were lost events, birthdays, and milestones.

The 10% of children with special educational needs and disability have faced a set of particular challenges. There are 7,728 children attending special schools, and 6219 children attending special classes in normal schools. There are 37,500 children being supported by 15,950 SNAs. During the lockdown a vast network of education and support was removed from these vulnerable children.

Many parents fear that their child may have regressed during the school closures. Very few parents have the necessary skill set to teach children with special needs. Looking after this group of children around the clock has caused stress and burnout among parents. Respite care was reduced or non-existent. One source reported that 70% of parents have stated that their own mental health has declined.

The lockdown made children more vulnerable to the risk of harm. School plays an important role in child protection. Longfield² states that in England there is data on the number of children who faced additional risks as the crisis unfolded. She estimates that 6 children in every class grows up at risk due to family circumstances. The toxic trio of domestic abuse, parental alcohol/drug abuse, and parental mental health problems. Job losses and financial stress have compounded the problems. During the school closures these children became more invisible to services. The number of children being referred to social services fell by 20% during the lockdown. In Ireland, Childline reported a 26% increase in calls.

The new school term has started smoothly. A sense of normality has returned despite the background of many uncertainties. The Government's repeated statements that the schools will remain open is highly welcome. Children's needs must be a priority as we work through this protracted Covid-19 pandemic. All Covid-19 documents and directives should have a section dealing specifically with the impact on children.

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Hiding in Plain Sight – Post Stroke Cognitive Assessment

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Cognitive decline after an acquired brain injury such as stroke is intuitively understood by both physicians and patients alike. Post Stroke Vascular Cognitive Impairment is an umbrella term for any one, or combination, of delirium, exacerbation of pre-existing dementia, transition of Mild Cognitive Impairment/Vascular Cognitive (MCI/VCI) Impairment to dementia, precipitation of new-onset dementia or VCI, and stable or improving cognitive deficit analogous to traumatic brain injury. Although the Irish National Stroke Audit recommends that 'all patients at risk should be screened periodically using a simple, standardised screen'¹, there are practical challenges in assessment due to the often complex linguistic, perceptual and praxis changes of stroke which means that assessment is neither simple nor standardised. Post-stroke cognitive impairment is an under-recognised and managed condition that results in significant functional impairment for many patients. We explore barriers to diagnosis and suggestions for approach in clinical practice.

Estimate of the impact of stroke diseases on cognition vary considerably: at the higher estimates, up to two-thirds of patients have been reported to have some post-stroke cognitive decline with up to one third progressing to develop dementia². A major systematic review suggested that 10% have a pre-existing dementia syndrome prior to an acute stroke, an additional 10% develop new dementia shortly after a first-overt stroke while more than one-third of patients may experience dementia following a recurrent stroke³. As there are approximately 10,000 strokes annually in Ireland and an estimated 30,000 people living in the community with post-stroke disability¹, it is clear that post-stroke cognitive decline is an issue of considerable importance

Clinical practice is often focused on the physical manifestations of stroke rather than the neuropsychological, with an emphasis on return to tasks related to self-care and independence rather than higher order cognitive function. Stroke patients share many of the risk characteristics for cognitive decline and all forms of dementia such as older age, smoking, hypertension, atrial fibrillation, and diabetes. Furthermore, many new presentations with memory impairment show evidence of previous infarction on brain imaging which may not have previously been formally diagnosed as stroke disease due to a lack of consensus on how to approach 'silent' stroke.

In the presence of communication and sensory disabilities, clinicians may need to consider a wider range of methods for assessing cognitive status, such as appropriateness of recognition of staff and family, preservation of diurnal rhythms, adequacy of engagement with care routines and rehabilitation, safety awareness, and carry-over of rehabilitation inputs over the course of time⁴. Non-verbal tests may also be helpful, with Raven's Matrices more helpful than standard cognitive screens, and tools such as 4-AT of more utility as they contain both observation and informant history.

Assessment is also made more difficult by confounding factors, particularly in the early phase of injury, such as increased risk of delirium (25% incidence in the acute post-stroke phase⁵) and depression. Incidence of depression post-stroke is as high as 33%⁶. Identifying change from cognitive baseline is complicated by the unfamiliar hospital environment and interaction with healthcare professionals who had not previously been in contact with these patients. Although 80% of extended cognitive assessments in Ireland are carried out by occupational therapists and 15% by psychologists, staffing deficits of occupational therapists in stroke units and a dearth of clinical psychologist posts may contribute to the paucity of in-depth cognitive assessment³.

Identification of functional impairment, key in dementia diagnosis, is not straightforward in the acute phase of stroke and assessment is ideally carried out later in the clinical course, with the differentiation as to what the cause of the deficit is cognitive or physical, a relatively sophisticated clinical judgement. On a practical level, the organization of assessment differs between institutions. Stroke outpatient and community services should provide adequate time and resources for appropriate cognitive assessment; it is a cause of some concern that coordinated community stroke services recommended in the Irish National Stroke Audit have not yet been implemented.

A study of 122 stroke survivors (median age 52) in Ireland published in 2016 found that 82% had been working before their stroke but only 32% were in full-time employment one-year post-stroke⁷. Mental fatigue (84%) and difficulties thinking (78%) were two of the three most common reasons reported causing difficulty at work. Although a younger cohort than the average of stroke patients, this study suggests a higher prevalence of cognitive dysfunction which may not be detected in standard cognitive impairment screening: earlier identification may aid in counselling of patients. Amongst a more age-representative sample of stroke patients, post-stroke cognitive impairment at 3 months is associated with increased institutionalization and a twofold increased risk of death at 3 years⁸.

For those diagnosed with post-stroke dementia, prognosis is more nuanced as some patients may stabilise after the initial insult: up to 20% will show recovery from a post-stroke cognitive decline. Others may undergo progressive cognitive decline related to worsening underlying vascular disease or a pre-existing dementia unmasked by the stroke-related deficit. In that context, standard dementia treatment such as acetylcholinesterase inhibitors should be trialled to assess benefit. Psychological interventions for cognition post-stroke may be of benefit, with a recent systematic review showing a small but significant effect on cognition, particularly attention and memory but not on executive dysfunction⁹.

The most effective strategy in preventing post-stroke cognitive impairment lies in the primary prevention of stroke disease. Management of vascular factors such as hypertension, hypercholesterolemia, diabetes, and smoking, as well as vigilance regarding detection of atrial fibrillation is effective not only in preventing acute strokes with hospitalisation but may also prevent the development of vascular cognitive decline¹⁰.

Although pharmacological intervention for post-stroke cognitive change is limited, significant benefit can be gained from post-diagnostic counselling and appropriate psychosocial support strategies from the fields of delirium and dementia care. Stroke services must engage in educating staff, patients and the public on post-stroke cognitive decline and limit progression through standardization of assessment, optimisation of vascular risk factors, treatment of delirium and dementia, and effective support.

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CT and MR Contrast in Breastfeeding Mothers: Is Current Practice Evidence Based?

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Abstract

Aim

Breastfeeding rates in Ireland are slowly increasing. In the setting of a mother breastfeeding requiring a CT or MRI study with either contrast media we set out to investigate how she would be advised to manage her lactation?

Methods

A survey was sent to all Consultant and trainee radiologist members and fellows (760) in the summer of 2017.

Results

Of the 760 fellows and members contacted 97 (12.7%) responded to the survey. Clinical questions on the topics were asked of 52% (50 respondents) multiple times per year. There was no specific policy in place with regards to advice for nursing mothers following administration of iodinated or gadolinium-based contrast media in 43% of responses (42 respondents). "Pumping and dumping" for 24-48 hours for one or both types of agents was recommended by 68% (66 respondents). That a Faculty guideline would be helpful to them in their practice was identified by 95% of respondents (92 people).

Discussion

Less than 1% of iodinated or gadolinium-based contrast is excreted in breast milk and less than 1% of this is absorbed. These are negligible amounts. Currently almost 70% of professionals are recommending mothers pump and dump whereas research suggests that it is safe to continue breastfeeding without interruption.

Introduction

Breastfeeding rates in Ireland are low but increasing (46% initiation in 2004, 56% in 2013) ¹. Due to the slow but continual increase in breastfeeding rates, radiologists are increasingly being asked if a period of interruption is required following the administration of iodinated or gadolinium-based contrast media. Nursing mothers come in contact with the radiology department when they experience perinatal complications either directly relating to pregnancy and delivery or due to pre-existing co-morbid conditions which can be exacerbated by pregnancy and delivery. Potential studies include, computed tomography pulmonary angiography (CTPA), MR brain with contrast for stroke-like symptoms or severe headache and CT abdomen and pelvis in settings of ileus or obstruction.

Breastfeeding is important for the nursing dyad. There is good evidence to support lower mortality and morbidity from infection in children who are breastfed for longer ². For the lactating mother, it can decrease the risk of breast cancer and may decrease the risk of both diabetes and ovarian cancer ²⁻⁴.

There are significant risks to the breastfeeding relationship of interruption even if temporary. Not all mothers can express their breastmilk or indeed have access to the necessary skills and equipment, contrary to popular belief not all babies will feed from a bottle when they are used to breastfeeding. This may lead to mastitis in the mother and dehydration of the baby. This further exacerbates the medical issues the mother is currently experiencing adding additional stress and co-morbidity.

It was hypothesized that historically low rates of breastfeeding impacted on clinical knowledge, experience and practice. Further that as a result of this, medical recommendations to nursing mothers were not evidence based. Anecdotally, on social media peer support networks, breastfeeding mothers report differing advice regarding the need to interrupt breastfeeding following administration of contrast media for CT or MR investigations. A need was therefore determined to assess clinical practice in Ireland and the need for a National evidence-based guideline.

Methods

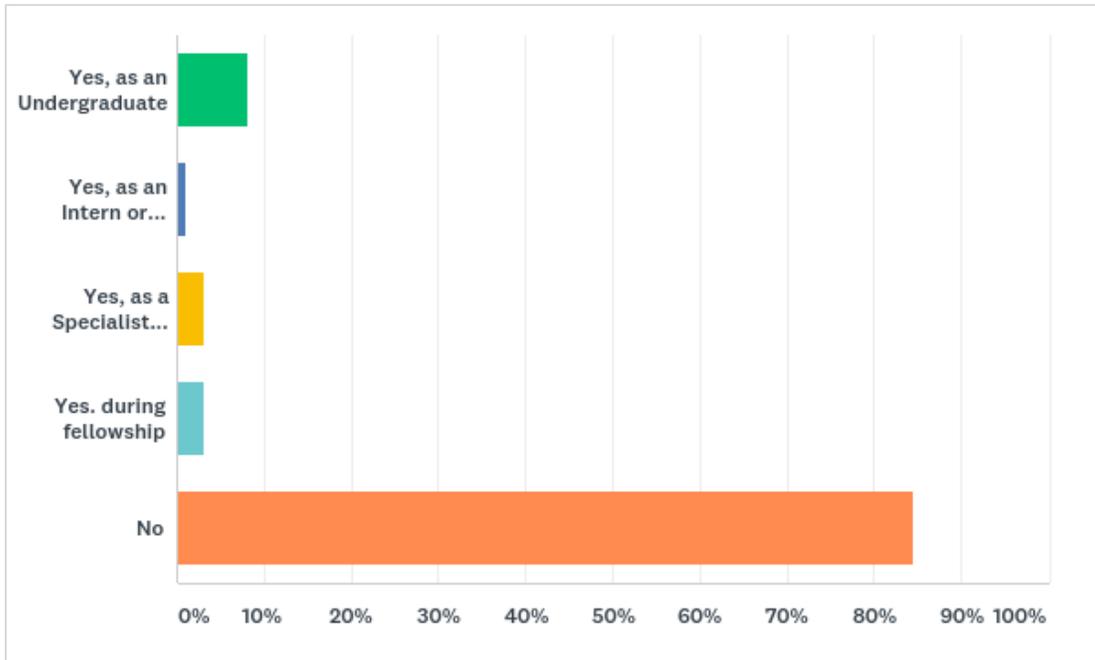
The Faculty of radiology surveyed its Fellows in the summer of 2017 regarding practice with respect to nursing mothers and contrast studies. The survey was administered via Survey Monkey [™] and sent to all 760 fellows of the faculty. A reminder email was sent in late August 2017. Participants were asked nine questions. Information was gathered on department role (Consultant or Trainee), training received in breastfeeding medicine, subjective assessment of knowledge level on the topic, presence or absence of a departmental policy on the topic, practice regarding continuing or temporarily interrupting breastfeeding, members' opinion on the need for a national guideline on the topic.

Results

Disappointingly only 97 responses were received from 760 recipients, a response rate of 12.7%.

The majority of respondents (65, 67%) were Consultant Radiologists, with a near equal mix of Pre and Post Fellowship Registrars, 15 (15.4%) and 16 (16.4%) respectively. Of the 82 respondents (84.5%) had not undergone any form of training in breastfeeding medicine, neither at undergraduate nor post-graduate levels. 15 (15.4%) had undergone some training. This was as an undergraduate (8, (8.2%), intern 1, (1.03%), specialist Registrar 3, (3.09%) and on while Fellowship 3, (3.09%), (Figure 1).

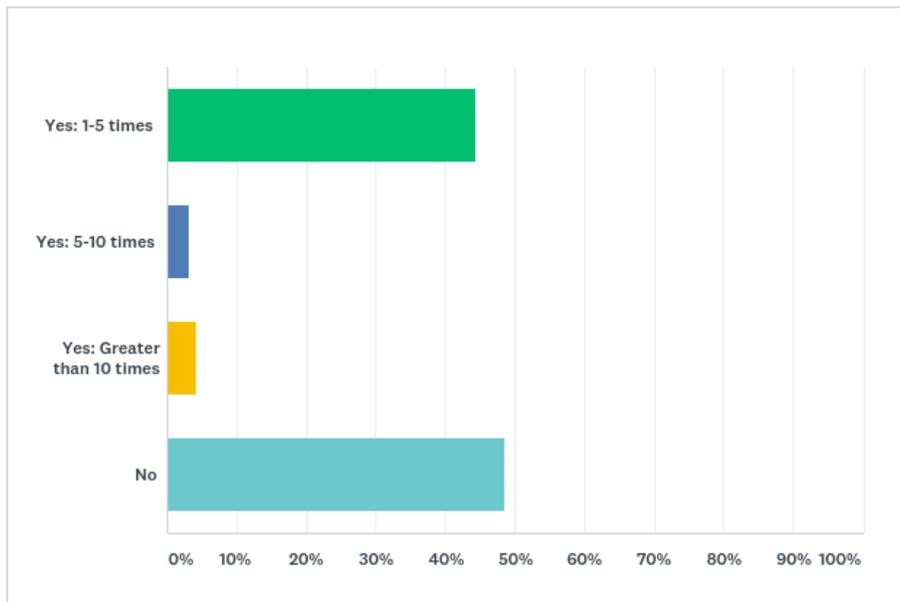
Figure 1: Survey Question 2 – Did you undergo Breastfeeding Medicine training?



Almost 70% of respondents (64) did not feel appropriately trained to provide evidence-based information on the topic to support their practice. It has to be assumed that they had either not attended or had been unable to find appropriate continued professional development (CPD) on this topic despite having identified a deficiency in their knowledge.

Of the respondents 50 (51.5%) had been asked clinical questions on the topic within the past year with a small number of respondents asked on greater than ten occasions (4 respondents, 4.1%), (Figure 2).

Figure 2: Survey Question 4 – Have you been asked about breastfeeding and contrast media in your clinical practice in the past year?



Fifty-two (57%) were aware of a departmental guideline regarding contrast and breastfeeding within their departments. A small number of these policies were based on international guidelines from the ACR and the RCR, 12%, (12 respondents) and 27% (26 respondents) respectively.

Most practitioners 49 (56% of 87 responses), recommended cessation of breastfeeding post contrast administration for 24-48 hours (Figure 3). There was further variation in practice as some practitioners only recommended interruption for iodinated contrast (8, 8.3%), others for gadolinium-based contrast media (11, 11.3%) but the majority who recommended interruption of breastfeeding, recommended it for both (39, 40.2%) (Figure 4). Ninety (95%,) respondents thought that a Faculty guideline would be helpful in their daily practice.

Figure 3: Survey Question 7 – Do you recommend the cessation of breastfeeding to patients?

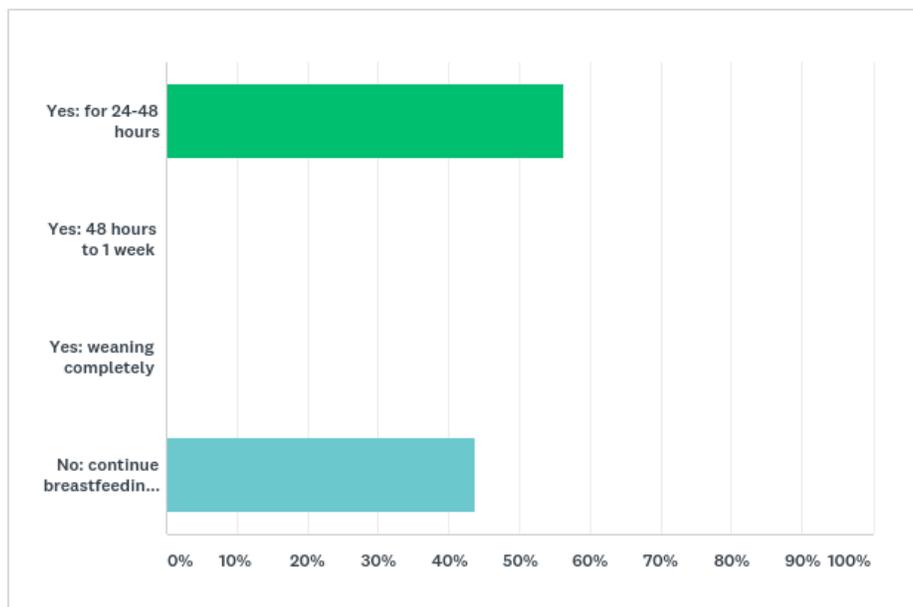
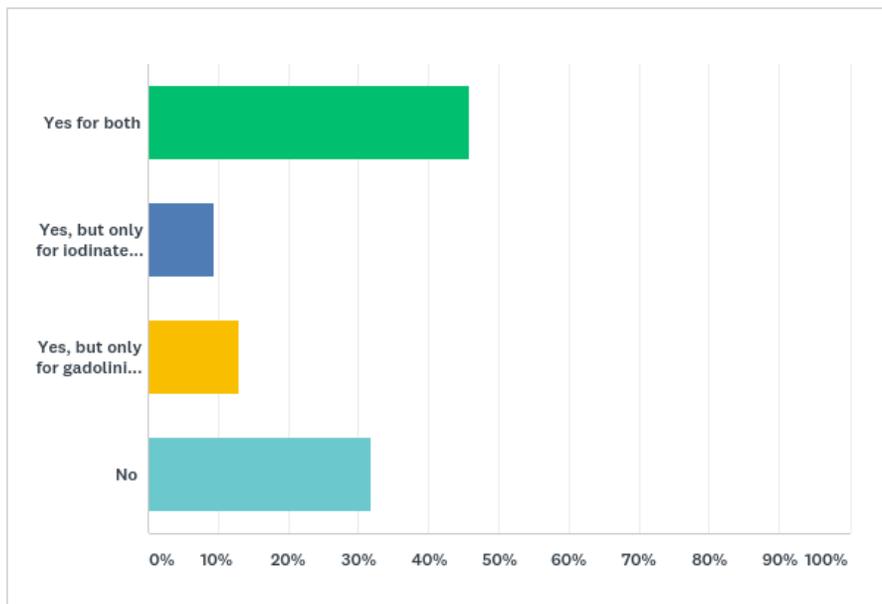


Figure 4: Survey Question 8 – Do you recommend that Mothers “pump and dump” breastmilk after iodinated or gadolinium-based contrast media?



Discussion

Results from this survey demonstrate that 54 respondents, 56% of our Fellows were recommending interruption to breastfeeding following administration of either gadolinium or iodine-based contrast. This recommendation is not in keeping with the current evidence and in fact poses risk to the nursing dyad in terms of mastitis in the mother and the negative potential health risks to both mother and Infant of early permanent weaning.

Less than 1% of the administered dose to the Mother of iodinated contrast material (CT contrast) is excreted into breast milk and of this less than 1% of this dose is absorbed by the infant. No adverse effects have been reported in the literature. Mothers can be safely advised to continue nursing without interruption⁵⁻¹⁰. This is consistent with the recommendation from the American College of Radiology and the Royal Australian and New Zealand College of Radiologists^{8,11,12}.

Research studies demonstrate that less than 0.04% of the dose of gadolinium based contrast media administered intravenously to the mother is excreted into her breast milk in the first 24 hours, and of that which is ingested by the infant, less than 1% is absorbed from its gastrointestinal tract resulting in a dose to the infant which is less than 0.0004% the dose administered to the mother^{8-10,13-15}. Lactating mothers can therefore be safely advised to continue nursing without interruption. This is consistent with the recommendation from the American College of Radiology and the Royal Australian and New Zealand College of Radiologists^{8,11,12}.

The majority of respondents 82 (84.5%) had not undergone any training in breastfeeding medicine and 66 (68%) did not feel confident to discuss their practice in this area based on evidence-based principles. This is significant as it explains the heterogeneity in practice and deviation from evidence-based practice in this area. It highlights a need for inclusion of modules in breastfeeding medicine within both undergraduate and post graduate curricula. As national health policies emphasize the importance of supporting breastfeeding dyads to reach their nursing goals it is important that radiologists and other healthcare professionals are provided with the appropriate evidence-based information to advise lactating mother. An e learning module could be developed for use by practitioners to support CPD.

The evidence does not support interruption of breastfeeding with the described risks to the nursing dyad of early weaning, mastitis and loss of the protective effects of breastfeeding for both mother and infant. These findings led to the development of a national guideline which is now freely available on the Faculty website (www.radiology.ie) for fellows and patients alike¹⁶.

Iodinated (CT) and gadolinium-based (MR) contrast agents are safe in breastfeeding mothers. Women should be advised to continue breastfeeding their children as normal without any interruption to breastfeeding post imaging. It is important to avoid unnecessary interruptions to breastfeeding due to the health risks to the nursing dyad of potential early weaning and the risk of mastitis in the mother.

Declaration of Conflicts of Interest:

The authors have no conflicts of interest to declare.

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Improving Obstetric Debriefing: An Interventional Study

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Abstract

Aims

We aimed to improve rates of obstetric debriefing following operative deliveries.

Methods

Utilising a prospective interventional design over a four-month period, we compared rates of documented Obstetric debriefing before and after an intervention. The intervention consisted of two 20-minute staff education sessions and dissemination of relevant literature.

Results

There were 292 pre-intervention cases and 318 post-intervention cases. There was a statistically significant improvement in the documentation of debriefing rates ($p < 0.001$) from 24.6% ($n=71$) to 59.6% ($n=190$). There was an improvement in documentation by all categories of Non-Consultant Hospital Doctors (144%), with Senior House Officers, Junior Registrars and Senior Registrars improving by 1060% (7% vs 81.2%), 173% (21.2% vs 57.9%) and 118% (28.6% vs 62.5%) respectively ($P < 0.001$).

Conclusion

We demonstrate how a simple, cost-neutral intervention can improve debriefing rates. Further work needs to examine the content of postnatal debriefing to ensure consistency and to assess their acceptability for women.

Introduction

Pregnancy and childbirth can have significant positive and negative implications for the health and wellbeing of women, both physically and psychologically.¹ While even a medically uncomplicated spontaneous vaginal delivery can be traumatic for women², births which involve increased medical intervention such as an operative vaginal delivery (OVD) and emergency Caesarean section (CS) are associated with increased psychological morbidity³.

In order to combat this, strategies to improve patient knowledge and understanding have been introduced including the provision of antenatal classes.⁴ Providing healthcare providers with additional communication skills training and reinforcing concepts such as active listening and recognising cues from women may be integral in creating a positive postnatal experience.⁵

Interestingly, even though interventions are performed by Obstetric doctors, there is a paucity of data on the role of medical, or doctor-led debriefing following obstetric interventions in labour.

The analysis of midwifery-led debriefing has found minimal⁶ or no significant benefit as a strategy to combat post-traumatic stress disorder,⁷ hence it is not recommended by the Cochrane collaboration.⁸ There is evidence that early postpartum counselling for women following emergency CS can decrease post-traumatic stress reactions compared to those who do not receive counselling.⁹ Numerous professional bodies have advocated debriefing and review of women following adverse obstetric events (such as stillbirth,¹⁰ collapse¹¹ and postpartum haemorrhage¹²). However, any delivery, even if deemed obstetrically “uncomplicated” may be viewed by a woman as an adverse event, and thus may be relevant in these scenarios. Furthermore, postnatal discussion gives women the opportunity to discuss their delivery with their care providers and provides an opportunity for health promotion and education.¹³

In this study, we aimed to assess rates of debriefing following OVD and emergency CS in our institution. We hypothesized that rates were low and therefore designed a cost-neutral intervention with the aim to increase rates of debriefing.

