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Introduction

The World Journal of Medical Education and Research (WJMER) (ISSN 2052-1715) is an online publication of the Doctors Academy Group of Educational Establishments. Published on a quarterly basis, the aim of the journal is to promote academia and research amongst members of the multi-disciplinary healthcare team including doctors, dentists, scientists, and students of these specialties from around the world. The principal objective of this journal is to encourage the aforementioned, from developing countries in particular, to publish their work. The journal intends to promote the healthy transfer of knowledge, opinions and expertise between those who have the benefit of cutting edge technology and those who need to innovate within their resource constraints. It is our hope that this will help to develop medical knowledge and to provide optimal clinical care in different settings. We envisage an incessant stream of information flowing along the channels that WJMER will create and that a surfeit of ideas will be gleaned from this process. We look forward to sharing these experiences with our readers in our editions. We are honoured to welcome you to WJMER.

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A WELCOME MESSAGE FROM THE EDITORS

Dear Reader,

It is our great pleasure to bring you the twenty-sixth edition of the World Journal of Medical Education and Research (WJMER). This edition consists of many varying intellectual articles in order to provide an insight into the innovative research that is being conducted around the world.

The opening article by Rajaratnam *et al.* offers an idea of a training programme in hand surgery for novice surgeons using cadaveric simulation to ensure authenticity. They find that such a programme is both beneficial and feasible for training new surgeons.

Tan *et al.* explore how the COVID-19 pandemic has affected self-harm by collating demographics of patients with deliberate injuries to the hand and forearm both pre-lockdown and post-lockdown. They found a statistically significant difference between those presenting with deliberate self-harm in 2019 compared to those presenting in 2020 after the lockdown. The latter was higher in number, showing a significant rise in self-harm injuries.

In the following article, Bandara *et al.* propose systemic changes to include self-care teaching in educational programmes for healthcare students. This is primarily due to the impact of the pandemic on the health and wellbeing of health care professionals, alongside the fact that very few medical practitioners accessed any self-care resources when offered. It is believed that this could change if the importance of self-care is taught early in a medical professional's career.

Acknowledging the possible benefits of amending diet in order to target chronic pain, French performed a literature review to find that inflammation, which is thought to be able to be mediated by endotoxins leaving the gut, plays a key role in chronic pain. Noting the anti-inflammatory effects of Omega-3, as well as the pro-inflammatory effects of Omega-6, it was concluded that the gut microbiome plays an important role in chronic pain regulation.

Al-Lawama proposes a four-stage process to preparing learning objectives, as this is the most important step when designing curricula. This consists of a writing stage, a revision stage, skill domain and cognitive levels classification, and, finally, a trimming stage. The first stage consists of using the ABCD (audience, behaviour, condition, degree of skill level) approach to write the objectives. Stage 2 involves applying the SMART (specific, measurable, achievable, relevant, time-based) acronym, which is followed by classifying these according to skill domain and Bloom's Taxonomy of cognitive levels in Stage 3. The final stage is to eliminate any redundancies or repetitions.

Darwin *et al.* compare off-pump and on-pump coronary artery bypass grafting (OPCAB and ONCAB, respectively) in the next article, with a focus on the long-term effects of OPCAB compared to ONCAB, given there are very few studies that have investigated this long-term. They analysed data for patients who presented for coronary angiogram investigation and found that those who underwent OPCAB had a significantly worse saphenous venous graft patency rate than those who had previously undergone ONCAB.

The final article by Tosetti *et al.* evaluates the effect of educational meetings on elderly patients' understanding of laboratory tests. They carried out two educational meetings at recreative centres for the elderly, involving the participants filling out two identical anonymous questionnaires at the beginning and end. They concluded from their results that elderly subjects overestimate abnormality of the results of most common laboratory tests, and that meetings such as this can improve their understanding.

We sincerely hope that you find each article in this edition educational, interesting, and entertaining to read.

Ms Karen Au-Yeung
Associate Editor

Ms Rebecca Williams
Associate Editor

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A Cadaver Simulation Model for Basic Hand Surgery Training – a Design and Development Research

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Abstract
Background: The present skill training in hand surgery has limitations bound by complexity, difficulty of performing surgery and compromise on patient safety. Cadaveric Simulation has been described as a great solution to replace and augment real life experiences for training purposes.
Aim: To design an instructional model based on cadaveric simulation for imparting training in hand surgery for novice surgeons.
Material and methods: Analysis, design, development, implementation, and evaluation (ADDIE) instructional design model was used. A two-day workshop with ten cadavers attended by 48 participants and 6 faculty members. A questionnaire with 10 items was given for the assessment of the program module. The results were descriptively summarized, internal consistency and reliability were analysed through Cronbach alpha.
Results: Results of the survey indicated that participants were satisfied with the program and found it met their requirements and the course objectives.
Conclusion: The program is found to be beneficial in providing uniform, authentic, easy and feasible training in hand surgery to novice surgeons. The same will be implemented in large scale and further assessed.

Key Words
Cadaveric; Simulation; Hand; Surgery; Skill; Training

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Background

The teaching of surgery has traditionally been in the working environment in the form of a mentor-apprenticeship model, in which trained surgeons provide training to the learner[1].

The complexity and difficulty of performing surgery, the challenges of preserving patient safety, as well as an increasing lack of training opportunities have mandated the surgical faculty to reconsider the kind of training model, where acquisition of surgical skills can only be achieved solely in a working environment with live patients. These challenges required innovative strategies to incorporate recent technological advances like simulation, with more emphasis on competency-based assessment, the use of online courses and resources, and the development of a system that rewards faculty and scholarly activity in surgical education so as to improve the quality of training[2].

Simulation has been described as one of the solutions to replace and augment real life experiences for trainees to practice and learn. It allows for an immersive experience with interaction. It has been described as a technique and not a technology[3].

Open surgical simulators currently used include live animals, cadavers, bench models, virtual reality and software-based computer simulators. Cadaver models for surgical simulation has been shown to be effective in surgical training, particularly orthopaedic surgery[5].

Instructional design and technology are a systematic and scientific approach to the management of instructional and non-instructional processes and resources intended to improve learning and performance. This process enables optimal learning to be achieved by deliberately arranging sets of external events based on educational and training contexts[6]. An overall framework for designing learning programs is the Analysis, Design, Development, Implementation, and Evaluation (ADDIE) instructional design model. The incorporation of the instructional design framework into surgical training programs will provide the foundation for designing and developing effective

programs that can be replicated and scaled to the various specialties.