Methods

We conducted a quality improvement initiative examining debriefing rates of postnatal women by doctors in a tertiary level university maternity hospital over a sixteen-week period from February to May 2018. The primary outcome measure of our study was to improve debriefing rates utilising a cost-neutral intervention.

Our pre-intervention phase (PRIP) data collection involved the sampling of all OVDs and CS' over a defined six-week period in women attending public combined antenatal care. Once inclusion criteria were applied, deliveries were sourced from birth registers. Utilising the electronic chart system, patient charts were assessed, and post-delivery documentation was reviewed. 14 parameters were collected during this study phase.

Following this, the quality improvement initiative consisted of an intervention phase which involved a twenty-minute presentation to all Non-Consultant Hospital Doctors, as well as two electronic mail newsletters both of which included information on debriefing, its' purpose and role in obstetrics. The presentation and email discussed the initial results from the PRIP, and the importance of reviewing a woman following operative delivery (for example allowing the woman to make sense of her birth story by explaining what happened and answering her questions, exploring her potential negative feelings of having “failed” to have a spontaneous vaginal birth leading to a more positive labour experience). Ongoing support and information were also offered to improve documentation of debriefing visits if this was a perceived obstacle. The electronic mail newsletter was sent initially at the time of the presentation and then two weeks' later. This time interval was chosen to act as a refresher for staff.

Four weeks following the initial presentation and email, the post-intervention phase (POIP) data collection was performed prospectively over a six-week period. The same methods and parameters were collected during this time period. Doctors were blinded to the timeframe of the collection periods to eliminate this as a potential confounder.

Exclusion criteria for our study were all women who attended a consultant privately for their antenatal care, as these women are reviewed in the postnatal period by their booked consultant or nominated substitute and are offered a routine 6-week postnatal appointment.

Following the two phases of data collection, data was analysed using Microsoft Excel and Predictive Analytics Software in each group; Descriptive analyses were performed and both groups were then compared to assess the percentage and rate of change following the intervention.

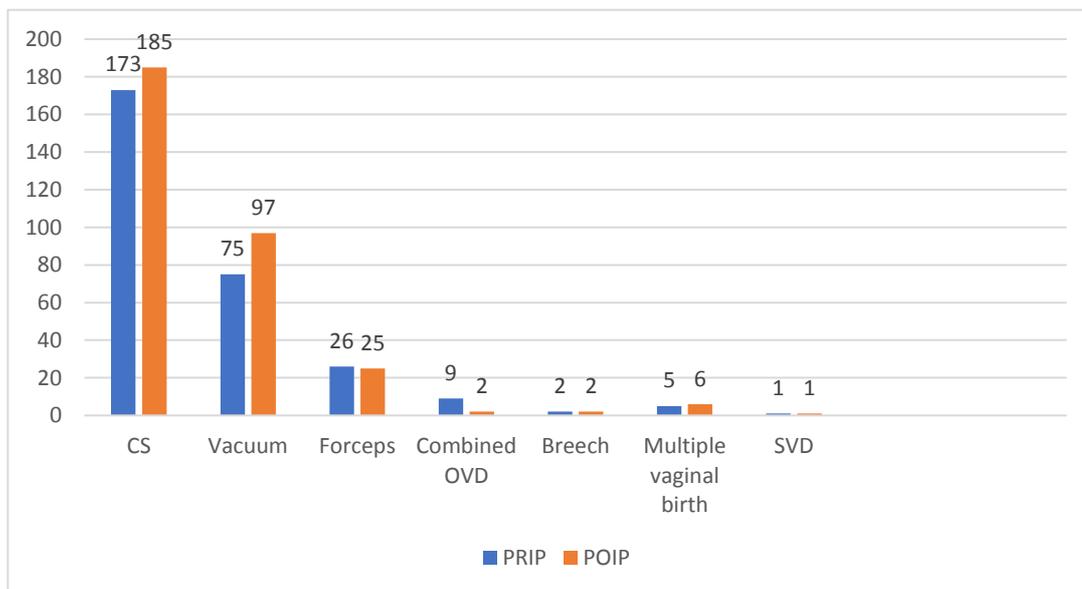
Ethical approval was received from the South/South West Local Information Governance Group.

Results

Demographic information

During the twelve-week data collection phases, there were 609 CS or OVDs for analysis (291 in PRIP and 318 in POIP). The majority of deliveries were conducted by registrars during both PRIP and POIP (91.9%; n=560), with consultants present (either supervising or conducting the delivery) in 6.2% (n=38) of cases. There were a similar number of CS and OVD between both time periods (CS: 59.4% (n=173) vs 58.1% (n=185); Graph 1). There were also similar numbers of neonatal admissions to the Neonatal unit in both data collection phases (16.4% (n=48) vs 16.9% (n=54)).

Graph 1. OVD and CS rates during PRIP and POIP.



Pre-intervention Phase

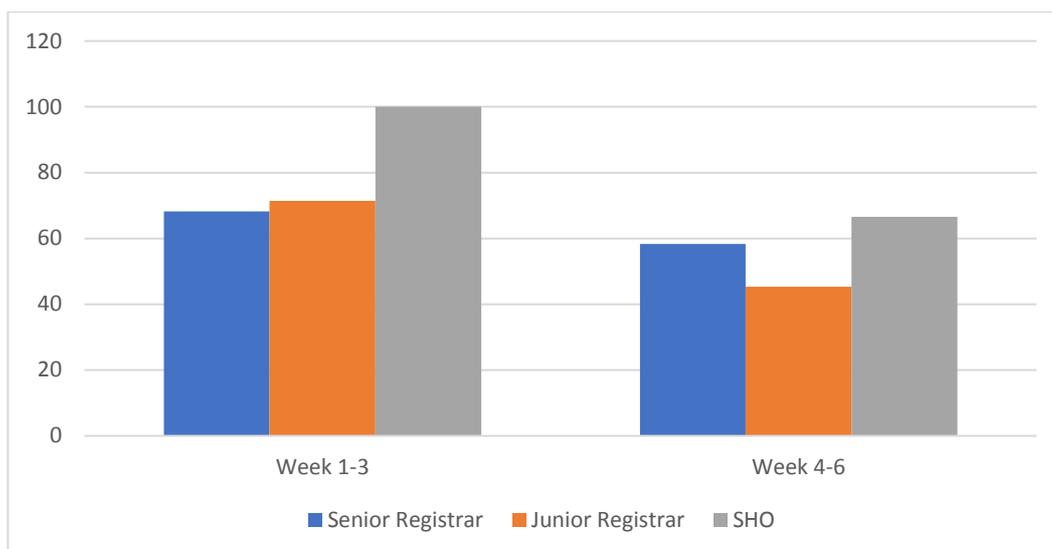
During PRIP, the overall debriefing rate was 24.4% (n=71), with Senior Registrars (SR) more likely to debrief than their Junior Registrar (JR) or Senior House Officer (SHO) colleagues (28.6% (n=35) vs 21.2% (n=31) vs 7.0% (n=1); p= NS). Debriefing visits were most likely to be conducted on day 1 or 2 post-delivery (80%, n=112). Women were most likely to be reviewed twice in the postnatal period. In addition, debriefing was carried out by 38 doctors who were not present at the delivery, 14 of whom were Consultant debriefs. These typically occurred where women were admitted to the High Dependency Unit on the Labour Ward following delivery for observation for maternal reasons.

A postnatal outpatient appointment was arranged for 6.8% (n=20) of women.

Post-intervention Phase

The overall debriefing rate during the POIP was 59.7% (n=190), with an SHO more likely to debrief than their registrar colleague (81.2% (n=13) vs 62.5% (n=65) vs 57.9% (n=109); p=NS)). When this time period was divided into the first three weeks vs the second three weeks, there is a visible reduction between periods (Graph 2). Similar to PRIP, debriefing visits were most likely to be conducted on day 1 or 2 post-delivery (45.9%, n=146); however more women were debriefed on the date of delivery (10%; n=19). Women were most likely to be visited only once in the postnatal period. In addition, debriefing was carried out by 33 doctors who were not present at the delivery. Postnatal follow-up appointments were offered to 13 women (4.1%).

Graph 2. Rate of Change in debriefing rates during POIP.



Comparison of PRIP and POIP

Debriefing rates improved overall from 24.4% (n=71) to 59.7% (n=190) following our intervention ($p < 0.01$), most marked in the initial three weeks following training. As is demonstrated in Table 1, an improvement was seen in the documentation of debriefing by all categories of doctors. Women were also more likely to be reviewed sooner after their delivery (Day 0 or Day 1) in the POIP compared to the PRIP (where there was no woman debriefed on Day 0). Documentation of discussion of future mode of delivery in those eligible for a trial of labour following CS also improved between PRIP and POIP (8.7% vs 34.7%, $p < 0.01$).

Table 1. Changes in debriefing rates between PRIP and POIP.

	Debriefed PRIP % (n)	Debriefed PROP % (n)	Percentage Change between PRIP and PROP	P value
Senior Registrar	28.6% (35)	62.5% (65)	+ 118%	<0.0001
Junior Registrar	21.2% (31)	57.9% (109)	+173%	<0.0001
Senior House Officer	7% (1)	81.2% (13)	+1060%	<0.0001
Overall	24.4% (71)	59.6% (190)	+144%	<0.0001

Discussion

Our results show how a simple intervention can have a significant improvement in the number of women who received a debriefing visit from their delivering doctor in the postnatal period. While there was a dramatic change in the rates of debriefing, it was evident that when comparing the two time periods of the POIP, there was a reduction in the number of debriefing visits that occurred as time advanced. This attritive trend has been previously described in the formation of new skills, for example when examining the management of emergency situations.¹⁴ In these studies, psychomotor skills have been shown to reduce dramatically in the first month, and then stabilise, but remain above pre-training levels.¹⁵ It demonstrates the importance of continuing professional development, the distribution of circulars to staff and the need to successively reinforce practices and policies that should be adhered to in the healthcare environment.

This study has a number of notable strengths. It is a novel topic which has been infrequently explored in the literature. It highlights an area of postnatal care that is often overlooked, yet an area that can have significant implications on women's and their families lives going forward.

However, there are a number of limitations of our study. It fails to take into account that debriefing may have occurred but was not documented. However, an important standard of care is the documentation of its' provision.¹⁶ The quality of debriefing is not examined in this study, and we are not aware if the debriefing process was a positive factor in a woman's postnatal journey. Therefore, qualitative work is needed to explore women's experience on the quality and content of the debrief. Given the brief period of time encompassed by this study, it is difficult to determine the true effect of the intervention or if there is an element of Hawthorne's effect. Therefore, repeated assessments would improve the validity of the intervention.

While Bastos et al's systematic review did not find high quality evidence to support debriefing, this was based on only seven trials.⁸ However, they note that women who have a higher rate of obstetric intervention may require increased emotional care. This is echoed by findings that women who experience an adverse outcome occasionally attribute the perceived failure to themselves, and fear failure in future pregnancies.¹⁷ Previous recommendations include evaluations to assess the efficacy of debriefing using targeted approaches,¹⁸ which also needs to encompass content and timing of debriefing. Thus, the paucity of evidence does mandate that further research is conducted into content and timing of debriefing. There is some evidence that the introduction of a debriefing tool can improve women's satisfaction.¹⁹

Clinical tools already in use could be adapted for this purpose, such as the A.S.S.I.S.T model of communication developed by the Medical Protection Society to aid staff in discussion of adverse events.²⁰ This focusses on listening prior to finding solutions for the issues that have been highlighted. It has been demonstrated that active listening practices aid focus on the woman's agenda.²¹ Thus, we suggest the postnatal debrief should be structured around an actively listening clinician, allowing a woman to re-tell their story from their perspective. This will allow the identification of any area that she found distressing or difficult, in order to come to a resolution before it becomes an issue in the long-term.

This study has demonstrated that a cost-neutral and time-efficient intervention can have a significant effect on the number of women who have a debriefing visit by the doctor who assisted with their birth. It supports recommendations from numerous guidelines regarding the provision of debriefing for women, and potentially the documentation of a debriefing visit may become an auditable topic and standard of care for women.¹⁰⁻¹² It highlights a large area for which future research can be focussed, including the value of doctor-led debriefing, the optimum timing for debriefing and the maternal effect of doctor-led briefing. Further follow-up studies would also allow us to ascertain the value of doctor-led debriefing, the optimum timing for debriefing and the maternal effect of doctor-led briefing, with the overall aim of improving the care we provide to women.

Declaration of Conflicts of Interest:

The authors have no conflicts of interest to declare.

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Accuracy of Carbohydrate Counting in Patients with Type 1 Diabetes Using Insulin Pump Therapy

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Abstract

Aim

To investigate the ability of patients with Type 1 Diabetes to visually estimate the carbohydrate content in meals/snacks, and to evaluate difficulties and concerns regarding CC.

Methods

Nineteen patients with Type 1 diabetes on insulin pump therapy who presented consecutively at an outpatient clinic were asked to visually estimate the carbohydrate content in 15 meals and snacks and complete a questionnaire around their experience of CC.

Results

Over half the participants felt confident/very confident about incorporating CC into daily life, 84.2% (n=16) reported not finding CC difficult and 68.4% (n=13) found apps a helpful aid. The mean score for the carbohydrate content assessment was 4.7 (SD =2, min = 1 and max = 8). Sixteen (84.3%) found fat/calorie dense meals difficult to account for. In addition, 42.1% (n=8) avoided certain foods as they could not gauge the carbohydrate content. Five (26.3%) felt it complicated the management of their diabetes while 42.1% (n=8) felt their blood sugars fluctuated a lot even if CC.

Conclusion

Despite appropriate and comprehensive education in CC these skills decline with time and repeated interval education is important. We recommend the introduction of regular refresher courses within the healthcare setting to improve diabetes management.

Introduction

Carbohydrate counting (CC) is a practical meal planning technique which involves accurate estimation of carbohydrates in meals in order to consequently determine a bolus insulin dosage. It is therefore an important part of the medical management of those with type 1 diabetes.

Past work has highlighted the positive impacts CC has on reducing Hb_{A1C} and improving quality of life among participants¹. However, the efficacy of CC is largely dependent on the extent of education and training received².

In Ireland training in CC is often provided at the onset of diabetes which may well be as early as childhood or adolescence³. However, these skills are rarely reviewed or updated in Ireland unlike other countries such as England and Germany where programmes are in place for the routine provision of diabetes education retraining^{4,5,6}. In Germany The Düsseldorf Diabetes Treatment and Teaching Programme is 5-day programme to retrain patients to measure insulin dosages according to the meals to be ingested. Outcomes from this have shown long-term sustainability in blood glucose levels⁷ and similarly in the UK the introduction of the REACCT (Re-education and Carbohydrate Counting Training) programme has improved confidence in CC for people with T1D⁸. The absence of such programmes in Ireland is a major flaw in the Irish diabetic education programme as knowledge and certainty have been known to decline overtime⁹. This could lead to the misinterpretation of carbohydrate quantities and the miscalculation of insulin dosages therefore resulting in inappropriate dosing of insulin¹⁰.

A national review of diabetes structured education carried out in 2009 outlined as one of their seven recommendations that Diabetes structured patient education should be available to all people with diabetes at diagnosis and at regular intervals thereafter¹¹. However, there is no indication as to what duration of time regular intervals reflect or how current resources can be utilised to ensure that this is possible.

Currently dietitians and diabetes nurses in Sligo University Hospital, as in other hospitals around the country, only have the resources to deal with priority patients and therefore although providing appropriate education (Berger) and support for those with type 1 diabetes at diagnosis, it is not currently feasible to provide refresher courses due to the time-consuming nature of these education activities.

It is clearly crucial for people with T1D to be able to effectively identify and quantify carbohydrates to reduce the likelihood of inappropriate dosing and ultimately adverse complications¹². The aim of this research is to assess the accuracy of CC by visual estimation of the carbohydrate content of prepared meals and snacks, and to provide a questionnaire to evaluate difficulties and concerns among people with T1DM on CSII who have previously received a training course in CC.

Methods

This cross-sectional study recruited adults over the age of 18 who were on insulin pump therapy from the diabetic outpatient clinic in Sligo University Hospital (SUH) between October 2018 and May 2019. Those with gestational diabetes and those who were receiving insulin by means of multiple daily injections were excluded. A 16-item questionnaire based on previous research⁶ was devised to assess patients views and experiences with carbohydrate counting.

A total of 15 meals and snacks were chosen and prepared based on recommendations of the Irish Nutrition and Dietician Institute (INDI) and a diabetes specialist dietitian and reflected foods which are most commonly consumed by an Irish population. Carbohydrate free meals and carbohydrate rich meals were included to adequately test the knowledge and ability of participants. Items were weighed and with the help of nutritional labels the carbohydrate content was calculated and noted. Where no nutritional label was provided (n=4) foods were weighed and carbohydrate content was calculated using carbohydrate counting reference tables where the following equation was applied to food; $\text{Weight of food (g)} / 100 \times \text{CHO content per 100g}$.

The study took place in a separate room from the outpatient clinic and participants were asked to estimate the carbohydrate content of each food item and answer the questions that followed.

Meals were presented uniformly on white plates spread evenly across a table accompanied by individual reference numbers. An estimation error of 10% above or below actual carbohydrate content was allocated.

HbA1c was obtained from the online lab system used within Sligo University Hospital. The most recent HbA1c value available at the time of taking the CHO counting test was used. Data was analysed using SPSS™ version 24 and significance was set at $p < 0.05$. Ethical approval was granted by the Sligo University Hospital Research Ethics Committee and informed written consent was obtained from all participants before enrolment in the study.

Results

Participant characteristics

The majority of participants were female ($n=18$, 94.7%), over 40 years ($n=10$, 52.7%), diagnosed with diabetes for >20 years ($n=14$, 73.7%), using an insulin pump for ≤ 6 years (91.8%) and received CC training in the last 4 years ($n=13$, 71.2%). The mean HbA1c was 57 ± 9.7 mmol/mol. Over half felt confident or very confident about incorporating CC into their daily life ($n=12$, 63.2%), 84.2% ($n=16$) reported not finding CC difficult and 68.4% ($n=13$) found apps a helpful aid (*Table 1*).

Table 1: Participant Characteristics.

	n (%)
Gender	
Male	1 (5.3)
Female	18 (94.7)
Age	
20-30	3 (15.8)
31-40	6 (31.6)
41-50	5 (26.3)
51-60	4 (21.1)
61+	1 (5.3)
HbA1c mmol/mol (mean \pmSD)	57 (± 9.7)
Highest level of education received	
Junior Certificate	1 (5.3)
Leaving Certificate	6 (31.6)
Bachelor's degree	4 (21.1)
Higher Diploma	3 (15.8)
Masters	4 (21.1)
Doctorate	1 (5.3)
Duration of diabetes diagnosis	
0-5 years	1 (5.3)
6-10 years	2 (10.5)
11-15 years	0 (0)
16-20 years	2 (10.5)
21-25 years	5 (26.3)
26 years +	9 (47.4)
Duration of insulin pump therapy	
0-2 years	3 (15.8)
3-4 years	8 (44.4)
5-6 years	6 (31.6)
7-8 years	1 (5.3)
9-10 years	0 (0)
11+ years	1 (5.3)

How long ago received carbohydrate counting training	
0-2 years	5 (27.8)
3-4 years	8 (44.4)
5-6 years	3 (16.7)
7-8 years	1 (5.6)
9-10 years	0 (0)
11+ years	1 (5.6)
Do you use nutritional labels as a guide to carbohydrate counting?	
Never	0 (0)
Sometimes	3 (15.8)
Daily	16 (84.2)
I don't know	0 (0)
When no nutritional labels are available, do you use a table detailing the carbohydrate content per 100g and relate to your portion size?	
Never	1 (5.3)
Sometimes	12 (63.2)
Daily	6 (31.6)
I don't know	0 (0)
When counting carbohydrates do you use measuring tools to estimate your portions? (e.g. measuring cups, scales, bowls spoons)	
Yes	14 (73.7)
No	5 (26.3)
Do you sometimes choose processed food to have access to the nutrition (facts) labels and to facilitate carbohydrate counting?	
Never	3 (15.8)
Sometimes	13 (68.4)
Regularly	1 (5.3)
I don't know	2 (10.5)
To what extent do you feel confident that you could incorporate carbohydrate counting into your daily life?	
Very confident	3 (15.8)
Confident	9 (47.4)
Moderately confident	6 (31.6)
A little confident	1 (5.3)
Not at all confident	0 (0)
Do you find mobile apps such as carbs and cals, my fitness pal useful when carbohydrate counting?	
Yes	13 (68.4)
No	6 (31.6)
Do you find carbohydrate counting difficult?	
Yes	3 (15.8)
No	16 (84.2)

Carbohydrate Counting Accuracy

The highest number of individual food items correctly estimated was 7 out of the 15 meals, with 1 food item being correctly estimated being the lowest score. The chicken curry and rice was incorrectly estimated by all participants: 78.9% (n=15) underestimating the carbohydrate content, with the remaining over estimating. The carbohydrate content of the cheese portion was correctly estimated by 14 of the 19 participants (73.7%) (Table 2).

A Pearson product-moment correlation was run to determine the relationship between CHO counting score and HbA1c. There was a very weak, negative relationship between CHO counting score and HbA1c level, which was not statistically significant ($r = -.196$, $n=19$, $p=0.4$).

Table 2: Carbohydrate Counting Test.

Meal/Snack	Actual CHO content (g)	Mean estimated CHO content (g±SD)	Overestimated n (%)	Underestimated n (%)
1: Chicken curry & rice	81	64.0 ± 30.6	4 (21.1)	15 (78.9)
2: Wholemeal baguette	58	54.7 ± 15.1	6 (31.6)	13 (68.4)
3: Spaghetti bolognaise & glass of milk	80	72.4 ± 33.5	4 (21.1)	15 (78.9)
4: Apple	21	14.8 ± 6.1	1 (5.31)	18 (94.7)
5: ½ pizza	50	73.4 ± 65.0	11 (57.9)	8 (42.1)
6: Ham salad	0	4.5 ± 6.9	6 (31.6)	13 (68.4)
7: Goujons & chips	90	73.4 ± 16.8	2 (10.5)	17 (89.5)
8: Porridge	19	36.2 ± 14.7	16 (84.2)	2 (10.5)
9: Scone with butter & jam	66	55.8 ± 17.1	3 (15.8)	16 (84.2)
10: Wrap	30	37.2 ± 13.3	9 (47.6)	10 (.6)
11: Scrambled eggs	0	2.1 ± 2.9	7 (36.8)	12 (63.2)
12: Cheese portion	0	1.4 ± 2.8	5 (26.3)	14 (73.7)
13: 2 finger kitkat & cup of tea	13	17.2 ± 4.9	14 (73.7)	5 (26.3)
14: Cereal bar	25	30.8 ± 13.3	10 (52.6)	9 (47.4)
15: Banana	27	30.6 ± 8.9	5 (26.3)	14 (73.7)

Views about carbohydrate counting

Sixteen patients (84.3%) report finding fat/calorie dense meals difficult to assess correctly. In addition, 26.3% (n=5) reported not having access to a healthcare professional to help them revise CC, the same % felt it was deleterious to the management of their diabetes while 42.1% (n=8) felt their blood sugars fluctuated a lot even when using CC (Table 3).

Table 3: Views about carbohydrate counting.

	Strongly Agree n (%)	Agree n (%)	Don't Disagree or Agree n (%)	Disagree n (%)	Strongly Disagree n (%)
You do not have access to a health professional to help you revise carbohydrate counting	3 (15.8)	2(10.5)	2(10.5)	3(15.8)	9(47.4)
You do not have the time to do it	0(0)	4(21.1)	3(15.8)	7(36.8)	5(26.3)
It prevents you from having variety in your diet	1(5.3)	1(5.3)	1(5.3)	9(47.4)	7(36.8)
It complicates the management of your diabetes	0(0)	5(26.3)	2(10.5)	4(21.1)	8(42.1)
You feel like your blood sugars fluctuates a lot even if you count your carbohydrates	1(5.3)	7(36.8)	3(15.8)	5(26.3)	3(15.8)
You find fat/calorie dense meals (such as fast food, pizza,) hard to account for	4(21.1)	12(63.2)	1(5.3)	1(5.3)	0(0)
It takes too much time and delays the beginning of your meal	1(5.3)	6(31.6)	2(10.5)	8(42.1)	2(10.5)
Do you purposely avoid eating out as you find carbohydrate counting too stressful?	0(0)	3(15.8)	1(5.3)	6(31.6)	9(47.4)
Feel overwhelmed by the demands of living with diabetes	1(5.3)	6(31.6)	2(10.5)	4(21.1)	6(31.6)

Eating out

Eight patients (42.1%) of individuals report avoiding certain foods when eating out as they are not confident in calculating the carbohydrate content, and over one in five (n=4, 21.1%) felt stressed when choosing what to eat. However, the majority (n=13, 68.4%) do not appear to have an issue with asking staff questions regarding the ingredients used in particular meals (Table 4).

Table 4: Carbohydrate counting and eating out.