The aim of this study was to design and develop a basic hand surgery training module for skill acquisition using a high-fidelity cadaver model incorporating the ADDIE model of instructional design.

Methods

This study was based on a design and development research framework, which is dedicated to the creation of new knowledge and the validation of existing practice is instructional[7].

A mixed methods approach was utilised with an exploratory sequential design[8]. This involved data collection sequentially, with the qualitative phase being the first step, and the quantitative method then sought to test and further quantify the initial qualitative findings.

Research Questions:

- How can an instructional program be designed and developed for basic hand surgery to produce competent performance among novices?
- Will the training programme provide the opportunity for authentic practice of surgical skills?
- Does the programme allow for ease of learning basic hand surgery?
- Is the module usable in the real world?

Design and Development of an instructional skills module for basic hand surgery

For this stage of the research, the ADDIE instructional design model (*Figure 1*) was used as the framework to design and develop a cadaveric workshop for the teaching of motor skills to perform basic hand surgery commonly seen in the community.

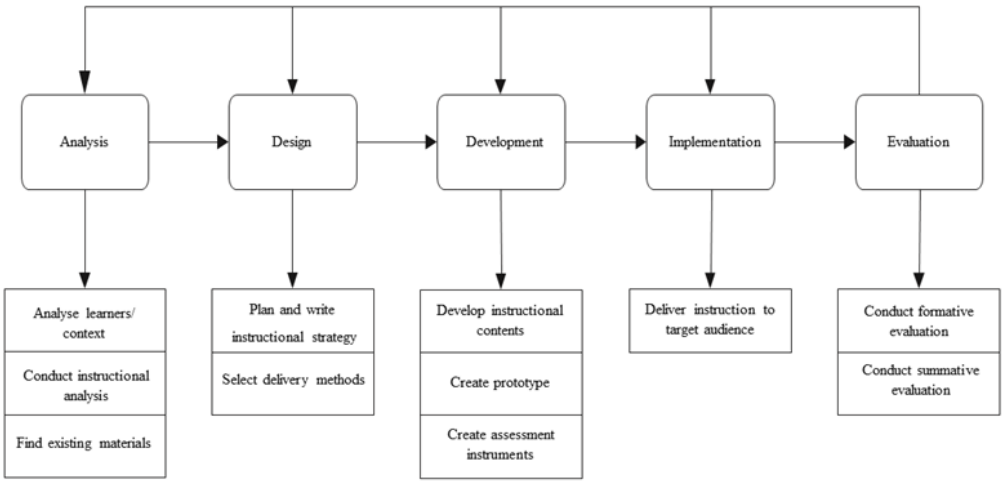

Figure 1: *Analysis, design, development, implementation, and evaluation (ADDIE) model phases and the steps during each phase.*

Analysis of Needs

A quantitative analysis from a previous study of the commonly performed procedures at a general hospital in Singapore was used to determine the index procedures to be covered in the program and the motor skills required to perform the surgical procedures[9]. Following which, the various tasks and subtasks needed to perform the procedure were described. An expert panel was used to validate the choice of the index procedures as an important need for training, and they were also involved in the description of the tasks and subtasks needed to perform that procedure. This led to the development of the learning outcomes for the procedures that included all the tasks and subtasks that were required.

Design and Development of Module

This study focused on designing the instructional content and tools for the module on basic hand surgery skills. The following framework details the process used in designing and developing the training module using the ADDIE model.

Table 1: *Design and Development process of Instructional Materials*

Research Design Concern	Recommended techniques used to address concern	How Study will Address Concern
Validity	Used experts with areas of specialisation for module review. Have participants verify reports of module use. Select doctors with varying levels of expertise to validate the module.	5 expert hand surgeons/ reviewers with broad knowledge of performance in hand surgery. Participants involved in the test of the tool confirmed their status as practicing hand surgery. Participants were selected from different grades to assess the modules that was developed.
Causal Inferences	Determine module's practicality. Determine module's effectiveness.	The module was made easily accessible via online access for the participants to review. Survey questions were deployed to ensure face and content validity.
Generalisation and Interpretation	Recognise "real world" constraints on module's use. Plan for module's independent use.	Non-Stakeholders were used to review and assess the module using an online survey tool. Made module accessible as an open educational resource for others to use.
Anticipating problems	Consider non-laboratory and different cultural contexts when analysing participant data.	In analyses, consideration was given that this is a small sample study, with its limitations.

Five experienced hand surgeons (as per the table below, each with more than five years in practice as consultants/specialists) were chosen as an expert review process, via purposeful sampling, to analyse the curriculum using an interview and survey for consensus. The review panel was also involved in the creation of the resource materials for the program which included the dissection and digital video recording of the procedures based on Mayer's Multimedia theory. These were conducted under the guidance of the instructional designer and subject matter expert RV.

Implementation

The products of the research (the content, sequence, and resources of the basic hand surgery skills training module) were then implemented as a 1.5-day cadaveric skill acquisition flipped workshop. The flipped classroom strategy involved participants studying the lectures at home with online videos and educational resources, and then engaging in interactive teacher-guided higher order learning in the class[10,11].

The whole module was deployed to an open online platform hosting a Moodle open source leaning management system. Participants were provided the link during registration to the workshop.

Evaluation

Evaluation was performed using surveys of the course content among the expert review panel and both participants and faculty during the course.

Results

To understand the community needs for emergency hand surgery, the results of a previously published study by the researcher was used (Sim, W. P., Ng, H. J. H., Tan, S., Bajaj, S. L., & Rajaratnam, V., 2019). This was a retrospective analysis of 1994 surgeries performed under regional anaesthesia from 2013-2016 at KTPH in Singapore. The average age of the patients was 46 years old with a male preponderance of 64%. A total of 96% of the patients had surgery done on a single limb and almost 40% of the surgeries were an emergency procedure. A detailed analysis of the type of operations performed was conducted using Pareto analysis of the frequencies of the types of surgery as shown in Figures 2 and 3.