	Strongly Agree n (%)	Agree n (%)	Don't Disagree or Agree n (%)	Disagree n (%)	Strongly Disagree n (%)
Find it difficult to carbohydrate count	0(0)	7(36.8)	6(31.6)	5(26.3)	1(5.3)
Feel embarrassed to ask staff questions regarding the ingredients used in the meals	0(0)	3(15.8)	3(15.8)	8(42.1)	5(26.3)
Avoid certain foods as you cannot gauge the carbohydrate content	2(10.5)	6(31.6)	2(10.5)	5(26.3)	4(21.1)
Feel stressed when choosing what to eat	0(0)	4(21.1)	3(15.8)	8(42.1)	4(21.1)
Feel restricted in the types of food you can eat	0(0)	3(15.8)	2(15.8)	5(26.3)	8(42.1)

Discussion

This study reports poor competence in CC among people with type 1 diabetes using CSII pump therapy in Sligo University Hospital. Foods which were high in carbohydrates or had a carbohydrate content $\geq 50\text{g}$ (Chicken Curry, Spaghetti Bolognese, Goujons and Chips, Scone) tended to be underestimated. Similar findings were noted in a study conducted by Kawamura et al in Japan, where foods high in carbohydrate such as rice and noodle dishes were significantly underestimated¹³.

In this study, foods which had little to no carbohydrates were more likely to be accurately estimated (ham salad, wrap, scrambled eggs, cheese, banana or yoghurt). However, the majority reported difficulty in assessing high fat and calorie dense meals. This is likely to be as a result of the complexity of distinguishing between calories and carbohydrate content of foods¹⁴. Of all the foods presented, porridge was the most significantly over estimated item as a total of 84.2% of the study group overestimated porridge with mean estimations of $36.2 \pm 14.7\text{g}$. This figure is almost two-fold greater than actual carbohydrate content of 19g. This overestimation could lead to the development of hypoglycaemia as a result of over administration of insulin. Overestimation however, is not uncommon among adults in CC. Meade et al demonstrated CC inaccuracies were predominantly due to overestimation with 82% of the study population unable to precisely quantify carbohydrates¹⁵. Teenagers and parents of children with T1D have also been renowned for misjudging carbs as current literature indicates that parents in particular tend to overestimate the carbohydrates in their children's meals by approximately 20%¹⁶.

A major strength of this study is that it tested the knowledge of subjects when no nutritional labels were available. This would reflect real life situations such as when dining out or when consuming foods which did not have accompanying nutritional labels. Accurate quantification in this way can

allow for greater variety in the diet and can reduce uncertainties or limitations when choosing to eat out. Additionally, this study not only tested CC abilities of people with T1D but also investigated specific difficulties and concerns people had regarding CC. This information could be useful to diabetes educators who can address exact difficulties associated with CC and accordingly improve and tailor education strategies to better suit the target population.

Several limitations were noted throughout the study. Firstly, the small sample size (n=19) was a major limiting factor. Fewer participants can reduce the power of the study and so results should be interpreted with caution¹⁷. Testing for this study was exclusive to patients with T1D who were on CSII. It may have been of interest to include those with T1D who used MDI. The use of preselected foods can also be seen as a limitation in this study as the foods chosen may not adequately reflect the diets of the individuals who took part. Also, currently the use of apps and technology the availability of nutritional information have become more widespread. Therefore, those who rely on apps and nutritional labels on a daily basis may struggle to estimate carbohydrates in foods based on appearance alone when these resources are unavailable to them.

In conclusion, despite appropriate and comprehensive education in CC these skills decline with time and repeated interval education is important to allow accurate counting and appropriate dosing of insulin. We recommend the introduction of regular refresher courses within the healthcare setting to improve diabetes management.

Keywords: Carbohydrate counting, Type 1 diabetes, Structured education, Diabetes education, Insulin pump therapy, CSII

Declarations of Conflicts of Interest:

The authors declare no conflicts of interest.

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Negative Paediatric Appendicectomy Rates

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Abstract

Aim

To assess the local paediatric NA rates at University Hospital Limerick (UHL) with regard to age, gender, histological diagnosis, biochemistry and radiology.

Methods

A retrospective audit was undertaken to examine the histological, radiological and biochemical records of paediatric appendectomies at UHL from 2010 to 2016. Negative appendectomy was defined as the removal of an appendix without any signs of histological inflammation (transmural acute inflammation).

Results

The local negative appendectomy rate at UHL was 31.9% (n=423/1325). The true negative appendectomy (TNA) rate was 6.6% (n=87/1325). We found that the non-inflamed appendix with other pathology subgroup (AWOP) was 25.4% (n=336). Other pathologies were found within the inflamed appendices; fecolith in 25.1% (n=226); lymphoid hyperplasia (LH) in 4.4% (n=40); enterobius in 2.3% (n=21) and carcinoid in 0.2% (n=2). Regarding the AWOP group specifically, the other pathologies identified were; fecolith in 55.7% (n=187), LH in 55.7% (n=187), enterobius in 24.1% (n=81) and carcinoid in 0.3% (n=1). The ultrasound scan (US) rate was 22.7% (n=301), which was inconclusive in 80.7% (n=243) and diagnostic in 18.3% (n=55).

Conclusion

Despite a high rate of NA, other pathologies were encountered which might explain RIF pain. We propose more specific definitions for negative appendectomy and highlight the need for a standardised approach to pathology and ultrasonography reporting.

Introduction

Appendectomies are the most common emergency surgical procedure carried out in the paediatric population.¹ The ability to accurately diagnose acute appendicitis has been the subject of discussions for decades due to its widely variable presentation, non-specific symptoms and wide differential diagnoses, particularly in the paediatric population.² Acute appendicitis occurs in nearly all age-groups and is notably difficult to diagnose among infants and toddlers.

The lifetime risk of developing appendicitis is approximately 9% in males and 7% in females. The initial misdiagnosis rate for appendicitis range from 28% to 57% for older children and may reach up to 100% for those 2 years or younger.³ Current strategies to help diagnose acute appendicitis include clinical scoring systems⁴⁻⁷, inflammatory markers⁸⁻¹⁰ and diagnostic imaging studies like ultrasound or CT.¹¹⁻¹⁴

A negative appendectomy (NA) is defined as the removal of an appendix which shows no evidence of inflammation or pathology.¹⁵ Velanovich et al. suggested that the complication rate in appendicitis patients was markedly reduced when the perforated appendix rate was low.¹⁶ The inverse relationship between negative appendectomies and perforated appendicitis means early diagnosis is key to ensure low rates of perforation and complications of appendicitis. This often means a higher, but justified, negative appendectomy rate (NAR). The appendix is no longer viewed as a vestigial organ as studies have shown that the removal of a normal appendix was suggested to increase the risk of acute myocardial infarction¹⁷ and is an independent risk factor for inflammatory bowel disease (IBD) development.¹⁸ Detmer et al. historically quoted acceptable NAR as between 15-25%.¹⁹ Over the past decade, due to improved various diagnostic imaging and scoring systems a drop in the paediatric NAR to <10% was reported.²⁰⁻²² A paper published in the United States showed that the rates of negative appendectomy (NA) in children range anywhere from 1% to 40% in the literature and that many reports do not provide clear pathological definitions for either appendicitis or NA on which they base their calculation of NAR. The authors concluded that the institutional variation of paediatric NAR may explain discrepancies in the literature as by example, including only those that show “the absence of inflammation or other appendiceal pathology” would decrease their NAR by 50%. This study calls into question the interpretation of interhospital NAR and the use of NAR as a quality metric in the management of appendicitis.²³ Our aim was to assess the local paediatric NA rates at University Hospital Limerick (UHL) with secondary objectives look at NA in relation to age, gender, histological diagnosis, biochemistry and radiology.

Methods

A retrospective study was undertaken to compare clinical and histological records of all children (defined as 16 years of age or less) from 29/12/10 to 7/9/16, who underwent appendectomy at UHL. A dataset was created and analysed using IBM SPSS Statistics for Windows, version 23 (IBM Corp., Armonk, N.Y., USA). Data regarding admission dates, age, gender and type of surgery were obtained from the Hospital In-Patient Enquiry (HIPE) database. Descriptive data analysis was described using frequencies, medians and interquartial range (IQR), means and standard deviation (SD). Acute appendicitis was defined histologically as inflammation of the appendix identified by the presence of infiltrating neutrophil polymorphs. This also included necrotic, gangrenous, suppurative and perforated appendices. A negative appendectomy (NA) was defined as the removal of an appendix without any signs of inflammation. A true normal appendix (TNA) was the removal of an appendix that shows no signs of acute inflammation or any other pathologies. An appendix with other pathology (AWOP) was the removal of an appendix that has no signs of inflammation and other pathology is present (figure 1). Biochemistry values used for analysis were taken from the admission bloods. A positively diagnostic US meant the sonographer described a visualised and inflamed appendix in the written report. A negatively diagnostic US meant the sonographer described a visualised, non-inflamed appendix and indicated that it was normal. An US was termed inconclusive if the appendix was not visualised.

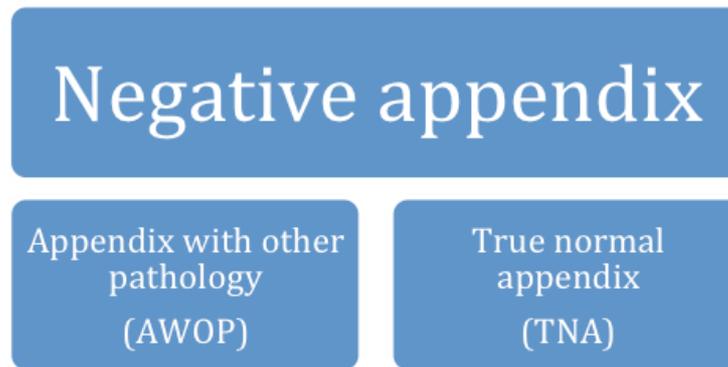


Figure 1. Histological definition clarification for negative appendectomies.

Results

Demographics

There were 1325 paediatric appendectomies over the study period (5 years and 8 months). The cohort was 57% male (n= 672) and the mean age (\pm SD) was 11.6 ± 3.2 years. The median length of stay in hospital was 3 days (IQR 2-4).

Pathology

The local negative appendectomy rate at UHL was 31.9% (n=423/1325). The TNA rate was 6.6% (n=87/1325). We found that the non-inflamed appendix with other pathology subgroup (AWOP) was 25.4% (n=336). Appendicitis was present in 68.1% (n= 902) of the appendectomies. Other pathologies were found within the inflamed appendices; fecolith in 25.1% (n=226); lymphoid hyperplasia (LH) in 4.4% (n=40); enterobius in 2.3% (n=21) and carcinoid in 0.2% (n=2). The AWOP subgroup comprised 25.4% (n=336) of the total appendicectomies. Regarding the AWOP group specifically, the other pathologies identified were; fecolith in 55.7% (n=187), LH in 55.7% (n=187), enterobius in 24.1% (n=81) and carcinoid in 0.3% (n=1).

Radiology

The ultrasound rate was 22.7% (n=301). Of the ultrasounds performed, 80.7% (n=243) were inconclusive, 18.3% (n=55) were positively diagnostic and 1% (n=3) were negatively diagnostic. When radiology wasn't performed, 72% (n=737) of the appendices showed inflammation on histology. When radiology was positively diagnostic, 94.5% (n=52) showed inflammation and when it was inconclusive, 45.3% (n=110) were inflamed.

Biochemistry

Biochemical markers showed significant baseline differences between the appendectomies that histologically showed inflammation (Table 1).

Table 1. Biochemistry values for negative appendectomy and appendicitis groups.

Variable	Total (n=)	Negative appendectomy	Appendicitis	P-value
		Median (IQR)	Median (IQR)	
White blood count	1306	8.5 (4.3)	14.2 (7.2)	<0.001
Lymphocyte count	1306	2.1 (1.3)	1.5 (1.1)	<0.001
Neutrophil count	1306	5.0 (4.4)	11.7 (7.6)	<0.001
Eosinophil)	1305	0.1 (0.2)	0.2 (0.3)	<0.001
C-Reactive Protein	657	3.0 (1.0)	26.0 (66.0)	<0.001
ESR	158	8.0 (6.2)	11.0 (15.2)	0.036
Amylase	575	51.0 (28.0)	44.0 (23.0)	<0.001
Bilirubin	658	10.0 (6.8)	13.0 (8.5)	<0.001
Aspartate aminotransferase	11	23.5 (0.5)	24.0 (6.0)	1
Alanine aminotransferase	650	17.0 (7.0)	16.0 (6.0)	0.043

Discussion

It is common in the literature for people to interchange the terms ‘normal appendix’ and ‘negative appendectomy’. Many reports do not provide clear pathological definitions for either appendicitis or NA on which they base their calculation of NAR.²³ Acute appendicitis is defined histologically as inflammation of the appendix, identified by the presence of infiltrating transmural neutrophil polymorphs. A negative appendectomy is defined as the removal of an appendix without any signs of inflammation. Negative appendectomy was relatively common at UHL (31.9% (n=423)) in comparison to international figures of 10-20%, and which are significantly less when using CT.¹⁴ The pathologies for negative appendectomy rarely warranted surgeries and thus this is an area that requires reformation. In this study, we have shown that despite lack of inflammatory features on histology, 25% of NA would have other pathological non-inflammatory features that might cause pain in the RIF. As such, for better pathological characterisation as well as clearer patient counseling and communication, we propose more specific negative appendectomy subgroup definitions. Thus, we coin the term for a ‘true normal appendix’ (TNA), which shows no signs of acute inflammation or any other pathology present. In contrast, the removal of an appendix with no signs of inflammation but with other pathologies present is an appendix with other pathology (AWOP). Further to this point there is a lack of consensus as to whether the presence of fecolith material and LH in the appendix should be deemed pathological. In our study they were both considered a pathology. We noted variability in pathology reporting, in particular the presence of fecolith and/or LH. We did not differentiate between transmural inflammation, necrotic, gangrenous, suppurative or perforated appendices. Radiology was under-utilised at UHL and calculating the sensitivity and specificity of ultrasound at our institute was beyond the scope of this study. Higher rates of US and adequate time allocation for ultrasonographers may be beneficial. However, for further research in this area to progress it is essential that we address the lack of standardised pathology and ultrasound reporting which has downstream effects on any research outputs. In our sample population, there was a high rate of enterobius thus consideration of pruritus ani could be included into clinical exams. Future studies could look at the potential role for high fibre diet in reducing fecoliths. There is a need for studies and guidelines to address non-inflammatory aberrations and pathologies of the appendix. Previously the Paediatric Appendicitis Score (PAS) or Alvarado score were proposed as clinical tools but more recently the Shera score was the best performing model, when compared to 15 risk prediction models.²⁴ Studies have shown that early paediatric consultant involvement can reduce NAR further.²⁵

Keywords: Negative appendectomy, Normal appendix, Paediatric appendicitis

Declaration of Conflicts of Interest:

We declare no competing interests.

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Multimodal Physical Activity Participation Rates in Middle-Aged and Older Adults

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Abstract

Aims

To determine the type and amount of structured physical activity (PA) that middle-aged (50-64yrs) and older adults (65-90yrs) in Laois engage in and use this data to inform the design and delivery of community-based PA interventions run by Laois Sports Partnership over the next 5 years.

Methods

Participants (n=353) completed a questionnaire, which examined their participation in PA (minutes, type), injuries/medical conditions that limit participation, and barriers to taking part in PA.

Results

The majority of participants (75.7%, n=255) took part in structured PA each week. Only 51.6% (n=182) of all participants achieved 150 minutes per week, predominantly through aerobic activities. Few participants met the guidelines for resistance (14.4%, n=51), flexibility (6.2%, n=22) or balance (0.0%, n=0) training. Barriers to PA participation were pain in joints or muscles (44.9%, n=111), unaware of available opportunities (35.9%, n=84), unfavourable weather (33.4%, n=80) and no time (32.6%, n=75). Injuries (24.5%, n=78) or medical conditions (12.9%, n=40) prevented participants from being physically active.

Conclusion

Participants predominantly undertook sufficient aerobic activities to improve health. However, most did not meet the guidelines for resistance, balance or flexibility training, which may contribute to increased frailty and falls and reduced independent living, well-being and quality of life in later years. Thus, educating middle-aged and older adults on the benefits of multimodal PA and providing enjoyable opportunities for both populations within the community that focus on social inclusion is required.

Introduction

Ageing results in structural and functional decline in most physiological systems in the human body¹. There is a notable decline in cardiovascular fitness, muscle mass, strength and power, bone mass, metabolic and cardiovascular health¹. These unfavourable adaptations place older adults at increased risk of developing a host of clinical conditions including obesity, type 2 diabetes, cardiovascular disease and certain cancers along with degenerative musculoskeletal conditions like sarcopenia, osteoporosis and arthritis and musculoskeletal injuries². Ultimately, these negative physiological adaptations increase frailty, increase risk of falls, reduce ability to perform activities of daily living, reduce psychological health and well-being and contribute to loss of independence and poor quality of life².

Physical activity (PA) can ameliorate these adaptations and promote a longer life span, health span and functional independent living¹. Aerobic training improves body composition, the functioning of the cardiovascular system, the cardiovascular lipid profile and insulin sensitivity³. Importantly, aerobic training increases aerobic fitness (VO_2max)³, which is an independent predictor of health and protects against a range of chronic conditions including type 2 diabetes and cardiovascular disease⁴. Resistance training increases total muscle mass, muscle strength and power, neuromuscular firing rate⁵ and recruitment and functioning of the fast twitch type 2 fibers which deteriorate with age⁶. Resistance training also increases bone density⁷. These adaptations are crucial to maintaining muscle function, strength and power, preventing frailty and falls and promoting functional independent living in older age². Flexibility training improves mobility and range of motion in all joints and is linked to independent living in later years⁸. Balance training improves stability and when combined with strength training reduces the likelihood of falls in older adults⁹. Thus, for optimal health benefit, it is important that older adults engage in multimodal PA weekly incorporating aerobic, resistance, flexibility and balance training². The same is true for middle-aged adults since baseline levels of strength and fitness in this population predict frailty and health in older years¹⁰. This study aimed to determine the type and amount of structured PA that middle-aged and older adults in Laois take part in and use this data to inform the design and delivery of community-based PA interventions run by Laois Sports Partnership over the next 5 years.

Methods

An anonymous questionnaire based on previous literature¹¹⁻¹³ was developed to examine PA participation in middle-aged and older adults in Laois and identify potential barriers to PA. Fourteen questions were included that examined their demographics, participation in structured PA (minutes, type, location, reasons for taking part in particular type of PA), interest in taking part in more PA, any personal, social or environmental barriers to taking part in PA, and any injuries or medical conditions that limit their PA participation (supplementary material 1). Eligible participants were aged between 50-90 years and must have been resident in Laois. Ethical approval was granted by Dublin City University's Research Ethics Committee and informed consent was required prior to completion. Hard copy and online versions of the questionnaire were available and were distributed by Laois Sports Partnership and True Fitness via their social media channels. Laois Sports Partnership also contacted their extensive database of age appropriate clubs and societies to distribute the questionnaire in addition to attending age appropriate social events in Laois. Three hundred and fifty-three participants completed the questionnaire which took approximately 10 minutes to complete.

Results

The majority of participants took part in structured PA (75.7%, n=255), with a similar percentage of those aged <65 and ≥65 years partaking in PA (Table 1). Participants undertook an average of 248.8±171.0 (range from 0-1,080) minutes of PA per week. Those aged <65 demonstrated a higher average minutes of PA per week than those ≥65 years (Table 1). Just over half of all participants (51.6%, n=182) completed at least 150 minutes of PA per week. Aerobic activities, mainly walking (58.6%, n=207) and swimming (11.3%, n=40) were the most frequent activities undertaken (Table 2). Outdoors and local area was the most common area PA was conducted in (39.4%, n=139), followed by local park/woods/canal/lake (18.7%, n=66), gym or studio (16.4%, n=58), at home (13.0%, n=46), community centre (9.6%, n=34), other town centre (8.2%, n=29), swimming pool (6.2%, n=22), local sporting clubs (4.5%, n=16) and at work (0.6%, n=2).

Table 1. PA participation in those aged <65 and ≥65 years.

Age	PA participation		Mean mins of PA per week	Participates in 150 mins PA per week		
	% (n)	Yes % (n)	Mean±SD	Full sample* Yes % (n)	Participate in PA** Yes % (n)	
<65	56.8 (196)	75.8 (144)	24.2 (46)	280.47±168.21	56.6 (111)	81.0 (111)
≥65	43.2 (149)	75.7 (106)	24.3 (36)	209.87±166.18	45.6 (68)	60.2 (68)

PA; Physical activity. SD; Standard deviation. N; number. Mins; minutes.

*This data refers to the full sample of participants surveyed, which includes participants who take part in PA and also those who do not take part in PA.

**This data refers only to the participants who do take part in PA within the full sample. It assesses how many of those physically active participants meet the recommended guidelines of 150 minutes per week.

Table 2. Percentage and number of participants that take part in individual activities.

Activity	All participants Yes % (n)	<65 years Yes % (n)	≥65 years Yes % (n)
Aerobic	69.1% (244)	68.9% (135)	69.8% (104)
Resistance	14.4% (51)	17.3% (34)	11.4% (17)
Flexibility	6.2% (22)	6.6% (13)	6.0% (9)
Balance	0.0% (0)	0.0% (0)	0.0% (0)

The majority of participants agreed and strongly agreed that PA improves their mental health (91.9%, n=217), helps them feel less stressed (90.0%, n=212), improves their heart health (90.0%, n=212) and they enjoy it (90.5%, n=217) (Table 3). Twenty-two percent of participants (n=45) did not believe there were convenient PA opportunities close to them.

Table 3. Why participants take part in PA.

	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
I enjoy it	6.3% (15)	0.4% (1)	2.9% (7)	33.8% (81)	56.7% (136)
It improves my mental health	5.9% (14)	1.3% (3)	0.8% (2)	37.7% (89)	54.2% (128)
It helps me to feel less stressed	5.6% (13)	0.9% (2)	2.6% (6)	36.5% (85)	54.5% (127)
It improves my heart health	5.6% (13)	0.4% (1)	3.0% (7)	34.8% (81)	56.2% (131)
It increases my muscle strength	6.3% (14)	2.3% (5)	4.5% (10)	38.9% (86)	48.0% (106)
It helps me to have contact with friends and people I enjoy being with	7.0% (16)	7.4% (17)	6.1% (14)	33.2% (76)	46.3% (106)
I feel great after exercise	6.3% (15)	1.7% (4)	4.2% (10)	34.3% (82)	53.6% (128)
It helps me to live independently	7.6% (16)	6.2% (13)	10.0% (21)	38.9% (82)	37.4% (79)
I exercise to control my weight	7.3% (16)	8.6% (19)	5.5% (12)	44.5% (98)	34.1% (75)
There are convenient physical activity opportunities close to me	9.8% (20)	12.2% (25)	14.6% (30)	39.0% (80)	24.4% (50)

Participants predominantly would like to take part in more PA (77.5%, n=248). Barriers to completing PA are presented in Table 4. The most common barriers to completing PA that participants agreed on were pain in joints or muscles (44.9%, n=111), unaware of available opportunities (35.9%, n=84), weather impacting their ability to be physically active (33.4%, n=80) and no time (32.6%, n=75). The majority of participants strongly disagreed that they were too old to do PA (90.2%, n=192).

Participants reported that an injury (24.5%, n=78) or medical condition (12.9%, n=40) prevented them from being physically active. Of those that reported the location of injury, 53.0% (n=35) occurred in the lower limb, 22.7% (n=15) at the trunk and back and 12.1% (n=8) at the head and neck and upper limb respectively. Pain and chronic pain (34.2%, n=25), joint pain or arthritis (32.9%, n=24) and disk injuries (8.2%, n=6) were the most frequently reported injuries that prevented participants from being physically active.

Table 4. Barriers to PA.