Table 2: *Profile of Expert Reviewers*

Name	Institution	Expertise
DP	UK	Consultant Hand Surgeon
LWL	UK	Consultant Hand Surgeon
RV	Singapore	Consultant Hand Surgeon
TPY	Singapore	Consultant Hand Surgeon
BM	Singapore	Senior Resident Hand Surgeon

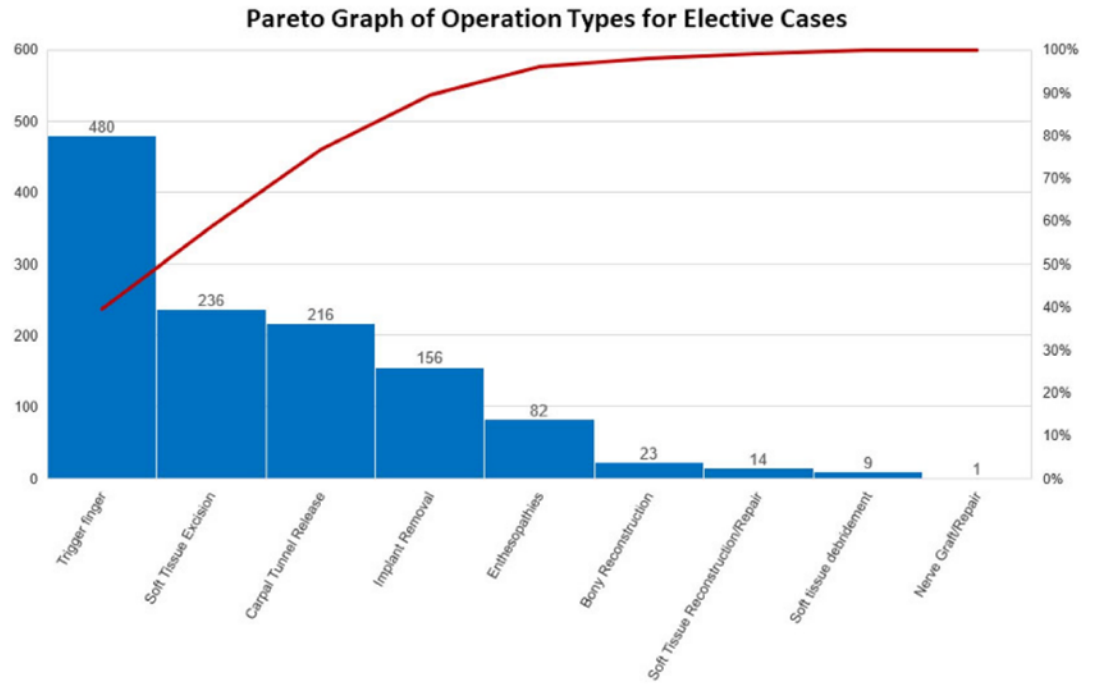

Figure 2: *Elective hand surgery cases*

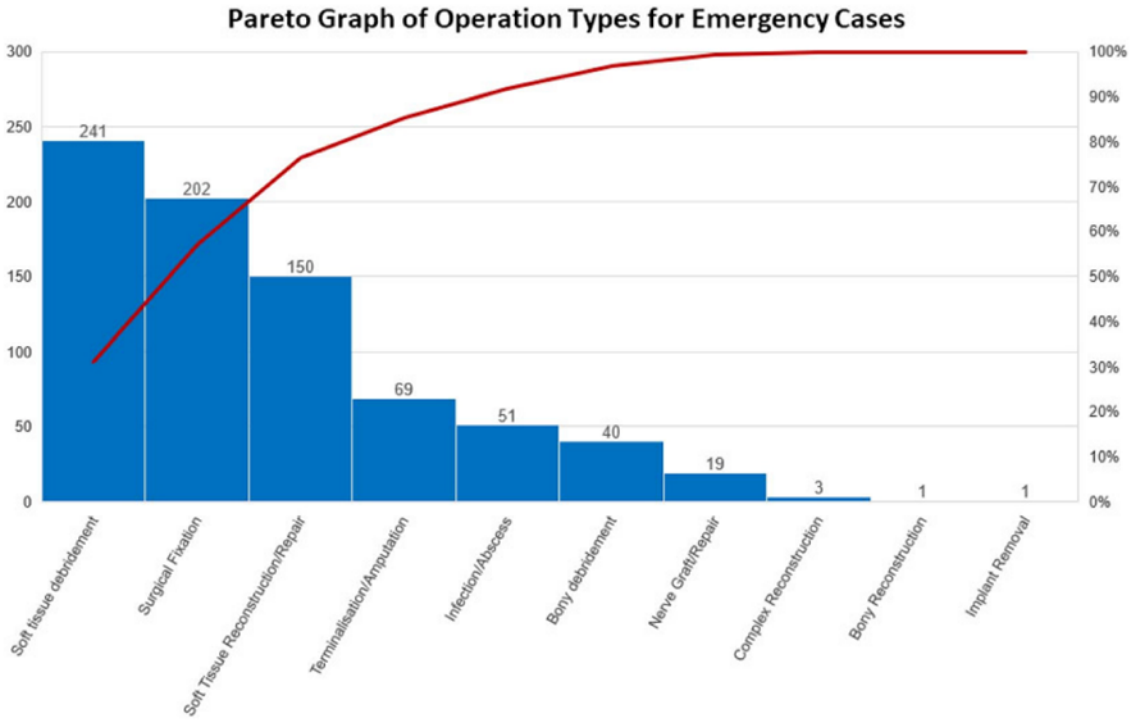

Figure 3: *Emergency hand surgery cases*

For the elective surgery procedures, the most common procedures from the Pareto analysis were trigger finger, excision of soft tissue and release carpal tunnel decompression, whereas in the emergency cases the procedures were soft tissue excisions, surgical fixation soft tissue reconstruction/repair and terminalisation of an amputation.

From this, a curriculum for the cadaver course was developed as online resources, a half day of short lectures and a whole day of hands cadaver simulation workshop. The program developed is as follows: -

Basic Hand Surgery Cadaver Course

Program Day 1

Functional anatomy of the hand
At the end of this lecture, you should be able to: -
- *Describe in detail the anatomy of the hand and wrist*
- *Plan skin incisions for exposure in common hand conditions*
- *Describe the anatomical basis of common hand presentations*

Hand assessment
At the end of this lecture, you should be able to: -
- *Confidently perform a targeted examination of the hand*
- *Understand the principles and basis of specific clinical tests in the hand*
- *Describe the various deformities and clinical presentation in the hand*

Principles of hand surgery
At the end of this lecture, you should be able to: -
- *Confidently take informed consents for common hand operations*
- *Explain the necessary surgical preparations and the use of specific equipment for hand surgery*
- *Describe the role of splinting and post-operative rehabilitation*

Regional Anaesthesia of the hand
At the end of this lecture, you should be able to: -
- *Describe the pharmacology, dose and toxicity of commonly used local anaesthetics agents*
- *Locate the surface marking of the peripheral nerves used in regional anaesthesia for hand surgery*
- *Confidently perform digital, median, ulnar and radial nerve and Biers blocks for hand and wrist surgery*