	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
<i>Personal barriers to exercise</i>					
I do not have any motivation to do physical activity	26.1% (61)	35.0% (82)	15.4% (36)	17.5% (41)	6.0% (14)
I do not have time	20.9% (48)	37.4% (86)	9.1% (21)	21.3% (49)	11.3% (26)
Physical activity is too hard for me	32.5% (74)	40.8% (93)	11.4% (26)	10.1% (23)	5.3% (12)
It costs too much to be physically active	31.0% (70)	36.7% (83)	13.3% (30)	13.3% (30)	5.8% (13)
I have pain in joints or muscles	19.4% (48)	24.7% (61)	10.9% (27)	29.1% (72)	15.8% (39)
I have too many family responsibilities	27.7% (62)	43.1% (93)	10.2% (22)	12.5% (27)	5.6% (12)
I am too tired	26.4% (57)	45.8% (99)	9.3% (20)	13.9% (30)	4.6% (10)
My family are not interested in physical activity	32.2% (69)	42.5% (91)	7.5% (16)	13.1% (28)	4.7% (10)
I am too self-conscious / embarrassed to be physical active	38.4% (84)	43.8% (96)	5.9% (13)	8.2% (18)	3.7% (8)
I do not know what to do	28.6% (61)	38.5% (82)	11.7% (25)	17.8% (38)	3.3% (7)
I have no interest in physical activity	40.8% (89)	6.0% (13)	5.5% (12)	2.3% (5)	0.5% (1)
I am too old to do physical activity	46.5% (99)	43.7% (93)	6.1% (13)	2.3% (5)	1.4% (3)
<i>Social barriers to exercise</i>					
I do not have anyone to bring me to a physical activity programme	49.4% (115)	36.9% (86)	3.9% (9)	7.3% (17)	2.6% (6)
I do not have any family or friends to be physically active with	42.0% (100)	37.8% (90)	4.6% (11)	10.1% (24)	5.5% (13)
<i>Environmental barriers to physical activity</i>					
There are no facilities near me	29.7% (71)	34.3% (82)	7.9% (19)	15.9% (38)	12.1% (29)
There are no physical activity programmes available near me	27.9% (65)	32.6% (76)	12.4% (29)	18.5% (43)	8.6% (20)
The weather impacts my ability to be physically active	25.5% (61)	30.1% (72)	10.9% (26)	25.5% (61)	7.9% (19)
Facilities do not have convenient schedules for me	23.6% (54)	31.4% (72)	17.5% (40)	23.6% (54)	3.9% (9)
Physical activity programmes near me do not have convenient schedules for me	23.2% (53)	32.9% (75)	18.4% (42)	21.1% (48)	4.4% (10)
I do not know what opportunities are available near me	25.6% (60)	29.1% (68)	9.4% (22)	28.2% (66)	7.7% (18)
The physical activity programmes I know of are too far away	29.6% (67)	36.3% (82)	12.8% (29)	16.4% (37)	4.9% (11)
I do not have any form of transport to go to any physical activities	45.0% (104)	39.8% (92)	1.7% (4)	8.2% (19)	5.2% (12)

Discussion

It is recommended that adults undertake 30 minutes of moderate intensity PA at least 5 times per week for health or 150 minutes each week². This study found 51.6% (n=182) of all participants, 56.6% (n=111) of middle-aged and 45.6% (n=68) of older adults achieved this recommendation. The average weekly reported PA was 280 and 210 minutes for middle-aged and older adults, respectively. This is in line with previous research in Ireland where 52% of participants over 50 years met the guidelines and participation decreased with increasing age (58% of 50-64year olds vs 55% 65-74year olds vs 37% \geq 75year olds)¹⁴. Worryingly, 43.4% (n=85) and 54.4% (n=81) of middle-aged and older adults respectively did not meet the guidelines. The cost associated with physical inactivity in Ireland is estimated to be €1.5 billion per year¹⁵. Previous Australian research reported that if their population increased their PA to meet recommended guidelines, they could save AUS\$1.5 billion a year in costs linked to cardiovascular disease, stroke, type 2 diabetes, breast cancer, colon cancer, depression and falls¹⁶. Thus, increasing PA in middle-aged and older adults should be encouraged and would be of substantial benefit to their morbidity, mortality, our health care system and economy.

The type of PA undertaken is also important as different modes of training stimulate different physiological adaptations that collectively ameliorate the ageing process². Aerobic activities were predominant in this study, with middle-aged and older adults engaging in 68.9% (n=135) and 69.8% (n=104) on a weekly basis, mostly by walking (58.6%, n=207), swimming (11.3%, n=40), aqua aerobics (8.8%, n=31) and cycling (5.9%, n=21). Compared to their aged matched sedentary counterparts, aerobically trained individuals exhibit a more favourable body composition, greater cardiovascular fitness, enhanced cardiovascular and metabolic health³ and slower development of disability in old age¹⁷. Thus, providing opportunities and encouraging all middle-aged and older adults to partake in aerobic activities weekly that they enjoy is important within our communities.

Adults are recommended to perform resistance training at least twice a week to maintain their muscle mass, strength and power and avoid frailty in later years². Frailty and pre-frailty are prevalent in Irish middle-aged (8.7%, 31.2%) and older adults (14.9%, 44.4% for 65-74yrs, 39.1%, 43.7% for >75years)¹⁴. Frailty is a risk factor for fear of falling, single and recurrent falls and disability among adults aged \geq 50 and contributes disability, hospitalisation, admission to nursing home and death¹⁸. Just 17.3% (n=34) and 11.4% (n=17) of middle-aged and older adults in Laois, respectively, reported that they engage in resistance training. National data on resistance training participation in these populations is lacking and as the older adult population is expected to double by 2040¹⁹ designing interventions to address this is warranted. Balance training is strongly recommended for falls prevention, particularly for individuals with frailty². In Ireland, one in three older adults fall every year with two thirds of them falling again within 6 months²⁰. The cost of treating falls and associated injuries and disabilities in Ireland is expected to rise to €1587-2043 million by 2030²⁰. No participants in the current study engaged in specific balance training, however balance training may have been incorporated into some of their aerobic (walking over uneven terrain) and strength activities. Specific balance training should be encouraged in this population to reduce their falls risk. Just 6.6% (n=13) and 6.0% (n=9) of middle-aged and older adults took part in flexibility activities, which have been associated with functional independent living in older adults⁸. Thus, access to and regular participation in multimodal PA sessions is crucial for a long health span in adults over 50 years.

Regular participation in PA can also improve psychological health and well-being²¹, cognitive functioning²² and quality of life²³. Participants in the current study reported that taking part in PA improved their mental health (91.9%, n=217), helps them feel less stressed (90.0%, n=212), and they enjoy it (90.5%, n=212). Additionally, participants predominantly wanted to take part in more PA (77.5%, n=248). However, barriers to PA can reduce participation. Common barriers reported in this

study was pain in joints or muscles (44.9%, n=111), unaware of opportunities available to them (35.9%, n=84), weather impacting their ability to be PA (33.4%, n=80) and no time (32.6%, n=75). An injury (24.5%, n=78) or a medical condition (12.9%, n=40) were also mentioned as factors that prevented them being active, with pain/chronic pain a commonly reported injury (34.2%, n=25). Pain, comorbidities and access to opportunities have been frequently identified as barriers internationally²⁴ and ageing and physical inactivity may cause or exacerbate many of the injuries and conditions noted in this study²⁵. Thus, regular participation in multimodal PA programmes can manage and treat these injuries and conditions² and education is needed to inform middle-aged and older Irish adults of the benefits of PA in both life stages.

While the intensity of structured PA that participants engage in and gender differences in PA participation were not measured as part of this study, both are important to inform the design of community PA programmes and should be measured in future research. Response bias may have occurred, as those more interested in PA may have completed the questionnaire. The database of clubs and societies contacted by Laois Sports Partnership to complete the questionnaire may include adults who are more likely to take part in PA, so the results may not be representative of the entire population. Participant's recall may affect the validity of the findings in this study and future research utilising objective measures is required.

This study aimed to inform the design and delivery of community-based PA programmes in Laois over the next 5 years by Laois Sports Partnership. The key findings show that just over half of participants are meeting the PA guidelines for health, predominantly through aerobic activities. In addition, the guidelines for resistance, balance or flexibility training are not frequently met which has implications for frailty, falls, morbidity, loss of independence and quality of life in later years. While the majority of participants would like to be more active, injuries, medical conditions and pain were identified as key barriers to PA participation even though multimodal PA can prevent, treat and manage same. Educating middle-aged and older adults on the importance and benefits of multimodal PA for both stages of life is required and providing free or cost limited opportunities for both populations within the community that focus on enjoyment and social inclusion is an important step.

Declaration of Conflicts of Interest:

There are no conflicts of interest to declare.

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The Role of Public Health Nurses in the Detection of Developmental Dysplasia of the Hip

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Abstract

Aims

Our study aimed to quantify the role played by public health nurses (PHNs) in the detection of cases of developmental dysplasia of the hip (DDH) not identified by existing national screening processes.

Methods

We conducted a review of all children diagnosed with DDH in our centre over an 18-month period. Referral details and general clinical information were then analysed for all late diagnoses, defined as later than three months of age.

Results

339 infants were diagnosed with at least some degree of dysplasia over the study period, implying an annual incidence of 31.3 cases per 1,000 live births. 86 of these (25.4%) were late diagnoses. 67.9% of referrals of late cases originated with a PHN. A small subgroup of late diagnoses ($n = 8$) presented with frank hip dislocation.

Conclusion

The proportion of DDH diagnoses made after three months of age remains significant. Our findings suggest that PHN reviews in the first year of life constitute an important 'safety net' in expediting the diagnosis of DDH in babies not identified by existing national screening processes. Quality improvement and training interventions would be of value in further supporting this role.

Introduction

Developmental dysplasia of the hip (DDH) refers to a spectrum of abnormal development of the hip joint, ranging from mild dysplasia, detectable only on X-ray or ultrasound, to severe dysplasia manifesting as frank dislocation of the hip joint. DDH is an important cause of disability in children and young adults, and the most common reason for total hip replacement in individuals younger than 40 years of age¹.

Efforts have been made to separate children with ‘true DDH’ – requiring treatment – from those children with mild dysplasia who, left untreated, will develop normal hips². It is believed that hip dysplasia affects 1-3% of Irish babies to some degree, with 1-2 in 1,000 babies affected by frank hip dislocation at birth³. Risk factors for DDH include female sex, breech position, a positive first-degree family history, and incorrect lower extremity swaddling^{4,5}.

Treatment varies from Pavlik harnessing to surgical reduction and osteotomy, depending on the age of the patient at presentation and degree of dysplasia. Most authors define late diagnosis of DDH as later than three months of age^{6,7}, with worse outcomes and greater need for surgical intervention seen among this cohort^{7,8,9}.

Current best practice recommends a whole-body clinical examination of all newborn infants within 72 hours of birth, to include the Ortolani¹⁰ and Barlow¹¹ hip tests as well as assessment of leg length, thigh fold symmetry and degree of abduction. A second assessment should occur at approximately 6 weeks of age – the ‘six-week check’. However, the reliability of the Barlow and Ortolani clinical tests appears to reduce beyond the neonatal period^{12,13}. Current Irish guidelines recommend a screening ultrasound for babies with either abnormal clinical examination or positive risk factor status (namely, breech presentation or first-degree family history)³.

After the neonatal period, all children in Ireland receive health checks from an assigned public health nurse (PHN), at 3 months and 7-9 months of age¹⁴. Variation exists between jurisdictions in this regard; for example, in Great Britain the four-month health visitor check is no longer routine^{15,16}, while in Northern Ireland it has been retained¹⁷. The breakdown of health problems identified by these visits has not received extensive research attention. Although others have alluded to an apparent role played by PHNs in identifying otherwise missed cases of hip dysplasia¹⁷, the proportion is not known and to our knowledge has not been studied.

As such, the aim of our study was to assess the proportion of babies requiring treatment for DDH in our catchment area, not identified by the current perinatal screening apparatus, who were subsequently first identified at PHN screening.

Methods

We conducted a retrospective analysis of all children presenting to our centre who were diagnosed with DDH and born in the South-East region of Ireland within an eighteen-month period (born on or between 1st January 2018 to 30th June 2019). We defined our incidence of DDH to include all babies diagnosed clinically or via imaging with DDH during the study period who were either treated locally in abduction bracing or referred onward for tertiary care. Within this cohort, we then identified all cases of late DDH, defined as diagnosis made at or later than three months of age.

For functional purposes, our late-diagnosed patients were categorised into three groups (Fig. 1). All patients were 13 weeks of age or older at diagnosis and were not identified perinatally by clinical examination or screening ultrasound. Group 1 included patients presenting with frank clinical dislocation of one or both hips. Group 2 consisted of patients referred because of clinical concern and diagnosed sonographically with hip dysplasia warranting treatment – namely, receiving a Graf classification of IIb or greater in one or both hips¹⁸. Group 3 included those patients diagnosed with hip dysplasia by hip X-ray.

Details of the referral pathway, demographics and clinical information for these patients were sourced from hospital records and consultant notes. In each case, we identified the healthcare professional documented as having instigated the referral process. We estimated regional DDH incidence using a denominator of total annual live births registered in the South-East region of Ireland¹⁹.

Results

Incidence

A total of 339 infants were diagnosed with DDH born during our 18-month study period, approximating an annual incidence of 226 cases per year. This figure includes all babies diagnosed with and treated for DDH in our centre, late or otherwise. It also includes 8 children referred onward to a tertiary centre for treatment having presented frankly dislocated. There were 7213 live births in the catchment area of our hospital in 2018, the latest year for which data are available¹⁹. This yields an overall estimated regional incidence of 31.3 cases of DDH per 1,000 live births during our study period.

Of these 339 diagnoses, 86 were late (25.4% of all diagnoses), producing an estimated annualised incidence of late-diagnosed DDH of 7.9 per 1000 live births. An overview of these cases is shown in Figure 1. 8 babies presented to clinic with frank hip dislocation, comprising Group 1. 10 babies were referred to clinic and diagnosed with hip dysplasia by way of an abnormal ultrasound with a Graf score of IIb or greater on at least one hip¹⁸, comprising Group 2. 66 babies were referred to the hip clinic and diagnosed with hip dysplasia by way of hip X-ray, comprising Group 3. Lastly, the clinical records of two babies who received a late diagnosis were unavailable and so could not be classified, leaving a total of 84 babies to be analysed.

Among our 84 cases of late-diagnosed DDH, the mean age at diagnosis was 33.2 weeks (7.6 months), and the oldest was 78 weeks (18.0 months) old, the only child in the cohort diagnosed after 1 year of age. Of 84 infants, 67 (79.8%) were female, and 17 (20.2%) were male.

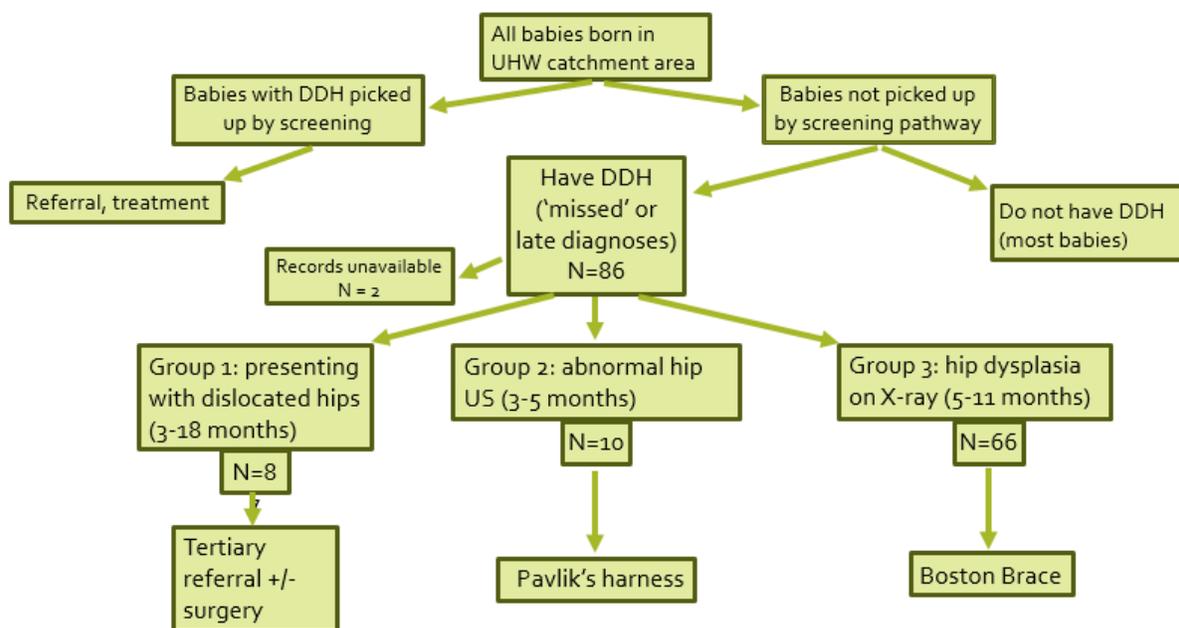


Figure 1: Overview of cases of late-diagnosed DDH.

Management Modality

Patients in Group 1 were referred once diagnosed to a paediatric orthopaedic specialist centre. Of the 8, 1 underwent open reduction and 5 underwent closed reduction; the management of the remaining 2 is pending at time of writing. Of the 10 patients in Group 2, 7 were treated with Pavlik harnessing and 3 with abduction bracing. All 66 patients in Group 3 were treated with abduction bracing.

Referral Pathway

An overview of the original referral pathways for our patient cohort is summarised in Table 1.

Table 1: Overview of referral origin of cases of late-diagnosed DDH.

	PHN	Physio	GP	Paediatric Clinic*	SMO	Parents	Outstanding Perinatal Appointment	Total
All late diagnoses	57	1	6	7	6	3	4	84
%	67.9	1.2	7.1	8.3	7.1	3.6	4.8	
Group 1	4	0	0	1	0	2	1	8
%	50	0	0	12.5	0	25	12.5	
Group 2	6	0	1	0	0	0	3	10
%	60	0	10	0	0	0	30	
Group 3	47	1	5	6	6	1	0	66
%	71.2	1.5	7.6	9.1	9.1	1.5	0	

(PHN: public health nurse. SMO: senior medical officer.) *Of 7 referrals from other paediatric clinics, 6 originated from a consultant-led outpatient clinic and 1 from an advanced nurse practitioner-led (ANP) clinic.

As shown, of the 84 cases of late-diagnosed DDH during the study period, 57 – or 67.9% – were first identified by way of review by a public health nurse. Other common origins of referral included paediatric outpatient clinics, the family GP, and physiotherapists. In 4 cases, patients had qualified for the national screening programme, due to either abnormal postnatal hip examination or positive risk factor status, yet diagnosis was delayed due to missed appointments, for example due to a family changing their address. All other patients came from the ‘non-risk’ population, with a negative risk factor status and screening examination, and were not screened perinatally.

Discussion

Our findings affirm that Irish public health nurses (PHNs) continue to play an indispensable role in the detection of DDH among babies not successfully identified by our current national screening apparatus. Of all 84 cases of late-diagnosed DDH analysed over the 18-month study period, 67.9% originated from a PHN referral. It is known that late diagnosis of DDH confers poorer long-term outcomes and increased need for operative intervention^{7,8,9}, though research detailing the contribution made by PHNs in identifying this health problem is scarce. Our data strongly suggest that interfaces with PHNs in the first year of life help to expedite these late diagnoses, thereby hopefully improving the outcome. Findings from colleagues in Northern Ireland support the continuation of a universal four-month health visitor check¹⁷, a practice discontinued in the remainder of the United Kingdom¹⁵.

In our study, we designated the first healthcare professional explicitly documented as having identified a clinical concern as the origin of each referral. Of note, PHNs in our region do not refer patients directly to our clinic, who arrive instead via a GP, senior medical officer (SMO) or other route.

As such, if a PHN developed a specific concern for DDH and, on that basis, referred that patient to a SMO who in turn referred to our service, the PHN was designated the origin of that referral. However, when several assessors are involved successively, and in the absence of exhaustive clinical documentation, it may be that this method either under- or over-estimates the role played by PHNs in various contexts. This constitutes a limitation to our study.

A second limitation relates to the difficulty in ascertaining the total number of PHN referrals with hip concerns to all healthcare professionals in our region, to include referrals who did not reach our clinic. Such a figure, incorporating both cases and non-cases of DDH, would enable an estimation of the positive predictive value of an individual PHN assessment in identifying eventual hip dysplasia. Further research in this regard would contribute usefully to the ongoing discussion of potential overtreatment and over-referral of DDH.

In addition, a fuller understanding of the specific clinical findings that improve the sensitivity and specificity of hip examination, by comparing the referrals of babies diagnosed with DDH and not, would be valuable in informing quality improvement and educational interventions. For example, hip crease asymmetry forms a common basis for referral despite being a consistently unreliable predictor of hip dysplasia^{20,21}. Moreover, it is known that false-negative rates of the Barlow and Ortolani tests increase quickly beyond 6 weeks¹³, while limitation of hip abduction may not become clinically apparent until 3 months of age¹⁷. Thus, it may be that a 'window of risk' exists for infants, between the neonatal period and 3-month mark, when clinical assessment is at particular risk of failing to detect hip dysplasia²².

Our study demonstrates a relatively high incidence of babies receiving treatment for DDH, at 31.3 cases per 1000 live births. We report an incidence of late-diagnosed DDH of 7.9 per 1000 live births. Encouragingly, only one child in our study cohort – and catchment area as a whole – was diagnosed with DDH at later than one year of life.

Estimates in the literature of DDH incidence vary widely, ranging from 4.4 to 518.5 per 1000 live births², contingent on method of detection, jurisdiction, and adherence to national screening protocols. Studies conducted in the era prior to universal clinical examination of newborns tended to report lower rates, of 1-2 per 1000 live births, with estimates of incidence tending to increase over time since then⁷. It may be that this change reflects a liberalising trend toward non-invasive treatment for milder degrees of dysplasia, by way of abduction bracing. Of note, a national standardised hip screening protocol has been issued in recent years in Ireland³, after previous studies showed disparate levels of screening effectiveness²³.

One-quarter of all cases of DDH detected during our study period were late diagnoses. Of these 84 cases, the most numerous subgroup (Group 3, n=66) comprised those infants exhibiting radiographic evidence of hip dysplasia who were treated with bracing. The long-term clinical relevance of radiographic features of hip dysplasia of differing extents of severity is not fully known. In contrast, a smaller subgroup in our cohort (Group 1, n=8) represented cases of frank clinical dislocation requiring onward tertiary referral and potential need for operative reduction, who had not been detected in the perinatal period. It might be argued that the successful and prompt identification of this small but important subgroup of babies poses the single most salient challenge to policymakers seeking to strengthen our national hip screening apparatus.

In conclusion, the primary hypothesis of our study was that opportunistic reviews of infants by PHNs in the first year of life constitute an important 'safety net' in the detection of late cases of DDH. Our findings strongly support this claim. We contend that retention of universal PHN reviews in the first year of life is essential. Quality improvement measures and training interventions would be of value in further supporting this important role.

Declaration of Conflicts of Interest:

The authors have no conflicts of interest or sources of funding to declare.

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Fertility Preservation in Adolescent Males

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Abstract

Aim

Survival rates of childhood cancer are now above 80%, so there is increasing emphasis on survivorship. A major late effect of cancer treatment is fertility loss. International best practice indicates that post-pubertal boys with cancer should be offered sperm cryopreservation prior to treatment. The aim of this study was to demonstrate the feasibility of a national sperm cryopreservation program for adolescent males and to examine outcomes for a pilot.

Methods

Patient demographics and semen parameters of adolescent male oncology patients referred to our service were analysed. Sperm analyses were performed in accordance with WHO guidelines.

Results

Fifteen patients were referred, 12 of whom (80%) attempted sperm production. Of these 12 samples, 25% (3/12) were unsuitable for freezing. One patient was too unwell to produce a sample. Eight patients (age range 12–17 years) had sperm successfully cryopreserved. Of these 8 samples, 25% were within WHO 'normal' limits, 50% had reduced sperm concentration. The number of cryopreserved samples (straws) ranged from 4-8 per patient.

Conclusion

We have established a successful, structured fertility preservation service for adolescent males in Ireland. Sperm cryopreservation is an accessible method of safeguarding fertility in male patients facing cancer treatment and should be offered to all.

Introduction

The incidence of both childhood and adolescent cancer is increasing throughout Europe ¹. Around 200 children and young adolescents (0-16 years) are diagnosed with cancer in the Republic of Ireland every year. Thanks to advances in medicine and surgery, survival rates in this group are now greater than 80%.²

As a result, there is increased emphasis on the long-term effects of cancer treatment. Large cohort studies have shown that approximately 70% of childhood survivors of cancer will experience at least one late effect of their treatment, one of these being impaired reproductive health.³ Future fertility is a primary concern of survivors of childhood, adolescent and young adult (CAYA) cancer.⁴ After cancer diagnosis, patients and parents will often, understandably, be primarily focused on treatment and prognosis. However, international guidelines recommend that the risk of infertility from disease and/or treatment modality and fertility preservation options should be discussed as early as possible following diagnosis.⁵ The term 'oncofertility' encompasses a new interdisciplinary approach dedicated to preserving future fertility in light of gonadotoxic cancer treatment.⁵

Fertility of male cancer survivors may be compromised by chemotherapy and radiotherapy that impair the production of both spermatozoa and of male sex steroid hormones, which are vital for normal male sexual development and fertility. Thirty percent of male survivors of childhood cancer suffer from azoospermia and 18% suffer from oligospermia.⁶ Treatments known to pose the most significant risk to fertility in both male and female patients include total body irradiation, chemotherapy conditioning prior to bone marrow transplantation, radiotherapy to a field that includes the sex organs, and specific chemotherapy drugs, including alkylating agents.

For post-pubertal males who are able to ejaculate, conventional sperm cryopreservation provides an excellent opportunity for future fertility and usually does not delay oncology treatment to a significant degree. Even if collected semen quality is poor, in-vitro fertilization (IVF) and, particularly intracytoplasmic sperm injection (ICSI), can be considered in the future with excellent pregnancy success outcomes.

Conversely, for pre-pubertal boys and post-pubertal boys who are unable to provide a sperm sample by ejaculation, fertility preservation remains a challenge as techniques involving gonadal (testicular) tissue cryopreservation are still experimental, with no embryo development or pregnancy to date.