Tendinopathies of the hand
At the end of this lecture, you should be able to: -
- *Describe the pathology and presentation of the common tendinopathies in the hand*
- *Confidently diagnose and consent for surgery for these conditions*
- *Describe the management including surgery and post-operative rehabilitation.*

Entrapment neuropathies of the hand
At the end of this lecture you should be able to: -
- *Describe the pathology and presentation of the common neuropathies in the hand*
- *Confidently diagnose and consent for surgery for these conditions*
- *Describe the management including surgery and post-operative rehabilitation.*

Nailbed and Digital tip injuries
At the end of this lecture, you should be able to: -
- *Describe the presentations and classifications of digital tip and nail bed injuries*
- *Confidently consent for surgery for these conditions*
- *Able to describe a logical management plan including surgery and post-operative rehabilitation.*

Program Day 2 Cadaveric workshop

Workshop 1 Trigger finger release
- *Anatomy*
- *Markings*
- *Surgical Incision*
- *Dissection*
- *Definitive procedure*
- *Closure*

Workshop 2 De Quervain's release
- *Anatomy*
- *Markings*
- *Surgical Incision*
- *Dissection*
- *Definitive procedure*
- *Closure*

Workshop 3 Carpal Tunnel release
- *Anatomy*
- *Markings*
- *Surgical Incision*
- *Dissection*
- *Definitive procedure*
- *Closure*

Workshop 4 Cubital tunnel release
- *Anatomy*
- *Markings*
- *Surgical Incision*

- *Dissection*
- *Definitive procedure*
- *Closure*

Workshop 5 Ganglion excision
- *Anatomy*
- *Markings*
- *Surgical Incision*
- *Dissection*
- *Definitive procedure*
- *Closure*

Workshop 6 Full thickness skin graft for finger tip
- *Anatomy*
- *Markings*
- *Surgical Incision*
- *Dissection*
- *Definitive procedure*
- *Closure*

Workshop 7 V-Y plasty (Atasoy flap) for finger tip
- *Anatomy*
- *Markings*
- *Surgical Incision*
- *Dissection*
- *Definitive procedure*
- *Closure*

Workshop 8 Cross finger flap
- *Anatomy*
- *Markings*
- *Surgical Incision*
- *Dissection*
- *Definitive procedure*
- *Closure*

Workshop 9 Homodigital Island Flap
- *Anatomy*
- *Markings*
- *Surgical Incision*
- *Dissection*
- *Definitive procedure*
- *Closure*

Workshop 10 Mystery injury
Use the skills learnt from the workshop to assess and manage this injury on the cadaver.
Discuss with a faculty member your plan.

Optional Workshop Remedial / Heterodigital Island Flap
- *Anatomy*
- *Markings*
- *Surgical Incision*
- *Dissection*
- *Definitive procedure*
- *Closure*

The detailed program was presented to the expert review panel and there was a unanimous consensus that these index procedures were appropriate for the aims of the course.

The course was made available on the following link https://tinyurl.com/BASICCADAVER

The statistical analysis of the expert review panel of the course was as follows:

Overall average score for all items was 6.3 and a Cronbach alpha of 0.97.

Learner analysis
The target audience for this learning program are the junior doctors and residents who have attended a basic surgical training and are confident in their ability to use basic instruments and perform suturing.

48 participants of which 6 were faculty responded to the evaluation survey.

Statistical Analysis
Descriptive statistics were used to summarise the scores from the survey (Fig 4) and internal consistency and reliability of the survey was summarised with Cronbach alpha as shown in Table 3 below.

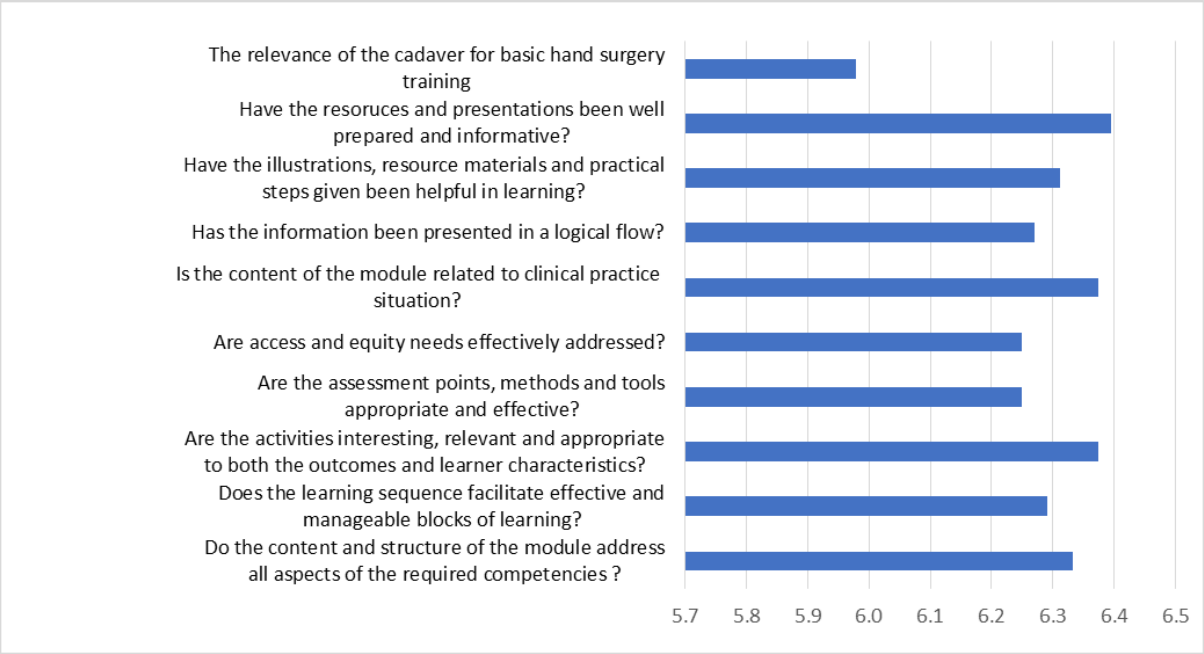

Figure 4: *Validity of the hand surgery training program*

Table 3: *Average scores for all 10 questions*

Count	10
Sum	63
Mean (Average)	6.3
Median	6.3
Mode	6.3, appeared 6 times
Largest	6.4
Smallest	6.0
Range	0.4
Geometric Mean	6.30
Standard Deviation	0.11
Variance	0.01
Sample Standard Deviation	0.11
Sample Variance	0.01