A fertility risk assessment is central to the process of fertility preservation. This assessment must consider factors including the age and pubertal developmental stage of the patient, the oncology treatment required and the prognosis for long-term survival after treatment. The aim of a dedicated clinical oncofertility program is to assist medical staff, patients and their families to discuss and pursue fertility preservation options. Clear and simple referral and treatment pathways are essential.⁷

In Ireland, the majority of patients with childhood and adolescent cancers are treated in Children's Health Ireland (CHI) at Crumlin. Historically, some male adolescent boys were referred for sperm cryopreservation at private fertility clinics, but the system tended to be ad hoc. In August 2018, in conjunction with CHI at Crumlin, Merrion Fertility Clinic (MFC) at the National Maternity Hospital set up a structured sperm cryopreservation service for adolescent males. Post-pubertal adolescent males due to undergo gonadotoxic treatment or surgery can be referred to our service if they wish to cryopreserve sperm. This is a pilot service, funded on a pro bono basis by Merrion Fertility Clinic.

The aims of this study were to review the establishment of this national sperm cryopreservation service in this population, to evaluate patient outcomes in terms of ability to store sperm and to analyse the sperm parameters of samples deemed suitable for cryopreservation.

Methods

Multidisciplinary approach: To facilitate this service, we initially developed a National CAYA Fertility Preservation Consortium with fertility specialists at our clinic and paediatric oncology specialists at CHI. This combined expertise allowed us to develop a streamlined sperm cryopreservation service for adolescent boys. Patients are identified through the National Paediatric Haematology/Oncology Programme and they and their parents are seen and counselled by their primary physician in CHI, Crumlin.

Patient selection criteria: Patients are deemed suitable for sperm cryopreservation if they are Tanner staged II or above. Tanner staging is a sexual maturity scale used to assess sexual development in males by assessing pubic hair and genitalia, including scrotal development, testicular volume, and penile length. This examination is performed by the patient's paediatrician prior to referral for cryopreservation. All young males deemed Tanner stage II or above should be considered for sperm cryopreservation before embarking on treatment likely to affect the spermatogenesis process.

Patient referral for oncofertility preservation: The referring oncology consultant has a discussion with a boy and his parents and counsels them regarding the options. If the boy wishes to proceed, oncology nurse specialists at CHI Crumlin (the primary treatment site) liaise with the fertility nurse specialist in MFC. Patients have the option of attending either MFC or CHI to produce a semen sample. As this is a national service, patients and their parents travel from all over Ireland.

Patient information: Patients and their families are provided with age-appropriate written information designed specifically in response to this initiative. This leaflet outlines the reasons why it is important to consider sperm freezing, what the process involves, how long the sperm can be stored, who to contact in MFC and how it may be used in the future. Copies of the Patient information leaflets are available in Crumlin and may be given to the family during their early discussions.

Viral screening: Documentation of a negative viral screen is a pre-requisite to any cryopreservation in our centre. Assessment of infection risk is important to identify any current infection which may predispose any patient to potential complications and lead to cross-contamination in the clinic / lab or in the storage of frozen gametes. Blood is taken at CHI and sent urgently to the National Viral Reference Laboratory for screening for Hepatitis B, Hepatitis C, HIV1 and HIV11 as per the European Commission Tissue and Cells Directives guidelines.

The clinical encounter: At the clinic, our priority is to provide a patient and adolescent friendly fertility service. As part of this we schedule appointments for quiet times at the clinic, and also facilitate parents and patients travelling from far distances. A designated nurse specialist meets with the patient and their parent(s) to sign tissue cryopreservation consent forms. This nurse also fulfills the role of the patient's keyworker, and acts as a point of contact for any questions the patient or parent(s) may have during their journey with us in Merrion Fertility Clinic. The designated nurse will have completed the appropriate Garda vetting process for both MFC and Crumlin and will also have completed the HSE "Children First" course. Unlike our adult patients, the adolescents who undergo sperm cryopreservation often require more than one appointment or visit.

Patient demographics: Clinical and demographic patient data is recorded, according to the information supplied by their primary physician in CHI Crumlin. Disease diagnosis is provided by the referring doctor.

Semen and sperm parameter evaluation: Semen samples are collected by masturbation and semen analysis is performed in accordance with World Health Organisation (WHO) recommendations.⁸ Sperm parameters analyzed are volume, sperm concentration and sperm motility. If of suitable quality, sperm is prepared and stored in labelled straws. A test straw is thawed to check for viability. In the event that a young boy is unable to produce a sample or there is no sperm present in the sample or if they wish to produce a second sample, another appointment is facilitated. This is made in conjunction with CHI treatment timelines.

Results

This study represents a retrospective review of all adolescent male patients referred to our service for consideration of sperm cryopreservation in a 16-month period.

Patient characteristics

Fifteen patients, aged between 12 and 17 years old, were referred between August 2018 and December 2019. Because all patients were under the age of 18, informed consent for cryopreservation was signed by both the patient and their parents/legal guardians. Of this cohort, 93% (14/15) presented with malignant disease: diagnoses included Hodgkin's lymphoma, non-Hodgkin's lymphoma, rhabdomyosarcoma, testicular germ cell tumour, acute lymphoblastic leukaemia, acute myeloid leukaemia, Ewing's sarcoma, medulloblastoma and osteosarcoma. One patient was referred for sperm cryopreservation prior to starting gonadotoxic treatment for Sickle Cell Disease (Table 1).

Table 1: Characteristics of patients who produced a sample (n=11).

	Sperm to freeze n=8	No sperm to freeze n=3	WHO threshold Normal (2010)
Age, years (median, range)	15.5 (12-17)	15 (15-16)	
Sperm concentration (x10 ⁶ /ml)	28 (1-59)	0 (0-0.01)	15 x 10 ⁶ /ml
Motility (%)	34 (16-48)	0 (0-0)	32%
Volume (ml)	0.9 (0.25-1.5)	0.8 (0.15-1.4)	1.5ml
Number of straws frozen	6 (4-8)	0	
<u>Diagnosis (n)</u>			
Hodgkin's lymphoma	3	1	
Rhabdomyosarcoma	1	0	
Testicular GCT	1	0	
AML	0	1	
Non-Hodgkin's lymphoma	0	1	
Sickle cell disease	1	0	
Ewing's Sarcoma	1	0	
Osteosarcoma	1	0	

All values are given as median and range (minimum to maximum), unless otherwise indicated.

Sperm analyses and cryopreservation outcomes

Of the 15 patients referred, 12 attempted sperm production. All elected to attend MFC rather than to produce the sample at CHI. Eight of these patients (67%) had sperm successfully cryopreserved. The youngest patient in our study was 12 years old and successfully obtained semen samples. The oldest patient was 17 years old. Four patients (36%) did not achieve sperm cryopreservation: 1 patient failed to collect any sample, 2 had no sperm in the sample produced, and 1 had very poor semen quality that was not sufficient for freezing. Five patients attended the clinic twice to attempt specimen production. Samples were further categorized into 'normal' and 'subnormal' (Table 2); only one patient had sample parameters entirely within the WHO normal range. Three patients did not attend for sperm cryopreservation - one patient declined, as cryopreservation was deemed not to be indicated based on his diagnosis, one did not wish to pursue cryopreservation and one patient tragically died secondary to his disease, prior to his appointment at MFC.

Table 2: Semen and sperm parameter ranges (normal, subnormal) in adolescent patients who produced a sample (n=11).

	Sperm concentration (x10 ⁶ /ml)		Motility (%)		Volume (ml)	
	Normal (≥15)	Subnormal (<15)	Normal (≥32)	Subnormal (<32)	Normal (≥1.5)	Subnormal (>1.5)
n (%)	5 (45)	6 (55)	5 (45)	6 (55)	10 (91)	1 (9)
Age (yrs)	14 (12-17)	16 (15-17)	15 (14-17)	15.5 (12-17)	15.5 (12-17)	14

Ages are given as median and range (minimum to maximum).

Discussion

This work demonstrates the feasibility of sperm cryopreservation for post-pubertal adolescent males in Ireland, regardless of age or disease diagnosis. A streamlined service with a clear referral process has been established.

Adolescent males have a higher prevalence of azoospermia and lower semen and sperm parameters compared to adults.⁹ However, over 65% of our cohort managed to successfully produce a sperm sample that was suitable for cryopreservation with the potential for future use in clinical assisted reproduction.

This data can help to inform patients and their families about the potential for fertility preservation, even in very young adolescent patients. Importantly, in our cohort, age was not a predictor of successful sperm production and subsequent freezing. Age alone should therefore not preclude patients for referral to our service.

Sperm cryopreservation is the safest and most accessible method of safeguarding fertility in male patients facing cancer treatment and should be recommended for post pubertal adolescent male patients with a new diagnosis of cancer. Patients should be referred for semen cryopreservation soon after they receive their diagnosis, and ideally prior to commencing cytotoxic treatment.

We currently have no long-term data on the rate of sperm utilization, given that this is a very new service in our clinic and the age range of our patients. Larger studies have demonstrated that only small numbers of patients return to use their cryopreserved samples for treatment in the future. In one epidemiological French study <5% of patients went on to utilize their specimens.¹⁰ Despite this, international guidelines recommend that sperm cryopreservation should be routinely offered to adolescent males undergoing gonadotoxic treatment to give the best chance of preserving fertility for the future. Studies in this area, including the aforementioned French study, are from prior to 2009 and there has since been a huge increase in public knowledge and interest in this area. In recent years the numbers availing of this service have increased, and the numbers using their sperm in the future will likely also grow. Daudin et al demonstrated a yearly increase in referred adolescents of 9.5% per year across their study period.¹¹

Prior to this study, the number of adolescent males availing of cryopreservation in Ireland was unknown. This service will enable collection of data and the establishment of a national database for patients availing of sperm cryopreservation. An important aspect of further research will be a comprehensive cost analysis of the service. The programme is the first structured fertility preservation service for adolescent males in Ireland, with a clear referral pathway and defined service user interface. Our clinic's partnership with the National Paediatric Oncology hospital has helped streamline the process for fertility preservation. This is a critical development for adolescent and young adult cancer patients and should be available and recommended to all adolescent males, prior to initiation of gonadotoxic therapy.

Declaration of Conflicts of Interest:

The authors declare no financial interests in any of the work submitted here.

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Responding to Needs of Residents in Long Term Care in Ireland

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Abstract

Residents in nursing home care have borne a disproportionate morbidity and mortality in the COVID-19 pandemic in comparison to the general population. Although the high rate of infection, morbidity and mortality in older people living in nursing homes may be attributable to increased levels of frailty and comorbidity in residents, the physical infrastructure and governance structures within nursing homes is also likely to be highly significant. The authors present, on behalf of Irish Society of Physicians in Geriatric Medicine, a position paper on changes that should be implemented to enhance the safety and quality of care for nursing home residents in Ireland.

Introduction

Residents in nursing homes represent a group with high levels of disability and co-morbidity which render them particularly vulnerable to external and internal stressors¹, as exemplified by the high death rate in Irish nursing homes during the COVID-19 pandemic. At the last census in 2016 were 22,762 people over 65 years of age (3.7%) listed as resident in nursing homes in Ireland². Although this was a decrease in the proportion of the older population in residential care from 2011 it reflects an actual increase of 9.4% in people living in nursing homes in this country. As our society ages it will be increasingly important to provide high quality care for this vulnerable group. The Irish Society of Physicians in Geriatric Medicine (ISPGM) has promoted the development of improved standards of care in residential care for several decades and was the first Irish professional group to formulate improved standards of care in 2001, published in the Irish Medical Journal³.

The pandemic has prompted the revisiting of these guidelines based on emerging research and on the evolving experiences of responding to the pandemic^{4,5}. The nexus of the new recommendations arose from an expert sub-group of the Clinical Advisory Group of the National Clinical Programme for Older People primarily representing consultant geriatricians who have a specific interest in the clinical care of older people in nursing home care. The recommendations incorporate the learnings of these senior clinicians supporting nursing homes during the pandemic and is endorsed by the ISPGM. It is recognized that a broader consultation with healthcare groups involved in the care of nursing home residents should be undertaken with regards to the recommendations proposed.

It should also be acknowledged that given the current split of provision of nursing home care across public, voluntary and private sector that the recommendations reflect principles that should underpin clinical care in all three types of facilities dependent on the model applicable. Given that 80% of provision is within the private sector many of the recommendations are specific to issues identified within that sector.

The COVID pandemic has highlighted challenges in relation to nursing home governance and the roles and responsibilities of the major stakeholders, including overall policy (the Department of Health); the commissioning body (the National Treatment Purchase Fund (NTPF)); the health services (Health Services Executive (HSE)); the regulatory authority (Health Information and Quality Authority (HIQA)); advocacy groups for older people; representative bodies for the range of professions involved; and the industry body representing the owners of private nursing homes (Nursing Homes Ireland) and now needs to be re-examined⁶. It is crucially important that we prioritise the needs of residents and provide equitable access to high quality healthcare for them.

Interim Recommendations

Governance

- 1) A review of clinical governance arrangements within private nursing homes is required to advise on the relationships between General Practitioners (GPs)/ Medical Officers, Persons in Charge (PIC), Registered Providers and care staff, in particular, as to the resilience of these structures in the context of the pandemic. These arrangements need to be able to respond to requirements for specific roles and responsibilities in outbreak management, succession in absentia in senior roles, accountability, and communication with residents and families.
- 2) HIQA inspection criteria will need to be revised and updated with support from the relevant National Clinical Programmes to reflect any implemented changes. In addition, HIQA should develop a specific advisory board with disciplines with expertise in nursing home care to incorporate emerging research and knowledge into quality assurance in nursing homes.
- 3) Rapid implementation of the assessment tool of needs for older people (Inter-RAI / Single Assessment Tool) is required and should, as previously agreed, include residents in nursing homes. This will allow for essential data to be collected and will support care planning, integration with community/acute hospital specialist services, and professional development⁷.

- 4) Improved advance care planning, with enactment of the Assisted Decision Making (Capacity) Act 2015 provisions on advance healthcare directives and with amendments to current nursing home regulations is needed. This is to ensure individualized advance care plans are made for all residents in accordance with the legislation and can be communicated across services where required.
- 5) There is a need for a regionalised function as part of the Sláintecare Population Health Planning that informs and determines the planning, development and scale of nursing homes based on local demography and the ability of local and regional health services. This will also be needed to support an equitable approach to the level of public and private provision within an area.
- 6) The relationship of the coronial system⁸, HIQA and formal death notification and certification in the context of the pandemic should be examined.
- 7) The relationships and roles of the HSE and private sector providers where private providers are unable to continue in service, including the mechanisms by which this is overseen and escalated, should be clarified.
- 8) Revision of the geographical boundaries of Community Health Organisations (CHO) to align with Acute Hospital Sector grouping should be strongly considered in line with the planned Regional Integrated Care Organisations in the Sláintecare strategy.

Staffing

- 1) Nursing homes require an age-attuned workforce with staff who have appropriate training and certified competencies in managing their residents, many of whom have complex needs. All staff need to receive training in gerontology, dementia care and management of end of life care in line with recommendations of the National Clinical Programmes for Older People and Palliative Care, and the National Dementia Strategy⁹.
- 2) Each nursing home should have a designated medical lead to provide clinical governance of the medical care within the home and with a reporting relationship with the proposed Regional Medical Director role, and to whom other GPs/medical officers in the nursing home have a reporting relationship. The post holder should be registered on the Irish Medical Council specialist register of GPs and have a certified competence in specialist healthcare for older people, ideally based on nursing-home medicine. They should have a requirement to maintain a record of continuous professional development (CPD)/continuous medical education (CME) relevant to their work in the nursing home. There should be specific remuneration for these roles linked to ongoing training, accreditation and an agreed model of service provision overseen by the HSE.

- 3) A specific Medical Director role for nursing homes should be developed and it should be linked to a system of clinical leadership that reflects the needs of older people across a population in a region (regional clinical lead for older persons) through pandemic Nursing Home Response teams¹⁰. This person should hold a Certificate of Completion of Specialist training, or equivalent, in a relevant field (such as Geriatric Medicine or Old Age Psychiatry). The role needs to be appropriately represented within CHO senior management structures in order to be effective. There should be specific remuneration for these roles linked to ongoing training, accreditation and an agreed model of service provision overseen by the HSE.
- 4) The continuation of the support structures developed through the COVID-19 Nursing Home Response teams should be sustained and enhanced as part of an overall integrated response to the pandemic and its effects in nursing homes.
- 5) The provision of integrated specialist supports through geriatric medicine, mental health services for older people and specialist palliative care to residents in nursing homes should form part of a network of services for older people within CHOs.
- 6) There should be a requirement for a trained lead in Infection Prevention and Control in each nursing home. They should have sufficient training to implement national guidelines on personal protective equipment (PPE) requirements for staff, be able to link with regional HSE Infection Prevention and Control (IPC) supports and be able to assure the local training of all staff in the appropriate use of PPE using the national training systems in place.
- 7) There should be an amendment to the current regulations which revoked the obligation for the Person in Charge (PIC) to have a formal gerontology qualification. The need for clinical nursing leadership and staffing with formal post-graduate gerontological training in all nursing homes should be reinstated as a matter of urgency.
- 8) A review of the regulatory change which removed the requirement for the presence of a Registered General Nurse on duty at all times, with additional focus on staff to resident ratio and skill mix, is required. In the context of a pandemic it is essential that all nursing staff can monitor the clinical status of patients on a regular basis, implement care plans that reflect their nursing care needs and respond appropriately as the resident's condition changes. This will also enable provision of key clinical supports including training to provide clinical care in facilities such as intravenous antibiotics, fluids and oxygen.
- 9) There is a need for the rapid expansion of Advance Nurse Practice roles that support specialist delivery through nurse prescribing, comprehensive assessment and liaison functions across acute, mental health and palliative services to ensure safe care can be delivered in the resident's home.

- 10) HSE primary care supports from all disciplines and therapies should be available to all residents in long-term care based on identified need. The availability of these supports should be prioritized in the context of pandemics where significant deconditioning results from periods of prolonged illness and isolation in residents. These services should be coordinated through scheduled multi-disciplinary review meetings and provide equity of access, based on need, to residents of private and public facilities.
- 11) Staffing structures in private nursing homes need to be reviewed to ensure appropriate resilience. Salary structures, terms and contracts should be linked to those of equivalent HSE grades in line with the Department of Health (DOH) Safer Staffing model. This will enable the retention of staff within facilities on an ongoing basis and is a key lever in ensuring sustainable staffing levels in facilities during pandemic. In doing so, nursing homes should aim to create an internal nursing bank to minimise their dependency on agency staff support.
- 12) The DoH Taskforce on Staffing and Skill mix should be reviewed to ensure that the needs of residents in long-term care settings are reflected in this work and incorporate the lessons learned from the pandemic through consultation with public and private sector providers.
- 13) The movement or sharing of staff across facilities needs to be done in accordance with Public Health and Infection Prevention and Control guidance and appropriate mechanisms and regulations put in place to minimise risk of transfer of infections between facilities.
- 14) A range of enhanced supports including occupational health, bereavement and counselling services should be put in place to support care home staff. A specific bereavement programme for families and residents should form part of these support structures.

Education/ Research

- 1) A career pathway for nursing home staff should be developed and linked with formal university-based training and accreditation and supported through a clinical rotation system with acute hospitals. For example, the National Frailty Education Programme provides specific frailty education across staff grades and is linked with the National Clinical Programme for Older People.
- 2) It is important to develop a research agenda within the nursing home environment to improve outcomes, care delivery and learning¹¹. There is also a need to ensure adequate levels of representation (including residents) and expertise are available to support research delivery.

Environment

- 1) Nursing home environmental standards will need to reflect their ability to deliver effective Infection Prevention and Control practice. In particular, residents who live in multioccupancy rooms or who share bathrooms will require the availability of single rooms for isolation.

- 2) The development of a design model for nursing homes reflective of smaller units embedded in communities, e.g. Eden/Green House models as opposed to large institutions, may better meet the needs of this population especially in this time of pandemic¹². Learning from implementation of decongregated models in intellectual disability care and elsewhere should be considered. Consideration should also be given to stepped models of care allowing people to transition from independent through supported living and into nursing home facilities allowing them to “age-in-place”.
- 3) More broadly, a wider range of residential options for older people needs to be considered apart from living at home and moving to residential care as was highlighted in the Citizens’ Assembly report on older people from December 2017¹³.
- 4) In line with the European Network of National Human Rights Institutions (ENNHRI) recommendations, policy makers and service providers should ensure that older people are involved in the design and delivery of nursing homes¹⁴.
- 5) The inclusion of post-acute care admissions under various terms such as rehabilitation, transitional care and 'step-down' in nursing homes should be reconsidered in terms of both an intrusion of transient populations of patients, visitors and staff into what is the home of a group of older people, as well as posing a hazard in terms of infection control¹⁵. Post-pandemic infection prevention and control arrangements will require a full physical and operational separation from the residential clients. Rehabilitation of older people requires additional specialist skills, staffing and governance arrangements and cannot be readily combined with residential services.

Discussion

The recommendations presented here by the ISPGM are intended to address the concerns of our professional body about the resilience of the nursing home sector as highlighted by the impact of the pandemic. We aim to inform public policy around the provision of supports for the nursing home sector as well as securing the provision of high-quality care for the growing population of older people in Ireland into the future.

Declaration of Conflicts of Interest:

The Authors declare that there are no conflicts of interest.

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A Change of Climate for Climate Change: The Environmental Benefit of Specialist Outreach Clinics

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Abstract

Introduction

Climate change represents a devastating threat to global health. We studied the environmental benefit of dermatology outreach clinics in Bantry and Tralee from our centre in Cork. We calculated the reduction in carbon dioxide (CO₂) emissions and the time saving for patients.

Methods

Outreach clinics from January to June 2019 were reviewed. The distance from patient's addresses to the outreach centre was subtracted from their distance to Cork. The reduction in CO₂ emissions was calculated by subtracting CO₂ emissions of doctors travelling to clinics.

Results

1,022 patients attended 44 outreach clinics. The average reduction in distance travelled was 142km per round trip. An average of 129 minutes was saved per round trip. The estimated annual reduction in carbon emissions as a result of the outreach clinics is 52.37 tonnes.

Discussion

Specialty outreach clinics reduce our carbon footprint, provide convenience to patients, and optimise access to specialty services in rural areas.

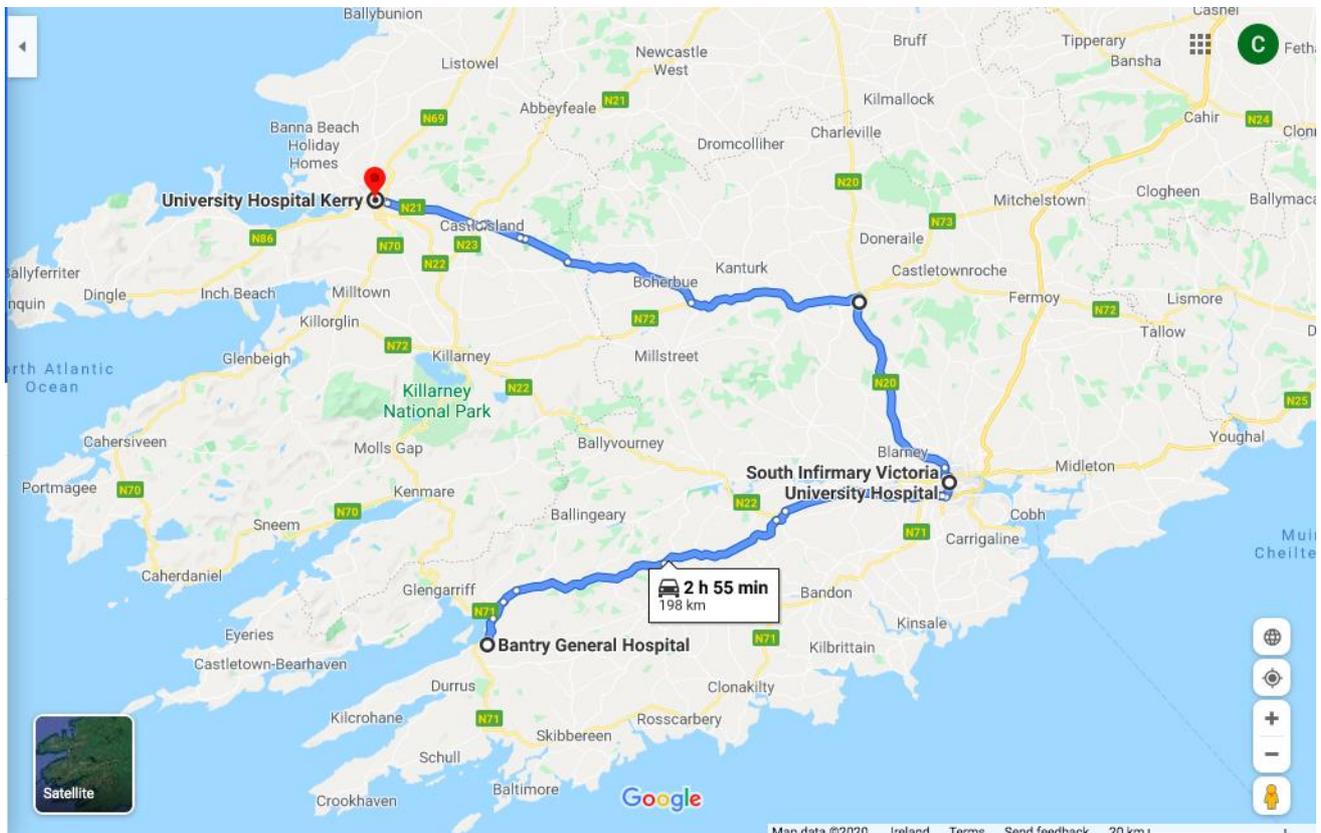
Introduction

Climate change represents a devastating threat to global health.¹ The Health Service Executive (HSE) aims to be a "leading sustainable organisation delivering low carbon quality sustainable healthcare, with the purpose of preserving natural resources, reducing carbon emissions, and mitigating the effects of climate change".² The main benefits of outreach clinics have previously been perceived to be patient convenience and resource efficiency.³ No research has examined the environmental benefit of outreach specialty clinics.

We performed a study assessing the environmental benefit of dermatology outreach clinics from our regional centre of excellence in the South Infirmity Victoria University Hospital (SIVUH) in Cork to Bantry General Hospital (BGH) in West Cork (86.5km from Cork) and University Hospital Kerry (UHK)

in Tralee (112km from Cork) (Figure 1). We aimed to estimate the reduction in carbon dioxide (CO₂) emissions from outreach clinics in Tralee and Bantry, and to estimate the time saving for patients attending the clinics.

Figure 1: Map of Cork and Kerry showing routes from SIVUH to UHK and BGH.



Methods

A retrospective review was performed of all dermatology outreach clinics in Bantry General Hospital and University Hospital Kerry from January to June 2019. Patients' addresses were obtained and input to three different mapping services (Google Maps, Apple Maps, and maps.me). The distance from the patient's address to the outreach centre was subtracted from the distance from the patient's address to the lead regional centre in Cork to calculate the distance saved per round trip. The reduction in CO₂ emissions was calculated using an algorithm supplied by the Irish Environmental Protection Agency,⁴ subtracting the CO₂ emissions of the doctors travelling to the clinics from Cork. For the CO₂ emission calculation, travel in an average car, of average size and value, with unknown fuel consumption (petrol/diesel), was assumed.

Results

1,022 patients attended 44 outreach clinics in total. In BGH there were an average of 2.83 clinics a month, with an average of 25.6 patients seen per clinic. In UHK there were an average of 4.5 clinics a month, with an average of 21.7 patients seen per clinic.

In BGH there was a total reduction in travel of 50,057km return, with an average of 115km per patient per round trip. This equated to a saving of 9.05 tonnes of CO₂ emissions over six months.

In UHK there was a total reduction in travel of 103,758km return, with an average of 177km per patient per round trip. This equated to a saving of 18.7 tonnes of CO₂ emissions over six months. The average drive for the consultant dermatologist to BGH and UHK was 173km return and 224km return respectively, with a total travelling distance of 9,026km over the period. This accounted for 1.63 tonnes of CO₂ emissions over six months.

The data from BGH and UHK were combined and the consultant data were subtracted to calculate the overall saving. In total, there was a reduction of 144,789km of travelling (142km average per round trip), with 26.18 metric tonnes of CO₂ saved. The average time saving was 129 minutes per round trip per patient. Extrapolating the results, the annual potential reduction in carbon emissions as a result of the outreach clinics is 52.37 tonnes.

Discussion

This study shows that provision of dermatology outreach clinics significantly benefits the environment, with large potential reductions in annual CO₂ emissions. Limitations of the study include the assumption of travel by car, some imprecise addresses (rural townlands over a large area), and failure to capture non-attendance at clinic. Surgical procedures and phototherapy were not captured, although attendance in the lead centre for three times weekly phototherapy would not be feasible for almost all patients seen in the outreach clinics.

Speciality outreach clinics reduce our national carbon footprint, provide convenience to patients, and optimise access to dermatology services in rural areas. This model of care could be adopted by many specialties in Ireland to optimise the sustainability of medical care.

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Declaration of Conflicts of Interest:

None declared.

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Oral Disease in People with Cystic Fibrosis

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Introduction

Cystic Fibrosis (CF) is a well-characterized, severe monogenic recessive disorder. It is mainly found in white populations of European ancestry and arises from mutations in the cystic fibrosis transmembrane conductance regulator (CFTR) gene on chromosome 7. It is a multi-organ disease with manifestations primarily seen in the pulmonary, digestive, and reproductive systems. The median age of diagnosis in Ireland is 0.29 years^{1, 2}. Ireland has the highest incidence of CF in the world. Currently, there are approximately 1380 People With CF (PWCF) in Ireland². The CF population worldwide is seeing an increase in life expectancy. In Ireland, approximately 58.5% of the CF patient population in Ireland is aged 18 years or older and the median age of survival is 44.4 years, an increase from 36.6 years in 2008².

Lung Transplantation may be carried out in cases of severe lung disease. Between 2011 and 2018, 68 PWCF received a bilateral lung transplant in the Mater Misericordiae University Hospital, Dublin². People undergoing lung transplantation are often recommended to be declared "dentally fit" pre-operatively, but there is currently no clear evidence-based guidelines on the dental management of PWCF in general or, specifically, pre- or post- transplantation.

Dental diseases are extremely prevalent worldwide and can significantly impact on a person's quality of life³. The most common oral diseases are dental caries (tooth decay), periodontal (gum) disease, developmental defects of enamel and candida infection.

Research has shown evidence of a relationship between dental disease and a number of systemic diseases. Studies have shown that there is greater prevalence and severity of periodontal disease in diabetic subjects than in nondiabetic subjects⁴. As 19.6% of PWCF in Ireland suffer from Cystic Fibrosis Related Diabetes (CFRD)², it is possible that this subset of PWCF are at higher risk of periodontal disease. Furthermore, it has been found that there is worsening glycemic control in diabetic patients with periodontal disease compared with those without suggesting a bidirectional relationship. Diabetic subjects who also have periodontal disease have been found to be at a three times greater risk of diabetic complications. There are also strong links between periodontal disease and cardiovascular disease and the development of atherosclerosis. Perhaps of most importance to PWCF is the risk that the oral cavity can act as a reservoir of respiratory pathogens, which can result in pulmonary disease and pneumonia⁴. Due to the increasing life expectancy of people with CF, it is timely that we review the literature available regarding any potential links between Cystic Fibrosis and oral diseases.

What is the evidence?

Dental Caries

Dental caries is the localised dissolution of dental hard tissues (enamel and dentine) by acidic by-products from the bacterial fermentation of sucrose and other dietary carbohydrates. It has been hypothesised that individuals with CF are at higher risk of dental caries due to certain risk factors. These include Gastro-Oesophageal Reflux Disease (GORD), high levels of *Streptococcus mutans*, high calorie diets to avoid malnutrition, and frequent prescription of sugar containing antibiotics^{5,6}.

Despite these risk factors, studies have shown that children with CF are actually at lower risk of developing dental caries. Two systematic reviews^{6,7} showed that, in general, there was equal or lesser caries risk in children with CF compared to a control group. It is hypothesised^{6,8} that this is due to long term antibiotics that PWCF must take for recurrent respiratory infections. These antibiotics (including penicillins) can target caries-causing bacteria such as *S. mutans*. Another hypothesis is that PWCF may be more health conscious and therefore may engage in more meticulous oral hygiene regimes- which will reduce the risk of caries (and also the risk of periodontal disease)⁶. Yet another hypothesis put forward is that supplemental Pancreatic Enzyme Replacement Therapy (PERT) could potentially reduce the incidence of caries due to the inhibition of plaque accumulation⁸. PERT is currently prescribed to at least 89.9% of PWCF in Ireland².

On the other hand, despite this seemingly protective effect CF bestows on individuals during childhood, Chi remarked that “adolescents with CF may not be at lower caries levels than those without CF”. Similarly, Dabrowska et al (2006) found that there was a higher incidence of caries in CF patients between the ages of 6-12 than a control group⁵. There are a number of reasons put forward for this: caries risk tends to increase during adolescence due to behavioural changes such as decreased frequency of toothbrushing and poor diet, and the antibiotics used are changed to address the fact that *pseudomonas aeruginosa* becomes the most prevalent pulmonary pathogen - these antibiotics (such as tobramycin) do not target *S. mutans*.

Periodontal Disease

Periodontal disease can be broadly defined as the “chronic inflammatory conditions that affect the tissues surrounding and supporting the teeth”. The main cause of the inflammatory condition is poor oral hygiene which can lead to an accumulation of pathogenic microbial biofilm, or plaque, at and below the gingival margin³. The initial presentation is that of gingivitis, red inflamed gums that bleed on brushing. In individuals where there is dysbiosis or immune overreaction of the host to microbial presence, gingivitis may progress to periodontitis, which results in damage to the alveolar bone (the supporting bone around the teeth). The final result of this process can be tooth loss. Due to recurrent respiratory infections, people with CF often breathe through the mouth- this can promote malocclusion/misalignment of teeth which may predispose to periodontitis⁵.

There are mixed findings regarding periodontal health in PWCF. Some studies concluded that there were lower levels of gingivitis in the CF group compared to a control group or to the national average⁹⁻¹¹. One study¹² found that a particular subset of patients (those with CF aged between 6 and 9.5 years) had higher levels of gingivitis. A number of studies, including those by Aps, Van Maele and Martens in 2001/2002 found there was no significant difference in oral hygiene between PWCF and controls^{13,14}. A number of studies showed that PWCF had higher levels of dental calculus compared to a control group^{8,9,12}. Only one study looked at periodontal pocketing depths- a major determinant of periodontal disease.

Interestingly, this study found that although plaque levels were generally "moderate or severe", there was no patient with severe gingivitis or periodontal pocketing depths greater than 4mm, i.e. no sign of clinical periodontal disease¹⁵. This study hypothesised that the reduced levels of clinical periodontitis could be due to frequent intake of systemic antibiotics.

Developmental defects of enamel (DDEs)

Developmental defects of enamel (DDEs) are commonly encountered in general dental practice where they may present as enamel hypoplasia or hypomineralization. The main clinical problems arising are compromised aesthetics, tooth sensitivity and increased risk for dental caries and tooth wear¹⁶.



Figure 1: example of enamel hypoplasia—a type of DDE. Picture copyright Dr. Mairead Harding, Cork University Dental School and Hospital, from FACCT Study CARG/HRB2012/34

The majority of studies^{10-12,14} showed that there was a higher incidence of DDEs in the CF population compared to the healthy population.

Candida

Among the factors that predispose individuals to oral candidiasis are use of broad-spectrum antibiotics and corticosteroids¹⁷. Approximately 62% of PWCF in Ireland have taken long term (>3months) oral antibiotics in the last year, and approximately 29% have taken inhaled steroids². Oral candidiasis can cause frequent and significant oral discomfort, pain, altered taste sensation (dysgeusia), and aversion to food¹⁷.

Discussion

The evidence is mixed as to whether or not PWCF are at greater risk of dental disease. There are limitations to some previous studies including small sample sizes, the young age of the population studied and the age of the studies. Most were carried out before the introduction of CFTR modulators so the impact –if any- of these on the oral environment is yet to be researched.

The population of PWCF is increasing, as is their life expectancy. As the majority of PWCF in Ireland are now adults, it would be beneficial to conduct a study to look at the oral health of these individuals.

If they are found to be at higher risk of dental disease, then it would be prudent to categorise them as “high risk” from the moment of diagnosis and make provision for them as “people needing special care” as outlined in the National Oral Health Policy, “Smile agus Sláinte”. It may also be wise to include a dentist as part of the multi-disciplinary team involved in the care of PWCF- including working with nutritionists when formulating a diet plan. Furthermore, people undergoing lung transplants often require an oral health clearance, but the specifics of this have not been clearly defined. There is potentially need for communication between the dental team and CF/respiratory or surgical team, and to create guidelines for the oral care of people with CF.

Conclusion

There is a need for good quality studies into the oral health of individuals, specifically adults, with Cystic Fibrosis. There is currently insufficient evidence to determine the impact of CF on oral health but PWCF should be encouraged to attend their dentists regularly to maintain good oral health and minimise any future complications.

Declaration of Conflicts of Interest:

The authors declare that they have no conflict of interest.

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"Active Consulting" During and Post COVID-19: Opportunities for Clinicians to Move More

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Introduction

Prior to the COVID-19 pandemic, the majority of clinical work for most healthcare professionals involved face-to-face consultation with patients. Throughout the working day, in both inpatient and outpatient settings, clinicians had many opportunities to expend energy by breaking up their sedentary time with physical activity. In the hospital setting, working on wards and in emergency departments has always required physical movement among staff in order to provide effective care for patients. This has remained a necessity despite the COVID-19 pandemic. In many hospital settings, the energy expenditure of staff may even have increased due to the wearing of personal protective equipment (PPE)¹.

In the outpatient and community settings, however, the arrival of the COVID-19 pandemic has resulted in rapid changes to traditional consulting practices which may have detrimental effects on the levels of sedentary behaviour and physical activity among clinicians in these environments. Almost overnight, when the first wave of COVID-19 infections was reaching its peak, most clinicians in outpatient and community settings switched to remote consulting where possible, using telehealth methods such as telephone and video²⁻⁴. There are many advantages of telehealth, such as reduced transmission of communicable diseases, and the potential for better time-efficiency^{2,4}. There are also numerous disadvantages, such as reduced patient rapport, and less ability to pick up on non-verbal cues and incidental findings^{2,4}. The pros and cons of remote consulting could be debated extensively, and vary depending on the clinical and situational context. Regardless of the positive and negative consequences of this rapid shift towards remote consulting, it is likely that it is here to stay. Addressing all of the good and bad points of remote consulting is beyond the scope of this paper. Instead, this paper examines the effects of remote consulting on the sedentary behaviour and physical activity of healthcare professionals.

Sedentary Behaviour and Health

Sedentary behaviour is when someone is awake, in a sitting, lying or reclining posture⁵. In a healthcare context, this would include when a clinician is sitting behind a desk while consulting with a patient via telephone or webcam. Sedentary behaviour is viewed as a separate entity from physical inactivity⁵.

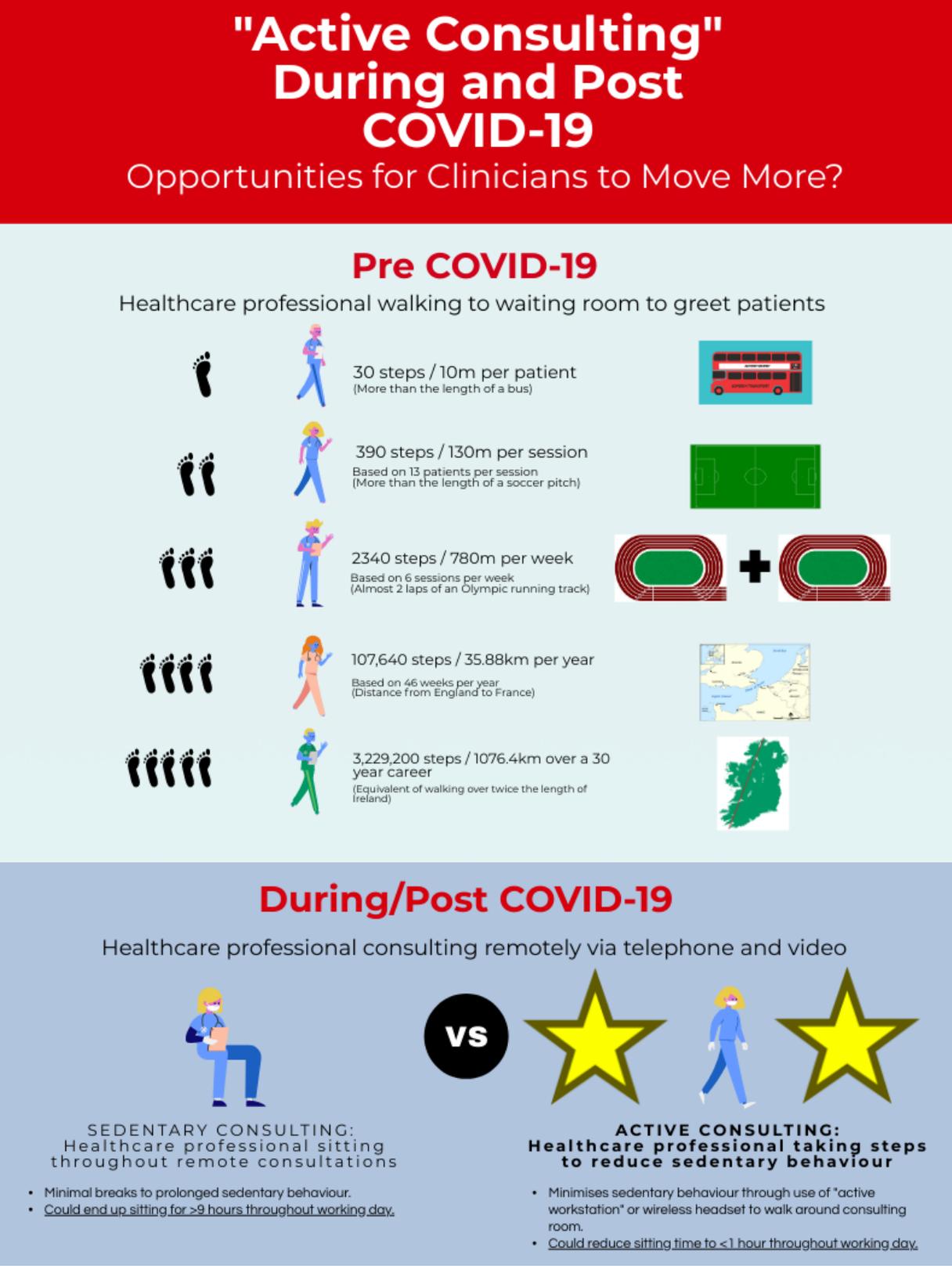
Physical inactivity is instead defined as insufficient levels of physical activity, that is, not achieving the current physical activity recommendations⁵. The effect of sedentary behaviour on health was first examined by the epidemiologist Jeremy Morris, in mid twentieth century London. Morris and his colleagues demonstrated that bus drivers had higher rates of mortality due to coronary heart disease than bus conductors⁶. It was postulated that the main variable to account for the difference in cardiovascular mortality between the two groups was their levels of sedentary behaviour throughout the working day, as bus conductors were much more physically active than their more sedentary, bus-driving colleagues⁶. There has been an increasing volume of evidence to demonstrate the negative health effects of sedentary behaviour ever since. Sedentary behaviour is associated with increased all-cause mortality, even when allowing for confounding variables⁷⁻¹⁰. These findings demonstrate a dose-response relationship, whereby increasing sedentary time corresponds with increasing mortality rate⁷⁻¹⁰. The increased mortality rate among more sedentary individuals is felt to be due to the association between sedentary behaviour and many adverse health outcomes, such as cardiovascular disease, obesity, type 2 diabetes, dementia, mental health issues, and breast, colorectal, endometrial and ovarian cancer⁷⁻¹⁰. In light of these findings, the National Physical Activity Plan for Ireland aims to promote an active way of life with less time spent being sedentary¹¹. It is important to note that non-exercise activity thermogenesis (NEAT), i.e. movement and posture changes during activities of daily living, overall accounts for greater energy expenditure than deliberate exercise in the vast majority of the population¹². Although it is debatable the extent to which levels of sedentary behaviour can be attenuated by physical activity, sedentary behaviour is an independent risk factor for increased mortality⁷⁻¹¹. This means that even if an individual achieves the recommended levels of physical activity, they will still have a lower risk of mortality if they also take steps to minimise their levels of sedentary behaviour. Given that many clinicians spend the majority of their waking lives in work, it is therefore crucial to consider levels of sedentary behaviour and physical activity in the workplace.

Sedentary Behaviour and Telehealth

In outpatient and community settings, with increased remote consulting and reduced face-to-face consulting, previous opportunities to break up sedentary time with movement (such as examining patients and walking to the waiting room) are now less frequent than in the pre COVID-19 era. Instead, clinicians are spending more time talking on the phone or using the computer screen, traditionally performed while sitting down. If we are not careful, changes during and after the COVID-19 pandemic mean that healthcare will become an increasingly sedentary occupation for many staff. As detailed above, this could have detrimental effects on the personal health of a significant proportion of healthcare professionals. One example is in the General Practice medical setting, as detailed in figure 1. Prior to the COVID-19 pandemic, a General Practitioner (GP) who walked to the waiting room to greet patients was able to break up their sedentary time every 10 to 15 minutes. A GP seeing 13 patients per session, working 6 clinical sessions per week, walking 30 steps to the waiting room per patient, would therefore have walked 390 steps per session. Over time, this would amount to 2,340 steps per week and 107,640 steps per year (based on working 46 weeks/year). Over a 30-year career, this would amount to 3,229,200 steps, the equivalent of walking over twice the length of Ireland. Prior to the COVID-19 pandemic, even if not all GPs were walking to the waiting room to greet patients, they still had to get out of their seat to open the door for patients, examine patients and wash their hands. During and post COVID-19, with the vast majority of patient interactions taking place remotely, GPs may now have much less physical activity, and much more sedentary time throughout the working day, leading to a consequential higher risk of the associated negative health outcomes. The increased risk of weight gain through reduced non-exercise activity thermogenesis is especially relevant given the increased morbidity and mortality among obese individuals affected by COVID-19^{13,14}.

It is important to ensure that staff in healthcare settings do not end up replicating the findings observed by Jeremy Morris in post-World War Two London⁵, with those working in outpatient settings resembling the sedentary bus drivers and those in inpatient settings resembling the physically active conductors.

Figure 1. "Active Consulting" During and Post COVID-19



“Active Consulting”

Instead of remote consulting leading to increased sedentary behaviour among many clinicians, it should instead be seen as an opportunity for clinicians to reduce their sedentary behaviour by engaging in “active consulting” (fig. 1). In the past, there were fears that the use of standing desks by clinicians would be detrimental to patient interaction, due to the clinician looking down at the patient. With telehealth, this perceived power imbalance is no longer an issue, as the patient is not in the same room as the clinician. Telephone and video consultations can therefore be held while standing up, while the availability of wireless headsets opens up the option of walking around the consulting room or even, for the early adopters, using a treadmill desk while talking with the patient. If remote consulting results in greater time-efficiency, clinicians may have more opportunities to exercise, such as during lunchbreaks or by taking “exercise snacks,” short physical activity breaks throughout the working day.

Healthcare professionals working in outpatient and community settings have significant levels of patient contact and opportunities for health promotion. Clinicians who are more physically active are more likely to recommend physical activity to their patients, and patients are also more likely to make healthy lifestyle changes if they believe their clinician follows the health advice themselves¹⁵. It could therefore be argued that reducing sedentary behaviour and increasing physical activity among clinicians could lead to health benefits for both the clinicians themselves, at an individual level, and their patients, at a population level.

To reduce the burden of overweight and obesity requires cultural change away from a society that is becoming increasingly sedentary, towards one which is increasingly physically active. This culture change requires buy-in and engagement at all levels of society. By engaging in “active consulting,” healthcare workers can be at the forefront of these changes, leading by example in order to reduce their sedentary behaviour and improve both their own health and the health of their patients.

Keywords:

Sedentary behaviour; Physical activity; Health promotion.

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Declaration of Conflicts of Interest:

None declared.

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COVID-19: The First 100 Days in the South of Ireland

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Introduction

The COVID-19 pandemic remains unprecedented, by 29/09/2020 over 33 million cases and over 1 million deaths have been recorded worldwide ¹. As a safe and effective vaccine and curative treatment are awaited, current pandemic response remains largely dependent on non-pharmaceutical interventions (NPIs) ². In Ireland, exhaustive Public Health efforts and extensive societal engagement with NPIs helped to mitigate risk and to 'flatten the curve' during the initial COVID-19 surge. This facilitated subsequent phased 're-opening' ³. However, by August 2020 resurgence activity required re-introduction of certain population-level NPIs ³. The Department of Public Health HSE South covers counties Cork and Kerry (population 690,575) ⁴; this is the 2nd largest Public Health region (of 8 nationally). The Health Protection Surveillance Centre (HPSC) provides national oversight for health protection activities. To further inform preparedness for surge activity, we describe the first 100 days of Public Health pandemic activity in our region and suggest 'lessons learned'.

Methodology

We reviewed the epidemiology of confirmed cases of COVID-19 notified to our department from 05/03/2020 - 13/06/2020. In Ireland COVID-19 cases are notified to Public Health under Infectious Diseases Regulations 1981; notifications occurred electronically from laboratories to the national Computerised Infectious Disease Reporting System (CIDR) ⁵. Confirmed cases were defined as per HPSC confirmed case definition of 'Detection of SARS-CoV-2 nucleic acid in a clinical specimen' ⁶; World Health Organisation (WHO) definition of 'Transmission classification' was used ⁷. Standardised data were collected locally by Public Health clinical staff during investigation of 'cases' and 'contacts' ^{8,9}. Contact tracing activities were conducted by trained departmental staff. Support was provided by a novel national contact management programme (incorporating a novel data management system and contact tracing centres). All data are provisional and subject to ongoing review, validation and update; data were extracted from CIDR on 07/07/2020⁷; additional data sources were used for transmission classification. Incomplete data were labelled 'unknown'. MS Excel was used to conduct analysis. This analysis was conducted as part of Public Health usual practice, was not conducted for research, does not include any identifiable information and data were managed in line with data protection requirements, therefore ethical approval was not required.