Table 4: *Summary*

SUMMARY	Count	Sum	Average	Variance
Does the content and structure of the module address all aspects of the required competencies?	48.0	304.0	6.3	0.7
Does the learning sequence facilitate effective and manageable blocks of learning?	48.0	302.0	6.3	0.7
Are the activities interesting, relevant, and appropriate to both the outcomes and learner characteristics?	48.0	306.0	6.4	0.5
Are the assessment points, methods, and tools appropriate and effective?	48.0	300.0	6.3	0.7
Are access and equity need effectively addressed?	48.0	300.0	6.3	1.0
Is the content of the module related to a clinical practice situation?	48.0	306.0	6.4	0.5
Has the information been presented in a logical flow?	48.0	301.0	6.3	0.8
Have the illustrations, resource materials and practical steps given been helpful in learning?	48.0	303.0	6.3	0.5
Have the resources and presentations been well prepared and informative?	48.0	307.0	6.4	0.5
The relevance of the cadaver for basic hand surgery training	48.0	286.0	6.0	1.2
Cronbach Alpha			0.94	

Conclusion

This design and development research has described the methodological approach to the use of the ADDIE model of instructional design to create a scientific, evidence-based and structured approach to creating a training skills program in hand surgery. The use of the cadaver model has proven to be useful and effective in the transfer of skills and is perceived to be authentic and effective by participants and faculty members as shown in this study. Further research of the use of this model and technique can be done in other domains of surgery to show acceptance and validity of training programs for skill acquisition in surgery.

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Original Research
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The Impact of COVID Pandemic on Rates of Deliberate Self-harm in a Tertiary Hand Unit

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Abstract
Background: It is well reported that the COVID pandemic has had a significant impact on people's mental well-being. We aimed to explore the rates of hand injuries from deliberate self-harm (DSH) following the United Kingdom 'National Lockdown' and explore the incidence and clinical profile of patients.
Method: Demographics of patients who presented with deliberate self-harm injuries in the forearm and hand were collated. Impact on hospital services were also analysed. Pre-lockdown and post-lockdown groups were analysed over seven-month periods in 2019 and 2020. Data was collected using the electronic patient management system, "E-Hands" at the Queen Elizabeth Hospital, Birmingham.
Results: Expectedly there were far fewer patients presenting to the Hand Service in the 2020 time period, secondary to COVID-19 and behavioural changes. The number of patients presenting to the Hand Surgery Service with DSH in 2019 was 13 of 3885 (0.3%) total presentations, compared to 26 of 3226 (0.8%) in 2020 after the National Lockdown for COVID-19. This difference was statistically significant ($p = 0.008$). Both cohorts had equal rates depression. Significantly more patients had no previous history of DSH in the post-COVID group compared to pre-COVID (81% versus 7%; $p = <0.05$). There was no difference between the cohorts in terms of past mental health conditions ($p = 0.73$).
Conclusion: There has been a significant rise in deliberate self-harm injuries presenting to our Hand Surgery Service following the National Lockdown for COVID-19, despite reduced overall presentations. There were more patients who presented with self-harm for the first time. The economical, emotional, and psychosocial impact of COVID-19 on people's mental well-being is evident through this doubling in DSH presentations.

Key Words
COVID-19; Self-Harm; Mental Health; Hand Injuries

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Introduction

Deliberate self-harm is defined as a direct intentional injury to the body[1]. The resulting injury in the upper limb can vary from superficial lacerations to deep injuries involving tendons, nerves and blood vessels[2]. The latter can result in lifelong disability. The act is associated with mental health crisis and is often managed by both the psychiatric team and the hand surgery team concurrently.

The COVID-19 pandemic reached the United Kingdom by February 2020 at which point the World Health Organisation declared the outbreak a global pandemic[3]. To contain the virus, the UK government announced a 'National Lockdown' which had a dramatic change to people's livelihoods. The Government's new measures led to job losses, redundancies and completely changed the social dynamic in society. The longevity of these measures has had widespread implications for the UK population financially, socially, emotionally and psychologically. Patients with pre-existing mental health conditions such as depression and anxiety are particularly vulnerable[4]. Maladaptive behaviours, emotional distress and defensive responses have been described due to the psychological impact of the COVID-19 pandemic[5]. The repetitive exposure to negatively associated news has also reportedly had a negative impact on people's mood.[6] Overall, a combination of increased anxiety, public restriction and economic recession have negatively impacted global mental health and led to significant increase in suicide rates.[7]

The aim of this study is to explore the effect of COVID-19 on the prevalence of deliberate self-harm including the clinical profiles of patients, risk factors and severity of injury.

Methods

Patients who presented with deliberate self-harm injuries were separated into two groups. The COVID-19 cohort included any patient with DSH presenting between 16th March 2020 and 16th November 2020. A matched group preceding COVID-19 included any patient with DSH presenting between 16th March 2019 and 16th November 2019. Patients with lacerations distal to the elbow were included. Demographics including age, occupation, psychiatric history, social circumstances, and previous self-harm were analysed. Severity of injury and associated injuries were also recorded. DSH injuries to other body sites in the absence of upper limb injuries were excluded. Patients under the age of 16 were excluded.

Data was gathered from the electronic patient management system "E-Hands" at the Queen Elizabeth Hospital, Birmingham. The data were recorded on Microsoft Excel and analysed. Datasets were analysed using X^2 for the categorical variables; a p value of less then 0.05 was considered statistically significant. The null hypothesis was that the proportion of DSH in the months preceding the pandemic was not different for that after.

Result

The number of patients presenting to the Hand Surgery Service with DSH in 2019 was 13 of 3885 (0.3%) total presentations, compared to 26 of 3226 (0.8%) in 2020 after the National Lockdown for COVID-19. This difference was statistically significant (p = 0.008). There were far fewer patients presenting to the Hand Service in the 2020 time period, likely secondary to government restrictions and behavioural changes.

Both cohorts had similar distribution of patient gender with a male to female ratio 1.6:1 and 2.2:1 pre- and post-COVID-19, respectively. The average age of the patient was 37 in the 2019 group and 35 in the 2020 group. There was a larger proportion of unilateral injury in 2020 compared to 2019 (81% in 2020 vs 69% in 2019), but a lower number of bilateral injuries (19% vs 31%). However, this was found to not be statistically significant (p=0.42)

With regards to employment status before lockdown, 85% were unemployed and 15% had office-based jobs. Conversely, in the cohort after National lockdown, employment status was much more variable. (Figure 1). Following the lockdown, there was a shift of demographics to include ex-military, and the working class.