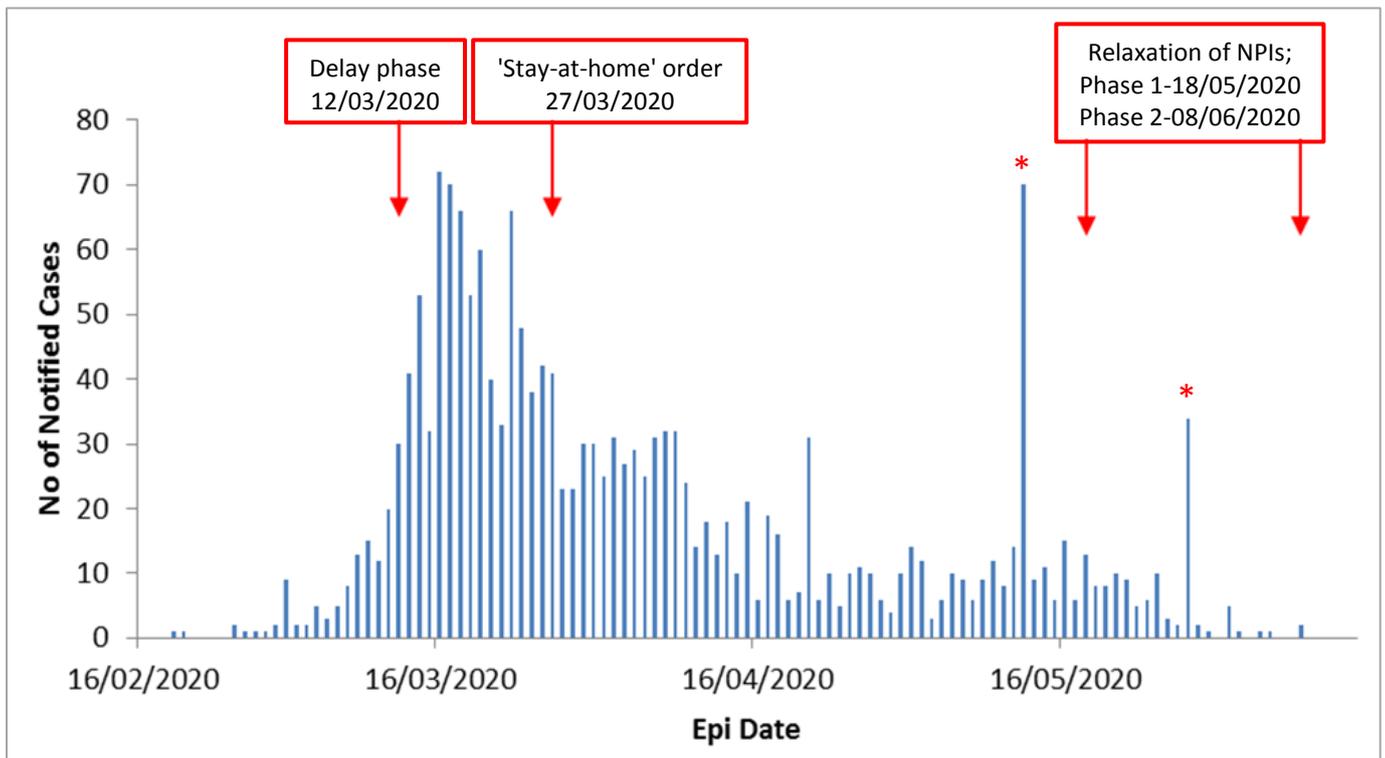
Results

Descriptive epidemiology

The first case of COVID-19 in our region was notified on 05/03/2020; by 13/06/2020 a total of 1,842 confirmed cases had been notified, representing 7.3% of cases nationally for that period ⁷. Epidemiological curves (epi-curves) were constructed using 'epidemiological date' (epi-date) and 'notification date' (Figures 1 and 2). These epi-curves are more closely aligned from May 2020 onwards, which likely reflects expedited testing/reporting processes (Figure 2). Of note the HSE South 'epi-date' curve diverges downwards from the national pattern in late-March 2020, which is early in the overall evolution of the pandemic in Ireland (Figure 2).

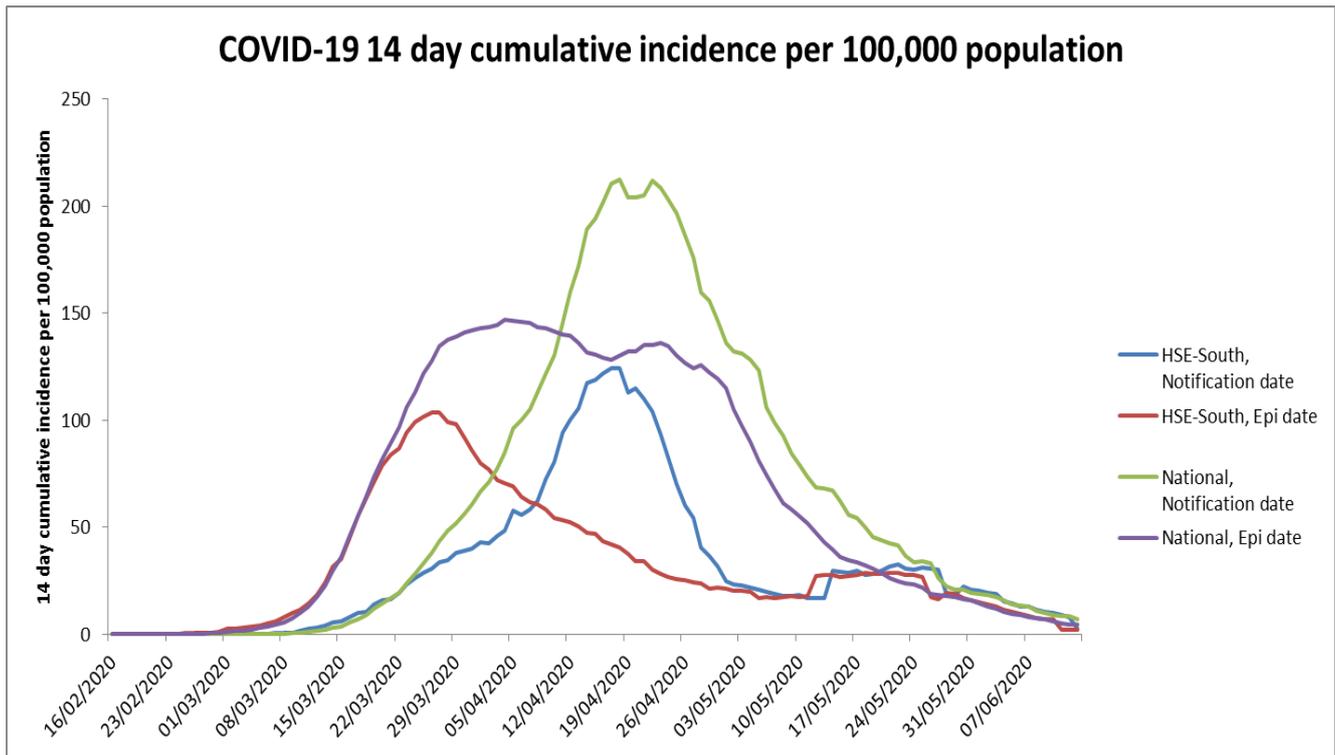
Epidemiological curves

Figure 1. HSE South epidemiological curve by epi-date*



*Epi-date: earliest of onset date, date of diagnosis, laboratory specimen collection date, laboratory received date, laboratory reported date, notification date ⁷; * = factory outbreak 'targeted testing' exercise.

Figure 2. HSE South and National epidemiological curves by epi-date and notification date.



Provisional data extracted from CIDR. Denominator; 2016 census.

Characterisation of cases

Of 1,842 cases, 891 were male (48.4%) and 951 were female (51.6%). Median case age was 47 years. The highest number of cases occurred in age groups >45 years of age. Two-hundred-and-nineteen cases (11.9%) were hospitalised, 33 (1.8%) admitted to ICU and 55 cases (almost 3%) died. The highest rate of hospitalisations per age group occurred in those >65 years (48%, n=106). Of those cases hospitalised, 28 cases (12.8%) died and of those admitted to ICU 9 cases (27.3%) died. Of all cases; 1,346 (73.1%) were symptomatic; 752 (40.8%) had underlying medical conditions, including heart disease 228 (12.4%), respiratory disease 210 (11.4%), diabetes 81 (4.4%); 436 (23.7%) were healthcare workers (HCW); 7 (0.4%) were pregnant; 61 (3.3%) were paediatric cases. Of 752 cases with underlying medical conditions; 163 (21.7%) were hospitalised - representing 74.4% of total hospitalised cases, 4.1% were admitted to ICU and 6.8% died. Of 55 total deaths; over 90% occurred in those >65 years of age, 92.7% had underlying medical conditions, 49% had heart disease. Of 61 paediatric cases; 55.7% were symptomatic, 14.8% reported underlying medical conditions, 9.8% were hospitalised. There were no ICU admissions or deaths in the pregnant or paediatric cohorts.

Overview of Transmission Classification and Outbreaks

In our study 1,115 cases (60.5%) occurred through 'local transmission', 482 (26.2%) in a healthcare setting; 471 (~25%) occurred via 'community transmission'; 137 (7.4%) were imported. Contact tracing was conducted for >4000 'close contacts' of confirmed cases. One-hundred-and-twenty-eight outbreaks were recorded, with 1,259 outbreak-associated cases, occurring in various settings including; private house (56), nursing home (11), residential institution (21), hospital (9), workplace (8), community hospital/long-stay unit (6), unknown (0) and other (17). Outbreaks occurred most commonly in private houses (56, 43.8%). The highest number of outbreak-associated cases was related to workplace-based outbreaks (324, 25.7%).

Discussion

The regional COVID-19 epidemic evolved with discrete surges in specific settings. From early March 2020 a spike in travel-related cases was temporally linked to increased COVID-19 activity in Italy in particular. Notifications from hospital and nursing home settings also increased rapidly, likely reflecting increased community transmission. Up to end of April 2020 notifications from healthcare and community settings featured prominently, with nursing home and residential institution settings of particular concern. Cases in private houses featured throughout. During the study period, cases in our region declined from mid-March 2020 but from May 2020 resource-intensive local clusters predominated e.g., in workplaces including an outbreak in a food processing plant. While our peak 'epi-date' activity occurred in March 2020, peak 'notification date' activity occurred in April 2020, reflecting early challenges in testing/reporting surge capacity described by this group previously. A quarter of cases did not have a clear source of transmission identified, raising the possibility of asymptomatic transmission. Approximately 7% of cases were imported and we noted a decrease in travel related transmission after a national travel restriction was implemented. From March-April 2020, 29.2% (35/120) of 'close contacts' who became symptomatic and were tested while under 14-day active surveillance in our region developed COVID-19 infection¹⁰. However, case definitions and broader testing strategies/capacity have evolved since³.

COVID-19 had a devastating and disproportionate impact on older age groups in our cohort. This mirrors national and international experience^{3,11} and underscores the need for vigilance in vulnerable cohort settings. Sadly, during the first 100 days in our region, fifty-five cases died, most aged >65 years. Case fatality rate (CFR) for that period was 2.99%, while the national CFR was 5.71% for the same period⁷. Nursing home outbreaks accounted for 8.6% of outbreaks in our region, compared with 26.2% of outbreaks nationally⁷. We observed an increased risk of severe illness in cases with underlying medical condition(s) and noted a two-fold increased risk of hospitalisation in that group, highlighting the need for targeted services and preventative measures. Paediatric cases in our cohort largely experienced a mild illness. More recently cases in younger age groups (<45 years) have predominated nationally³.

Approximately 23% of total cases in our cohort were HCW, which is less than the national figure for that period of 32.1%⁷. While occupational exposure must be considered, local transmission within shared accommodation/social settings was also implicated in some outbreaks, including a food processing plant and residential institutions such as 'direct provision' settings. In our experience, migrant workers, particularly those from non-English speaking communities, are especially vulnerable to household spread and development of familial clusters - due to crowded living conditions and language and cultural barriers. This mirrors international observations¹². In addition, COVID-19 outbreaks in meat plants pose unique challenges¹³. The importance of social determinants of health and the impact of health inequities on COVID-19 acquisition risk and outcomes have become increasingly evident¹⁴. Initiatives to reduce health inequities, including multilingual initiatives such as the 'COVID 19 World Service' video messages in 30 languages, are vital and facilitate health protection of wider communities.

Public Health Medicine forms the cornerstone of the national response for prevention and control of COVID-19 in Ireland. Core 'health protection' activities protect the health of the nation by breaking chains of transmission, preventing secondary/tertiary cases and further COVID-19 associated morbidity and mortality. Core activities within regional departments include crucial outbreak control/investigation/management in complex settings such as e.g., schools, childcare-facilities, nursing homes, 'direct provision' centres, prisons, food processing plants amongst many others. Other departmental core activities include identification of transmission source as standard, case finding/management, risk assessment, contact tracing, enhanced surveillance, data management etc. These data help to inform national policy decisions such as those relating to 'Living with COVID National Framework' levels¹⁵. The novel national contact management programme (which includes contact tracing centres developed for high-throughput of low complexity cases) and the novel contact tracing app. are valuable adjuncts.

Given SARS-CoV-2 transmission dynamics timely testing and reporting pathways are critical to interruption of transmission and innovations such as SARS-CoV-2 wastewater surveillance are welcome.

The potential 'negative impact' of certain NPIs is increasingly recognised². However, the recent SCOPi study reports an estimated national prevalence of infection of 1.7%, indicating that we remain a susceptible population at high risk of community transmission if NPIs are not adhered to¹⁶. This is compounded by uncertainty regarding post-infection immunity, reports of 're-infection', increasing concerns regarding 'Long-COVID' and other healthcare challenges seen during winter months. Priorities outlined by our acting Chief Medical Officer include protecting our most vulnerable, resumption of non-COVID healthcare and maintaining educational activities¹⁷. As Dr Mike Ryan WHO tells us 'No one is safe until everyone is safe'. To mitigate the ongoing risk of surge activity, in the absence of a vaccine/curative treatment, sustained engagement with NPIs² and robust resourcing of Public Health Medicine in Ireland are vital.

Declaration of Conflicts of Interest:

There are no conflicts of interest to declare.

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Paediatric Cystic Parathyroid Adenoma

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Abstract

Presentation

A 15-year-old boy was admitted with a 4-week history of nonbilious, non-bloody emesis 3-4 times a day with progressively decreasing appetite with nausea, fatigue, irritability and 8 kg weight loss. His labs were normal except for BUN 12.1, Creatinine 150, Calcium 4.56 and PTH 157.9.

Diagnosis

Data was collected from the patient's medical chart in addition to radiology and histology reports.

Treatment

Mixed solid and cystic adenoma was treated with a parathyroidectomy.

Conclusion

Cystic parathyroid adenoma is an important consideration for individuals presenting with unexplained electrolyte imbalance, hyperparathyroidism and hypercalcemia.

Introduction

Cystic parathyroid adenomas are very rare and account for less than 1/10,000 of neck masses.¹ We report a 15-year-old patient presenting with hyperparathyroidism and hypercalcemia secondary to cystic parathyroid adenoma.

Case Report

A 15-year-old boy was admitted with a 4-week history of nonbilious, non-bloody emesis 3-4 times a day with progressively decreasing appetite with nausea, fatigue, irritability and 8 kg weight loss. His labs were normal except for BUN 12.1, Creatinine 150, Calcium 4.56 and PTH 157.9.

Apart from Attention Deficient Hyperactivity Disorder, his medical, surgical, family, social history, and systems review were unremarkable. He also had no allergies and his immunizations were up to date.

On examination, there was no evidence of cervical lymphadenopathy or a thyroid mass. The thyroid gland was palpable and non-tender. His cardiovascular, respiratory and gastrointestinal examinations were unremarkable.

The working diagnosis included parathyroid adenoma followed by parathyroid hyperplasia. Parathyroid carcinoma is less likely as it is extremely rare in the paediatric age group

On ultrasound, two cystic lesions were noted adjacent to the lower pole of the right thyroid lobe, measuring 2.3 x 2.0 x 3.2 cm and 2.9 x 3.5 x 5.2 cm. The smaller cyst appeared simple with a thin internal septation without internal vascularity, while the larger one appeared complex and demonstrated internal vascularity (Figure 1).

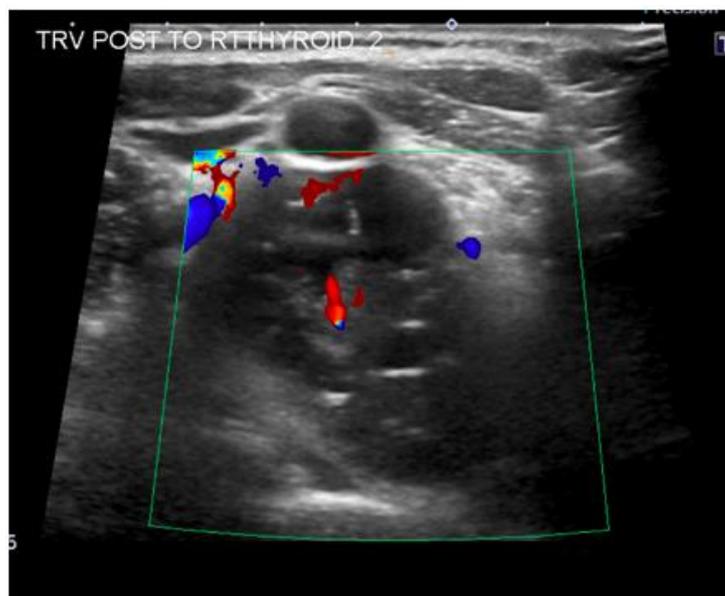


Figure 1: Ultrasound images of the neck at the level of the thyroid gland demonstrates vascular solid and cystic components within the lesion situated posteriorly to the carotid artery.

Parathyroid scintigraphy (^{99m}Tc - Sestamibi) revealed a focal increased tracer uptake at the inferior thyroid bed, right of the midline, which was further confirmed with SPECT/CT. When correlated with the neck ultrasound, these findings were consistent with a parathyroid adenoma.

Subsequently, the patient underwent a right-sided parathyroidectomy. The excised mass weighed 60.0 g and measured 8.0 x 5.0 x 3.6 cm (Figure 2). Histological examination demonstrated a biphasic lesion with about 30% being a pale solid irregular area while the other 70% was cystic and multilocular with three ill-defined locules. No features associated with malignancy were present apart from capsular invasion without extension to surrounding tissue and broad intra-tumoral fibrous bands containing expansile nodules. These findings were reflective of an atypical parathyroid adenoma.



Figure 2: Sectioned Excised Mass (60g) demonstrating the nodular configuration with solid and cystic components. No features associated with malignancy were present apart from capsular invasion without extension to surrounding tissue and broad intratumoral fibrous bands containing expansile nodules. Additionally, there was no evidence of vascular or perineural invasion, and no metastasis to surrounding tissues. Findings were most in keeping with atypical parathyroid adenoma, which is a diagnostic term applied to a parathyroid neoplasm exhibiting some atypical features, but not fulfilling the absolute criteria for malignancy.

He was discharged and scheduled for follow up with Endocrinology as an out-patient for his elevated parathyroid hormone levels (23.7 mmol/L). He remained asymptomatic at ten weeks postoperatively.

Discussion

Majority of parathyroid adenomas are solid; however, they can be cystic or partly cystic in 1-2% of Primary Hyperparathyroidism cases. In 1952, Green et al. reported the first case of a functioning parathyroid cyst causing primary hyperparathyroidism⁴, and only around 300 cases of cystic parathyroid adenomas have been reported in literature thus far.^{3,4} These lesions are more common in males between the ages of 40 and 50 years involving predominantly the inferior parathyroid glands⁵ and complex parathyroid adenomas are very rare in children. Multiple explanations have been put forward regarding the pathogenesis of cystic parathyroid adenomas, including (i) vestigial origin and development from the 3rd and 4th branchial cleft and cyst, (ii) amalgamation of parathyroid acini, (iii) parathyroid development failure, (iv) retention of secretion vesicles, and (v) intra-adenoma hemorrhage with consecutive liquefaction of hematoma.⁵

Diagnosing parathyroid adenomas preoperatively poses many challenges due to cytologic similarities in parathyroid cysts and non-functional thyroid cysts along with the low sensitivities of ^{99m}Tc-Sestamibi and neck ultrasound for cystic adenomas compared to solid adenomas. Consequently, neck ultrasound results should be correlated with ^{99m}Tc-Sestamibi to increase diagnostic sensitivity for cystic adenomas.

Cystic parathyroid adenomas are a subtype of atypical parathyroid adenomas. These can present in the paediatric population, although they are much more common in males between the age of 40-50 years old. Additionally, atypical parathyroid adenomas share some similarities with parathyroid carcinomas, and therefore an accurate diagnosis is essential for timely and effective management. Consequently, cystic parathyroid adenomas should be on the differential diagnosis list for individuals presenting with unexplained electrolyte imbalance, hyperparathyroidism and hypercalcemia.

Declaration of Conflicts of Interest:

No conflicts of interest to declare.

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An Unusual Burn Injury Caused by an E-Cigarette

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Abstract

Presentation

We present the case of a burn wound of the left chest induced by the leaking hot liquid contents of an e-cigarette.

Diagnosis

A full thickness burn of 0.3% total body surface area (TBSA).

Treatment

A wound requiring formal surgical excision and reconstruction in the form of an autologous split skin graft.

Discussion/Conclusion

This case demonstrates a previously undescribed risk of e-cigarette use, resulting in an injury that required inpatient admission and treatment in a tertiary plastic surgery unit.

Introduction

E-cigarettes first became available in Europe in 2006; their use in Ireland has been popularised as an alternative to conventional cigarettes and an aid to smoking cessation. Powered by a lithium battery, the e-cigarette heats an “e-liquid” (containing a variable mixture of nicotine, water, a chemical solvent and flavourings) and converts it to a vapour. This, in turn, is inhaled by the user via a mouthpiece. However malfunctions in the e-cigarette mechanism have resulted in several injuries, some severe ¹, and even death ². While thermal and chemical burns associated with spontaneous battery explosion are the most common accidents ³, intra-oral trauma ⁴ and cervical spine fractures ⁵ have also occurred. The commonest site of injury is the lower limbs ^{1, 6, 7}.

This case introduces a previously undescribed mode of burn injury associated with e-cigarettes, which initially manifested as sudden onset chest pain.

Case Report

We present the case of a 60-year-old male who was referred by his GP to the Emergency Department (ED) with a full thickness burn of the left breast. (Figure 1)



Fig 1: Presentation with full thickness burn of left breast at 10 days post injury.

Ten days previously, the patient presented to another hospital, complaining of acute left sided chest pain of several hours' duration. When he was asked to loosen his shirt in the ED for clinical assessment and the placement of ECG leads, he noted a wound on his left breast and that his shirt was wet in the same area. Once his clothing had been fully removed the pain eased and the diagnosis of a burn wound was confirmed. On further questioning it was determined that the patient had been carrying an e-cigarette in his left breast pocket. It had inadvertently activated, and the e-liquid had leaked from the device causing a burn. The integrity of the e-cigarette was otherwise intact. Cardiac investigations were unremarkable. He was discharged with simple dressings to the care of his GP.

The wound deteriorated over subsequent days and he was referred to our centre for further management. We diagnosed a full thickness burn of 0.3% TBSA. We tangentially excised the wound and resurfaced using a split thickness skin graft from the left thigh, under combined general and local anaesthesia, the day following admission to hospital. On review at 4 weeks post-operatively, both the chest and donor wounds had healed fully. (Figure 2)



Fig 2: Healed split skin graft reconstruction of wound at 4 weeks post-operatively.

Discussion

The findings of the 2019 Healthy Ireland survey suggested the use of e-cigarettes in Ireland is rising⁸. However, in the absence of long term data relating to their side-effects, their use as an aid to smoking cessation in Ireland is not endorsed by the Health Service Executive⁹. Furthermore, regulation of these devices does not fall under the remit of the Health Products Regulatory Authority, which makes safety assurance difficult.

The composition of e-cigarettes explains the most commonly described mechanism of burn associated with their use. An e-liquid is vaporised through the generation of high temperatures, by a heating element, of up to 250 C and this is inhaled through a reusable mouthpiece. This process is initiated by switching the e-cigarette “on” and it is powered by a rechargeable lithium battery.