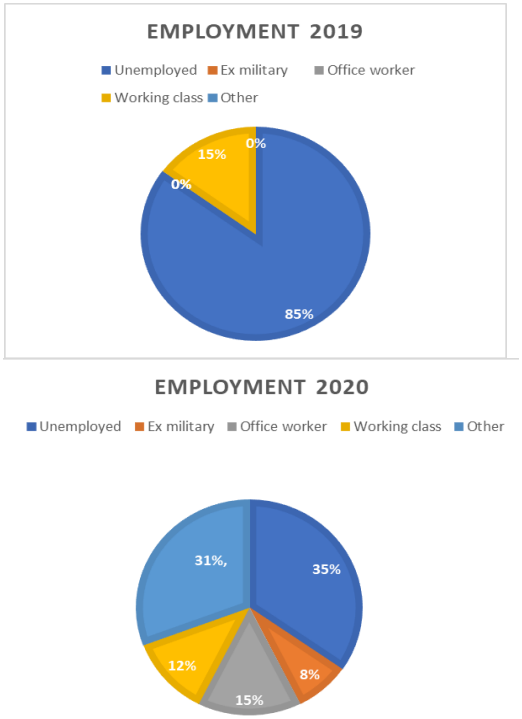

Figure 1: *Employment status - 2019 and 2020 cohort*

Significantly more patients had no previous history of DSH in the post-COVID group compared to pre-COVID (81% versus 7%; p = <0.05). The number of patients presenting with no pre-existing mental health history were 14% and 27% in the pre- and post-lockdown groups respectively. There were similar rates of depression between the two groups. There were no significant differences in terms of mental health history between the two groups (p = 0.73).

Discussion

The act of deliberate self-harm is an extreme form of mental health crisis. It is often considered a combination of factors such as pre-existing mental illness, genetic pre-disposition, family history and personality traits.[8]

In 1897, Emile Durkheim describes 4 types of suicide based on an imbalance of social integration and moral regulation, emphasising a link to increasing isolation and loss of family and community bonds[9].

It is unsurprising that in times of natural disasters and pandemics, there is a significant increase in suicide rates. The SARS virus pandemic in 2003 showed an increase of 31.7% suicide rate amongst those aged 65 and above[9–11], whilst Hurricane Maria

in Puerto Rico experienced an increase from 19 suicides per month to 25 in the immediate three months following the disaster.[12]

In the Birmingham Hand Surgery Unit, which sees on average 7440 patients a year, there has been a significant rise in patients presenting with DSH requiring surgical intervention since the start of 'national lockdown'.

Several predictive factors were identified as potential causes in this study. The COVID-19 pandemic poses a special challenge to physical[13–15], economic[16], mental and social health[17]. Social distancing measures, and loss of social interaction have caused loneliness amongst all ages which in turn is associated with increased anxiety and depression[18]. This population are particularly vulnerable to extreme suicidal thoughts which may explain the effect of the imposed quarantine on suicide rates[19]. Although a reduction of movement in population through lockdown measures have actively suppressed the spread of the virus, there has been an increase in prevalence of domestic violence which is strongly associated with suicide attempts[20–22].

There was a significant rise in patients with no previous history of DSH presenting to the Birmingham Hand Service despite no changes to the demographics in terms of average age and female to male ratios. Similar findings were reported in Canada, USA, Pakistan, India, France, Germany and Italy[19,23,24].

In recent years, a seasonal rise in suicide has been observed during the colder months and reduction in the warmer months. In the year 2020, there was a bimodal peak distribution of suicide rate. The first rise in the immediate 3 months following the first national lockdown with a peak just before the end of lock down in June. The second peak in suicide rates occurred in August, which correlates with the introduction of new restrictions. This was also seen in a real time surveillance study in England by the University of Manchester[25].

Occupation status is a generally good predictor of psychological distress. A meta-analysis of suicide by occupation found that those of lowest skilled occupation were at greater risk of suicide[26]. In this study, the majority of the DSH patients were unemployed before national lockdown measures, which was consistent with the findings of the meta-analysis. Comparatively, in the period after national lockdown, the employment status was much more variable in DSH patients. This could be explained by financial stress, loss of employment or an inability to provide. McIntyre and Lee[23] had similar findings with a projected increase in suicide rate from 418 per year to 2114 associated with joblessness in Canada.

Interestingly, this study observed a significant increase in patients with no previous history of DSH in the 2020 cohort. This demonstrates the intense emotional and psychological stress created by COVID-19 and its associated restrictions. It is well described that pre-existing mental health conditions are predictors for DSH. Depression was seen in both cohorts at similer rates. Anxiety and PTSD are often strongly associated with depression[27]. Factors which may cause or worsen this involve isolation, loss of routine structure, long term consequences of disability from COVID-19 and financial pressure [28,29]. In addition, some studies have found that prolonged exposure to social media and news information concerning COVID-19 have positively worsened symptoms of anxiety[30,31].

Limitations

There were a number of limitations in this study. Documentation regarding patients' mental heath history was poor due to the various documentation systems used in Birmingham. Therefore, specific details relating to the severity of the mental health were unavailable. Secondly, only patients who have deliberately self harmed by injury to the hand and wrist were included, thus this article is unable to account for other types of DSH such as neck injuries and burns which did occour in this time period. Finally, there was no available data on social circumstances of these patients as they were not recorded, the effect of death in the family and other social stressors were not included.

Conclusion

COVID-19 has had a negative effect on the economic, social and physical health of the population. This article highlights the significant impact on mental health and has demonstated a significant rise in DSH and a greater proportion of patients who had not harmed before. This demonstrates the impact of COVID on mental well-being and the importance in identifying and providing help early to those who are vulnerable.

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Establishing Self-Care Practices Early in Medical and Health Education: A Reflection on Lessons Learnt from the COVID-19 Pandemic

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Abstract
The COVID-19 pandemic has highlighted key challenges associated with our health care system. Evidence shows that the health and wellbeing of health care professionals has been negatively impacted by COVID-19. To address this, there have been several self-care resources created by various agencies. While self-care resources are certainly important, we must acknowledge that these do not address the systemic factors that negatively impact the mental health of health professionals nor do they address issues pertaining to self-care resource access and stigma.

To address the above, we propose that systemic changes within the educational programs of health care students be made. Self-care teaching should become a foundational cornerstone of education. Moreover, by educating students how to engage in self-care through their education we address issues pertaining to stigma and access and give them tools needed throughout and beyond their career. Thus, self-care should be integrated into the curriculums of all health care programs while acknowledging that individual educators also play an important role in delivering self-care education to students. As we move forward, it is important to undertake long-term evaluation of self-care programs to measure its effectiveness and plan our next steps.

Key Words
COVID-19; Medical Education; Self-care; Medical Students; Educators

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Establishing Self-Care Practices Early in Medical and Health Education: A Reflection on Lessons Learnt from the COVID-19 Pandemic

The COVID-19 pandemic has changed the way we approach medical and health education.[1] Around the world, there have been several changes to adjust to the pandemic, including medical schools shutting down, delays re-starting medical education, and transitions to online learning.[1] It is clear that the wellbeing of medical students has been impacted by the pandemic.[1] A cross-sectional study,[1] that looked at the pandemic's impact on the wellbeing of final year medical and dental students in Pakistan, showed that 63.4% of students reported feeling isolated and 41.5% of students had difficulties sleeping. The psychological challenges brought by the pandemic can exacerbate burnout amongst medical students.[1] According to IsHak et al.,[2] burnout is defined as "a state of mental and physical exhaustion related to work or care-giving activities" (p. 242). Further, distress during one's medical school years can lead to burnout not only in the present, but can continue into residency and practice.[2] It is also important to identify that the psychological distress of health care professionals can have negative downstream impacts on patient care, making it a public health concern.[3] According to the Canadian Medical Association's 2018 National Physician Survey,[3] even before the pandemic, it was established that the wellbeing of health care professionals was of concern; 30% of physicians experienced high levels of burnout and 34% screened for depression. Thus, a proactive approach of improving the wellbeing of health care professionals, as opposed to a reactive approach of disease management, becomes even more paramount during the context of living amidst a global pandemic.

One of the ideas to improve the health and wellbeing of health care professionals is the development and deployment of self-care strategies.[3] There have been a number of self-care resources created for health care professionals, including those from the American Academy of Family Physicians[5] and Centre for Addiction and Mental Health (CAMH)[6]. For example, the CAMH

has provided quick self-care tips to support health care professionals to practice mindfulness through deep breathing exercises[6] Creating self-care resources for healthcare professionals is certainly a positive step, however, one must be aware of their limitations. [4] Self-care strategies do not necessarily address the underlying and systemic factors that harm the wellbeing of health care professionals described next. Further, evidence highlights that, despite high levels of knowledge of available self-care resources, only a small proportion of health care professionals actually access these resources[3] since some had difficulty assessing if their situation warrants additional support, feeling conscience-stricken and also being unaware of what exact resources were available. [3] Additionally, the stigma against health care professionals engaging in self-care must be considered[7] as there is a disconnect between knowledge of available resources and accessibility of resources which may be mitigated by using knowledge on wellbeing as a key curricular theme in medical educational programs. Educational programs provide an excellent opportunity for the integration and introduction of wellbeing strategies as existing evidence suggests that medical students may experience burnout early on during their educational training.[2] By normalising and focusing on self-care in educational settings, we can give health care students an opportunity to engage in self-care practices in a manner that is free from stigma. Moreover, by teaching self-care in our curriculum we can actively show students that seeking and engaging in self-care will reduce the stigma of shame and is part of a healthy practice. Such strategies will hopefully continue as the student transitions into professional practice.

An example of a helpful intervention involves a mindfulness-based stress reduction (MBSR) program, promoting wellbeing for health care students, which showed significant reductions in stress, negative self-regard and anxiety.[8] Additionally, it was found that programs of this nature also increased levels of positive self-regard, self-compassion and mindfulness amongst psychology students.[8] At the core of the MBSR program is meditation, yoga and other informal mindfulness practices.[8] Programs such as the MBSR have the potential to be integrated into the curriculum of different health care programs; or at the very least, components of the MBSR can be amalgamated within existing curriculums. However, learning these self-care strategies during one's education has the potential to play an important role in utilising and developing self-care strategies throughout the life course.[9] Long-term evaluation, spanning over two to six years after taking a mindfulness-based self-care course, showed that the practicing psychotherapists and counselors were more likely to have positive experiences with themselves, with their patients, and it changed the way they approached their clinical practice.[9] Moreover, having the opportunity to learn and put these strategies into practice during one's education allowed these students to identify what self-care practices worked best for them; in the case for strategies that were not helpful, students had the chance to develop strategies that work best for them by using their learned skills as foundational building blocks.[9] Whether these findings can be extrapolated to medical students would warrant further studies.

Further, by having a focus on self-care in medical education, we are actively normalising and de-stigmatising the notion of health care professionals' health and wellbeing, as discussions on wellbeing become the norm, rather than an exception. Additionally, openly discussing self-care can help to remove the cloak of shame that prevents health professionals from accessing these resources.[3] Ultimately, through providing education integrating self-care, we are giving future health care professionals the best opportunity to engage in self-care both now and in the future. Further, these lessons and knowledge of self-care can be useful when supporting patients to engage in the practice of self-care themselves. Although programs such as MBSR can have potential positive downstream effects that span beyond the level of individual health care professionals, one should be aware of the potential limitations since such programs focus primarily on mindfulness-based strategies and these strategies may not work for all individuals. Also, we need to consider the unique differences between medical students, resident doctors, and practicing physicians. For example, some of these differences include level of responsibility and the stress associated with differing responsibility requirements. Other important contextual factors to consider include the learning and work environments, as well as a lack of time.

Given the potentially promising impacts of mindfulness-based self-care programs, we should actively consider embedding self-care and wellbeing content within medical curricula. This implementation will require a well-coordinated effort from academics, practitioners and community members. We can extend our knowledge gains by collaborating with other health professional disciplines and integrating various self-care knowledge into the curricula. A shared voice, that brings together the ideas and thoughts from diverse stakeholders in medical education, needs to be created and the implementation of relevant programs should be prioritized.