Previous reports have postulated that a “thermal runaway” exothermic malfunction of the lithium battery, often as a result of exposure to moisture or contact with metal, can lead to overheating and secondary explosion⁷. Equally, a short-circuit within the battery can cause it to overheat⁷. We are unclear, due to his delayed presentation, of the exact mechanism of injury to our patient, however given he noted an egress of the e-liquid onto his shirt and the e-cigarette was in the “on” mode, it was likely the result of a fault in the product and a mixture of both chemical and thermal burns. He also received no first aid and as he did not perceive his symptoms to be the result of a burn injury, the contact time with the inciting agents was prolonged. This likely contributed to a more severe - albeit small - full thickness injury. This case, therefore, demonstrates an additional danger of e-cigarettes not previously described.

This report demonstrates potential pitfalls of e-cigarette use, exclusive of the known effects of nicotine and, yet, unknown effects of their additional constituents. We caution patients regarding the transport of e-cigarettes, especially when the risk exists of direct contact of components with skin. In this regard we echo the sentiments of Treitl et al who suggest the use of an insulated protective case¹⁰.

Declaration of Conflicts of Interest:

The authors of this paper declare no conflicts of interest.

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The Irish Phineas Gage: Frontal Lobe Traumatic Brain Injury

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Abstract

Presentation

We describe the clinical case of a gentleman who suffered a traumatic brain injury, following a fall on a building site. He was impaled with an iron rod through his left temple, sustaining significant injury to his frontal lobe.

Diagnosis

Frontal lobe traumatic brain injury with resultant behavioural change and cognitive impairment, which is discussed in detail in the manuscript and supplementary material.

Treatment

Emergency neurosurgical intervention, with removal of the rod and haematoma evacuation.

Discussion

Phineas Gage remains the archetypal example of frontal lobe dysfunction in medical education. A previously placid, mild-tempered railway foreman, Gage's frontal brain injury irrevocably changed his personality and engendered much interest in the functions of the frontal lobes. We describe Gage's modern-day Irish counterpart.

Introduction

Phineas Gage was a 25-year-old railway foreman, a "shrewd businessman with a well-balanced mind"¹. In 1848, an accidental explosion caused a 3cm-wide tamping rod to be propelled upward through Gage's facial bones and frontal skull, causing predominant left frontal lobe injuries (The Boston Crowbar Case)^{2,3}.

Gage recovered physically, but psychological deficits rendered him unable to resume his former position as a foreman. Harlow, Gage's physician commented that the equilibrium between his intellectual faculties and animal propensities seemed to have been destroyed¹. Previously a favourite of his peers, Gage now displayed deference for colleagues, was profane, impatient, obstinate and despite devising many plans, was unable to proceed with any of them³; his friends commented that "Gage was no longer Gage"⁴.

Case Report

Our patient, a 46-year-old right-handed carpenter, was injured in Ireland in 2006 after falling 2.5m from a scaffolding and becoming impaled on a 1.5cm diameter steel foundation rod which penetrated the left side of his temple, causing left fronto-parietal and temporal lobe damage. He was transferred to hospital with the steel rod in situ, which required surgical removal and evacuation of surrounding parenchymal haematoma. Acute imaging (Figure 1) and post-operative imaging (Figure 2) are shown below.

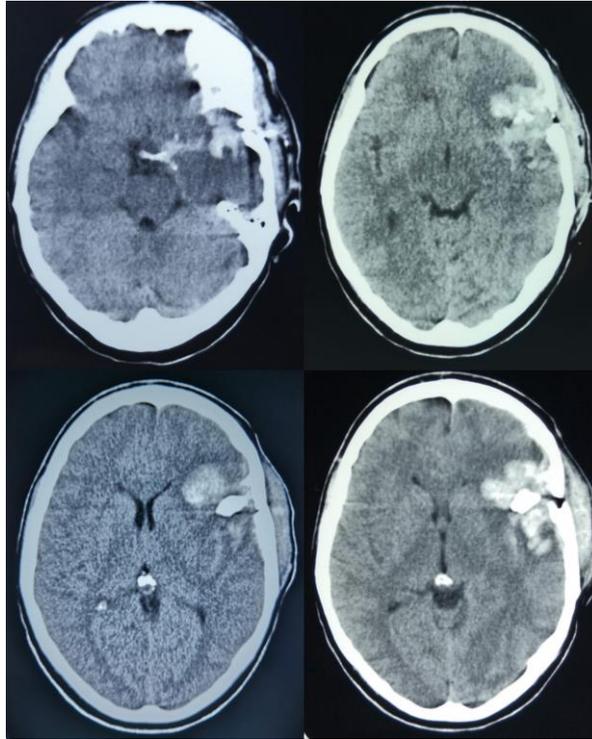


Figure 1: Initial non-contrast CT brain shows acute haemorrhage in the dorsolateral frontal lobe, a corresponding bone defect and significant extra-axial oedema. The path of the iron bar looks to pass medially and rostrally following penetration of the skull.

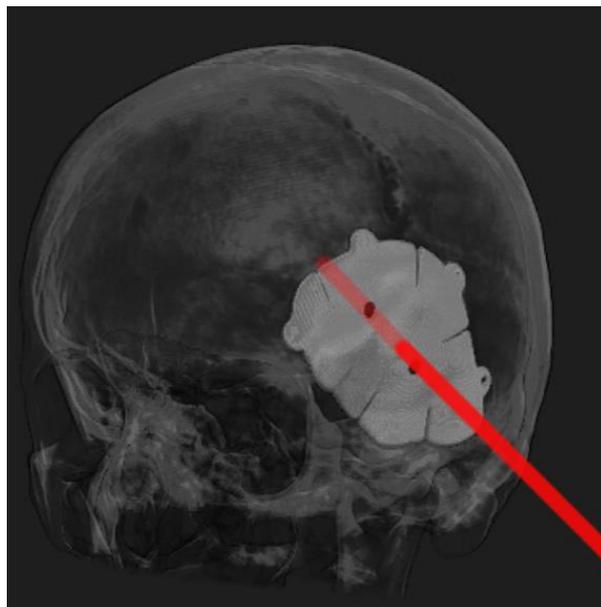


Figure 2: Volume rendered CT image of our patient showing our impression of the trajectory of the iron bar traversing the skull (titanium plate also visible).

He made a good physical recovery but subsequently was a changed man. Previously affable and gregarious, he became paranoid, irritable, short-tempered; he found it difficult to socialise and withdrew from society. He displayed poor concentration and memory and like Phineas 165 years ago, lost his job. He readily insults people and shows no remorse or empathy. He was forced to move out of the family home and became estranged from his longtime partner.

Neuropsychological examination performed ten years following the accident showed pervasive deficits consistent with frontal lobe injury. He assumed an overfamiliar manner, reflecting poor social awareness. He performed poorly on focused testing of cognitive skills considered sensitive to frontal lobe dysfunction, including mental abstraction, social reasoning, organisational functioning and sustained application of mental effort. Disproportionate executive functioning deficits were observed, with poor mental application to tasks, poor self-monitoring skills, defective abstraction, planning, organizational and strategic functioning and cognitive inflexibility, reflecting predominant dorsolateral prefrontal injuries.

Discussion

Post-mortem examination of Gage's skull and detailed digital reconstructions of the rod's trajectory have confirmed that most of the cerebral damage occurred in the left frontal lobe, and the loss of over 10% of frontal white matter volume resulted in major disruption to the white matter connectome.^{3,8}

Frontal sub-cortical circuits determine many facets of human behaviour. Damage to these can produce dramatic neurobehavioral syndromes, yet they are rarely formally assessed during routine neurological consultations⁶. Many different symptom groups are referable to frontal lobe injury, which generally predominantly localise to one of three frontal distinct regions. These include the dorsolateral prefrontal (heteromodal cortex) syndrome, which in isolation produces executive and learning dysfunction; the orbitofrontal and medial frontal (paralimbic) syndrome which manifests as personality changes and social disinhibition; and the anterior cingulate syndrome (the least studied of the three), which in isolation produces apathy and mutism (abulic syndrome)⁶. Isolated circuitry lesions have been reported, including Penfield who described executive dysfunction without personality change (heteromodal syndrome) in his sister following surgical treatment of an oligodendroglioma⁹. In practice however (as seen with Phineas, our patient, and more commonly in neurodegenerative disease) overlap is common. In the absence of accompanying physical deficits however, such frontal neurobehavioural and neuropsychiatric syndromes can be overlooked, or misinterpreted as personality traits.^{6,7}

Our patient's frontal lobe injuries produced a clinical syndrome strikingly akin to that of Phineas Gage. This Irish modern-day doppelganger serves as a reminder to clinicians about the story of Phineas Gage and his unique contribution to the study of frontal lobe function.

Declaration of Conflicts of Interest:

The authors declare that they have no conflict of interest.

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Angioimmunoblastic T Cell Lymphoma

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Dear Editor,

Angioimmunoblastic T cell lymphoma (AITL) is one of the most common Peripheral T cell lymphomas (PTCL) arising from a subset of peripheral CD4 positive T cells but is a rare form of Non-Hodgkin lymphoma. AITL was first described as an angioimmunoblastic lymphadenopathy with dysproteinemia in 1974¹. The incidence of AITL is higher in Europe (28% of PTCL) than in the USA (15% of PTCL) and in Asia (17% of PTCL). Patients frequently exhibit B-symptoms and generalized lymphadenopathy. Other clinical features include hepatomegaly, splenomegaly, polymorphic skin rash and pleural effusion. Advanced stage disease (Ann Arbor III/IV) is observed in 80% of cases. Polyclonal hypergammaglobulinemia occurs in approximately 50 percent of AITL cases².

There is no standard treatment for AITL. Corticosteroids have been the first line agents and can be given alone or in combination with cyclophosphamide, vincristine, or both. CHOP and CHOP based regimens have produced complete remission rates of 60% in retrospective analysis. In 2018, brentuximab was approved by the FDA for CD 30 expressing PTCLs. Brentuximab plus CHP was superior to CHOP for progression-free survival (p=0.011). Furthermore, the natural history of AITL is characterized by several relapses, with a five-year overall survival of 30 percent³. The survival is significantly related to age, stage and clinical features. Several case reports have been published in recent years showing the complexity and aggressive nature of the disease⁴.

This letter discusses the complex presentation of a confirmed case of AITL in Ireland. This is a case of a 75-year old male who presented with lethargy, shortness of breath and productive cough for the past few months. He was a chronic smoker and had no significant background history. Physical examination revealed bilateral submandibular, cervical, axillary and inguinal lymphadenopathy. His breath sounds were reduced at both lung bases and, he had moderate ascites with peripheral edema.

Blood tests showed anemia, thrombocytopenia, elevated ESR with deranged renal function. Chest x-ray revealed bi-basal consolidations with small pleural effusions. CT thorax, abdomen and pelvis was performed and showed diffuse adenopathy, bilateral pleural effusions, bi-basal consolidation, moderate splenomegaly and moderate ascites. He underwent excision biopsy of left cervical lymph nodes and histopathology showed T cell lymphoma with expression of T follicular helper cell markers, regarded as angioimmunoblastic T cell lymphoma.

His bone marrow aspirate was taken, and it revealed an increased population of T lymphocytes. Other tests for relevant differentials including quinterferon test, autoimmune screen, vasculitic screen, hepatitis and HIV serology, which were all negative.

Sepsis protocol was commenced as initial management of the patient and relevant investigations were carried out to find severe underlying illness. On reaching the final diagnosis, the patient received the first cycle of chemotherapy (CHOP) along with supportive measures. With further progression of the disease to an advanced stage, the patient's condition didn't improve. A decision was made to consider palliative treatment and stop further chemotherapy as patient developed multi-organ failure, but unfortunately, he died within a short period of time.

This case illustrates the aggressive nature of AITL and explains the complexity of the disease as it can mimic infectious, autoimmune and allergic aetiologies. At the time of diagnosis, most of the patients present with advanced-stage disease (stages III-IV). The diagnosis of AITL can be challenging, given the lack of clinical and histological diagnostic criteria therefore, clinical history, symptoms and complementary studies are crucial.

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Consideration of Tetanus Prophylaxis in an Infant Born Out of Hospital

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Dear Sir,

In January an infant was born on the streets in Dublin. In a first world country this is not something we have great experience of and prompted discussion about how this would be approached. The initial stabilisation steps would naturally follow along the Neonatal Resuscitation Programme and the approach to management of a case where maternal serology or medical history is unknown. However, this is still within a clean hospital setting. 'What about Tetanus?' was the question asked, which we could not immediately answer.

Tetanus is caused by spores of the bacterium *Clostridium tetani*. The spores, which can survive for years, are found everywhere in the environment, particularly in soil, intestinal tracts/faeces of animals and humans, and on the surfaces of skin and rusty tools¹. Maternal and Neonatal Tetanus (MNT) has been among the most common life-threatening consequences of unclean deliveries and umbilical cord care practices². When tetanus develops, mortality rates are extremely high, especially when appropriate medical care is not available, as is often the case in low income countries². In countries where national programmes have maintained high immunization coverage for several decades, tetanus incidence rates are very low¹.

The disease remains an important public health problem especially in low-income countries or districts, where immunization coverage is low, and unclean birth practices are common. In 2015, approximately 34 000 newborns died worldwide from neonatal tetanus¹. It can be prevented by immunizing women of reproductive age with tetanus-toxoid-containing vaccines (TTCV), either during pregnancy or outside of pregnancy in addition to robust medical practices. The vaccine against tetanus was introduced into the Irish vaccination schedule during the 1930's. Between 2000-2015 twelve cases of tetanus were reported in Ireland with 2 deaths. The majority of these cases were >20 years of age¹. There are no documented reports of neonatal tetanus available in Ireland thus far.

In this scenario we have a baby of uncertain gestation born to a mother with unknown medical and immunization status, delivered in an environment putting the baby at risk of acquiring tetanus. Although HSE recommendation is not neonatal specific, it states that Prophylaxis with TIG is recommended for those with tetanus-prone wounds who are not immunised or unknown vaccine status and /or immunocompromised, even if fully immunised³. In this case the infant was observed in NICU pending serology status and clarification sought in relation to implement used to cut umbilical cord.

The case was discussed with the Infectious Diseases team who advised Hep B vaccination for the child, to hold TIG prophylaxis and observe for 7 days. The infant was discharged to foster care after two weeks in the unit, is thriving and meeting developmental milestones.

Some of our team have worked in resource poor regions and had experience of such cases whereby such an infant would receive prophylaxis and demonstrated the value of our diverse teams with their cumulative experience from different countries, especially in the developing world. Evidence-based guidance for such scenario is not readily available. We suggest the care for such infants should include in hospital observation for at least 7 days, vigilant history taking and maternal immune status inquiry, relevant serology screening and wound / umbilical swabs and fastidious umbilical stump care. Consideration should be given to prophylaxis with human tetanus immune globulin (TIG) and discussion with Infectious Diseases. We also propose that the national immunisation guidelines could include recommendations for the neonate at high risk of tetanus neonatorum.

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Fever Under 3 Months: Is It NICE to Continue?

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Dear Editor,

The majority of fever $>38^{\circ}$ are due to viral illness. However invasive bacterial infection can occur. NICE published a guideline for the management of fever in those under five¹. We set out to ascertain the cause and pattern of infections in infants aged less than three months and to examine our compliance with the guideline.

The medical records of infants aged less than 3 months who presented with fever more than 38°C from January to December 2018 were reviewed. Patients were divided into two groups for statistical analysis; those aged less than 1 month (group i) and aged between 1 and 3 months (group ii). Investigation was performed where indicated, as per guideline.

We examined 43 records [7 (16.27%) (group i) and 36 (83.7%) group ii], mean (SD) age 49.56 (18.22) days. Mean (SD) serum WCC, CRP and neutrophil were 11.45 (5.05) $10^9/\text{L}$, 17.04 (21.25) mg/L and 5.58 (3.47) $10^9/\text{L}$, respectively. Neutrophil and CRP values were above the reference range in one of four infants (25%) with UTI. Moreover, serum WCC, neutrophil and CRP values did not differ between infants with x-ray changes and those with normal chest x-ray (p value 0.32).

Four viral pathogens were isolated in CSF by PCR [enterovirus, HHV6 and parechovirus (two)] [all group ii except HHV6]. No bacterial pathogen was isolated by CSF PCR, CSF culture or blood culture, however meningococcal B was detected by serum PCR in one infant, aged 7 weeks. Consolidation was reported in three infants (group ii). Bacterial uropathogens were isolated in 4 urine samples (one group i and three group ii). Rotavirus was isolated in two stool samples (group ii) and enterovirus in one (group i).

In conclusion, our compliance with NICE guideline is satisfactory. In febrile infants aged less than three months, normal serum WCC, neutrophil or CRP value does not exclude bacterial infection. In this cohort of febrile infants aged less than 3 months, approximately, one in 14 had consolidation and one in eleven experienced UTI. Moreover, one infant had meningococcal B septicaemia. Nevertheless, viral pathogens were reported in three stool and four CSF samples. These results highlight the importance of following the current NICE guideline, in order to avoid serious bacterial infection.

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A National Review of Amplitude Integrated Electroencephalography (aEEG)

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Dear Sir,

The use of amplitude integrated encephalography (aEEG) has become well integrated into routine care in the neonatal intensive care unit (NICU), to monitor brain function where encephalopathy or seizures are suspected.¹ Early aEEG abnormalities and their rate of resolution have clinical and prognostic significance in severely ill newborns with altered levels of consciousness.²

The most common use of aEEG is in infants with neonatal encephalopathy undergoing therapeutic hypothermia (TH). While TH is performed in tertiary centres, local and regional centres play an important role in the diagnosis and initial management of these infants. The Therapeutic Hypothermia Working Group National Report from 2018 reported that 28/69 (40%) of infants requiring Therapeutic Hypothermia were outborn in local or regional units requiring transfer.³ The report also highlighted that early and accurate aEEG interpretation is important in the care of these infants with many seizures being sub-clinical or electrographic without clinical correlation.

We performed a national audit on aEEG in neonatal services in Ireland, surveying 18 neonatal units that are divided into Level 1 (Local), Level 2 (Regional) and Level 3 (Tertiary). One unit was excluded from our study as it provides a continuous EEG monitoring service on a 24-hour basis as part of the Neonatal Brain Research Group.

Our findings showed that while no Level 1 unit had aEEG, it is widely available in Level 2 and Level 3 units [3/4 (75%) and 3/3 (100%)] respectively. With regards to electrode availability, 1/6 (16%) of centres had hydrogel electrodes. This represents a substandard level of care, given that hydrogel electrodes are the standard of care for preterm infants. The responsibility of electrode placement and aEEG set-up lay mostly with nursing staff (3/5 [60%]), with some inter-hospital variability. Interpretation was largely the responsibility of the doctor (4/5 [80%]).

With regards to education, bedside teaching was the baseline standard of education provided by all units, with one unit relying on teaching from the manufacturing company supplying its equipment. Additional education was provided by two level 3 facilities, in the form of didactic lectures and small group tutorials. Of note, one Level 2 unit reported that while they possessed the equipment, the technology was not generally utilised in SCBU for encephalopathic infants due to a lack of staff education.

This study group has previously shown that trainee paediatric doctors in Ireland have poor baseline knowledge of aEEG set-up, use and interpretation, with improvement noted following a structured education programme. Subsequent to this, and in conjunction with the Royal College

of Physicians in Ireland (RCPI) and the Therapeutic Hypothermia Working Group, an online module titled 'aEEG in the NICU' will be launched in 2020. This will allow for a standardisation of aEEG education for neonatal staff nationally.

Accurate use of aEEG is important in the diagnosis and management of neurologically compromised infants. Having highlighted its widespread use in units throughout Ireland, we hope the development of a standardised online education programme will help to educate and empower the neonatal workforce to provide the optimal standard of neurocritical care to newborns nationally.

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Infants Born to Mothers with COVID-19 During Pregnancy: The First Four Months of the Pandemic

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Dear Sir,

A recent UK report on COVID-19 in pregnancy found that, of the infants delivered, 25% were preterm and 5% tested positive for SARS-CoV-2, half of which required admission to NICU¹. In contrast, a US study of 120 infants born to mothers with SARS-CoV-2, all tested negative for SARS-CoV-2 in the first 24 hours, and of those followed up, all remained PCR negative and asymptomatic at 14 days².

Our aim was to describe the outcome of infants born to women with SARS-CoV-2 PCR detected during pregnancy in the Rotunda Hospital. This was a retrospective review of the first four months (1st March to 1st July 2020) of the COVID-19 outbreak in Ireland (n=26). Ethical approval was obtained (RAG-2020-023).

The median gestational age (GA) at diagnosis of SARS-CoV-2 was 36+6 weeks (interquartile range (IQR) 32+1 - 39+1 weeks). The median date of diagnosis was 3rd April 2020 and median time from diagnosis to delivery was 11 days. Twelve (46%) were detected more than 14 days before delivery. Four women (15%) were from Ireland's Roma community, a vulnerable group disproportionately affected by COVID-19³.

The median GA at birth was 39+3 weeks (IQR 37 – 40+1 weeks), although 6 (23%) were preterm. The mean birth weight was 3.29kg (+/- 0.69kg).

As per National Guidelines, infants routinely roomed-in with their mothers in a designated covid ward if mothers were symptomatic, < 14 days from symptom onset or positive test. Mothers were allowed to breast feed, with strict hand hygiene and a maternal face mask⁴. Nineteen infants (73%) were breast fed before discharge. Seven (27%) required admission to the Neonatal Unit, three for prematurity and four for non-COVID neonatal problems. Two infants were tested for SARS-CoV-2 (one due to excessive nasal congestion and one following discharge), both were negative and remained well.

The median day of life (DOL) at discharge was DOL 4 (IQR DOL 3 to 6). Twenty-five infants (96%) were discharged home and one to a self-isolation facility to complete 14 days of isolation. Eleven (42%) were followed up in clinic for routine issues and 8 (31%) (maternal diagnosis < 14 days before delivery) were contacted by phone 4 to 8 weeks after discharge; none had developed suspected or confirmed COVID-19.

There was a high rate of prematurity, similar to the UK (26%) and US study (17%), although it was unclear if this was due to maternal COVID-19 or other confounding factors. The study limitations include small sample size and all maternal infections/diagnoses were in the 3rd trimester. Infants were not routinely tested for SARS-CoV-2 unless clinically indicated, as per National Guidelines⁴.

These figures provide some reassurance regarding the neonatal outcomes of infants born to mothers with COVID-19 during pregnancy or at delivery, and the postnatal guidelines currently in place in our hospital. As we approach potential further surges of COVID-19, we must continue to monitor the neonatal outcomes, in particular the incidence of preterm birth and evaluate the outcome of infants following maternal infection early in gestation, the effects of which are not yet known.

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COPD and Asthma Hospitalisations in Ireland During COVID-19

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The first case of coronavirus recorded in the Republic of Ireland was on 29th February 2020, with the first death from COVID-19 occurring on 11th March 2020 [Statement from National Public Health Emergency Team (1)]. The number of daily deaths from COVID-19 in the Republic of Ireland peaked at 77 on the 20th of April 2020 (1).

Despite the COVID-19 outbreak, the number of hospital discharges with a principal diagnosis of asthma in April 2020 was down 49% and for COPD was also down 49%, compared with the same time period in 2019 (Source: Hospital In-Patient Enquiry 2020, 87.4% coded).

Between 2nd of March and the 22nd May 2020, COPD and asthma patients with COVID-19 represented 3% of patients with COVID-19 discharged from Irish hospitals. The reported prevalence of asthma in Ireland is 7-9.4% (2). However, from 2nd March to 29th April, of the 83 asthma patients admitted to hospital with COVID-19, 51% received treatment in Intensive Care Unit (ICU), while 27% of admitted COVID-19 patients with a chronic respiratory disease other than asthma received ICU care. It would therefore appear that asthma and COPD patients were less likely to get COVID-19, but for those who did the consequences were more severe.

This pattern has been noted elsewhere, with several explanations proposed, including the impact of public health measures and isolating resulting in a reduction in exposure to other infectious agents; that asthma and COPD may have an inherently protective mechanism against coronavirus; or that therapies such as inhaled corticosteroids may help defend against viral acquisition (3). Of course, patients may also simply be avoiding health-care professionals and institutions for fear of coronavirus transmission and be enduring symptoms in isolation.

Another possible reason is the improvement in air quality seen during this period due to reduction in traffic and reduced industrial output. Improvements in air quality have been shown to reduce respiratory disease and respiratory related mortality. Figures obtained from the Environmental Protection Agency in Ireland note a 52% and 36% reduction in PM_{2.5} from monitoring stations in Dublin and Cork respectively for April when compared to April 2019. Similar reductions were seen in NO₂ in Dublin (urban 41%, suburban 56%) and Cork (suburban 21%) (4).

There are several reasons why asthma and COPD patients may not be presenting to hospitals. Although unlikely to be the sole reason, we believe that improved air quality may be a contributing factor.

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Declaration of Conflicts of Interest:

D.M.M. has received fees for participating on advisory boards for Nycomed, Mundipharma, BI, AZ, Bayer, MSD, Gilead, Menarini, Teva, Orion, GSK, Rowex and Novartis. He has received speaker's fees from Astra Zeneca, GSK, BI, Bayer, Novartis, Teva, Menarini and MSD. He has travelled to ERS 2019 as a guest of Astra Zeneca.

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