Education on self-care should be purposeful and reflective in nature. For instance, proper nutrition and physical activity are important building blocks of self-care plans.[10] Students should have an opportunity to develop a dietary regime. Moreover, knowledge shared on nutrition needs to be specific, for example what a nutritious diet looks like or the opportunity to cook meals together.[10] Further, physical activity plays an important role in the reduction of stress and the prevention of a variety of diseases. We should create opportunities to empower students to engage in a variety of physical activity experiences, so they can incorporate what works best for them. In addition, it is important that educators facilitate a sensitive and safe space for teaching on self-care, so students have the best opportunity to engage and adapt these practices into their lifestyle. For example, in medical education, instructors can have set times during classes where self-care is discussed openly and practical examples are done, such as a five-minute yoga tutorial. Moreover, follow-up discussions provide a space for reflection and for ideas on self-care to be exchanged between students and educators and the nature of discussions helps de-stigmatise engaging in self-care. Further, education on self-care should revolve around how to effectively manage one's time and engage in self-care, as this has been another barrier for health care professionals when engaging in self-care.[11] Ultimately, as educators, we should prioritize and ensure that our educational time involves discussion on self-care practice, so that our students are well equipped to engage in self-care.

As we work towards large system-level changes to our education system, there are changes that we can make as individual educators.[12] According to Harvard Business Publishing Education,[12] there are four approaches that educators can incorporate within the classroom to promote self-care amongst students, including making ourselves available, taking breaks, providing space for reflection and equalizing participation amongst students. Making ourselves available to students entails us encouraging students to use us as resources to chat about course problems or general academic guidance.[12] We have the opportunity to be active members of a student's support network. Further, integrating self-care into our curriculum can involve structured breaks during class time,[12] such that, two or three self-care ideas could be shared during these breaks. Providing space for reflection necessitates us encouraging our students to engage in the practice of self-reflection through journals or blog posts and these activities also tie into what is covered in the curriculum.[12] Lastly, equalizing participation amongst all students can involve us waiting at least 10 seconds for answers when asking in-class questions.[12] This results in increased participation from all students and promotes the practice of self-reflection, patience and respect for classmates.[12] However, it is also important for educators to recognise that some vulnerable students, such as students who are visible minorities, or who have disabilities and who have had previous psychological distress, may not feel as comfortable participating. Therefore, strategies that support all students to participate in our classes should be created. For example, a survey at the beginning of a course on students' preferences for participation could be used to inform how to successfully have students participate. We can use these four approaches to support health care students engage in self-care within our educational interactions with them.

Hence, as we work towards integrating self-care as a cornerstone of health care education, we must pay due attention to the effectiveness of the interventions we implement. Program evaluation and individual assessment of the above interventions are necessary. Evaluations can take the form of surveys and focus groups studying health care students' wellbeing and transparently discussing results and trends. It is important that evaluation is longitudinal in nature and that we should be able to witness the effectiveness of our evaluations in the long-term, for example, over five years and throughout the careers of health care professionals. Successful programs would hopefully show a reduction in students' levels of stress, negative self-regard and anxiety. Results from evaluation can help us critically reflect on our approach and if we need to change course. Particular caution should be given to avoid the burden of over-surveying, which can lead to psychological distress of students who have busy schedules.

In conclusion, the COVID-19 pandemic has further revealed the importance of addressing the wellbeing of medical and health professionals. Despite high levels of self-care resource knowledge, only a small percentage of medical practitioners actually accessed these resources.[3] To address this issue at the ground level, one approach is to work towards establishing self-care knowledge and practices as a cornerstone for medical and health education. Through providing strong knowledge during the early phase of education, we hope to help address issues of stigma removal.[7] There are opportunities for medical education to translate knowledge on self-care into actions.[12] That being said, improving the wellbeing of medical practitioners is complex and will likely require a multi-faceted approach, including additional and concurrent interventions in the workplace setting. Future studies are warranted to examine the effect of establishing self-care practices early in medical and health education.

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Diet as a Potential Therapeutic Target in the Management of Chronic Pain: A Review

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Abstract
Introduction: Chronic pain affects millions in the UK, with those affected more likely to suffer with diabetes, cardiovascular disease and obesity, all intrinsically linked to diet. Due to growing concerns around the dangers of opioid prescription, there has been an increased effort to adopt a more holistic approach when treating chronic pain. Despite this, diet has yet to be addressed as a possible therapeutic target. This review aims to investigate how diet can influence pain and if dietary advice can be used in the management of chronic pain patients.
Methods: A literature review was performed using the PubMed database to identify relevant literature, with the following keywords "chronic pain", "diet", "gut microbiome" and "omega-3". The research papers found were critically appraised and only those of high quality and relevance were selected.
Results: Research has shown that inflammation in the gut microbiome plays a key role in chronic pain. This is thought to be modulated by the effect of endotoxins leaving the gut and causing peripheral and central sensitization, resulting in chronic pain. Many studies have demonstrated the pro-inflammatory effects of Omega-6 and a high Omega-6 to Omega-3 ratio, as well as the anti-inflammatory benefits of Omega-3. Systematic reviews have shown that nutritional interventions promoting a healthy eating diet, as opposed to the use of individual supplements only, have significantly reduced pain scores by -1.415 (P=0.030) in those with chronic pain.
Conclusion: The gut microbiome plays an important role in pain regulation, primarily through inflammation, which can be mediated by a high Omega-6 to Omega-3 ratio. Systematic reviews have shown that a healthy balanced diet provides important pain relief in those suffering with chronic pain. More research is needed in this area; however it would seem appropriate for nutritional advice to be included in the management of chronic pain.

Key Words
Diet; Chronic Pain; Gut Microbiome

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Introduction

Chronic pain can be defined as pain lasting beyond the typical healing time of three months and has been shown to be the leading cause of disability in the world.[1] Research suggests that it affects between 35% to 51.3% of the UK population, with up to 14.3% of the population reporting this pain as severely disabling.[2] This has an impact on both the mental and physical wellbeing of the population as well as on our NHS, with back pain alone costing £10 billion pounds and accounting for 40% of sickness absence in the NHS.[3] Furthermore, many nutrition-related comorbidities such as type 2 diabetes, obesity and cardiovascular disease are associated with chronic pain.[4] Many of these are considered to be both cause and effect, whereby pain increases the risk of that condition, whilst that condition can exacerbate pain, shown by the higher rates of overweight and obese individuals (80%) in those suffering with chronic pain.[4]

As incidence of chronic pain has increased, there has also been a rise in opioids, with prescriptions doubling between 1998 and 2018.[5]

In order to combat this, there has been an increased effort in offering lifestyle advice and providing a more holistic approach to pain management.[6] Pain management programmes now offer body reprogramming which offers a range of lifestyle advice around exercise and mindfulness; however they fail to target the potential therapeutic benefits of providing dietary advice. When 31 patients on the Cornwall pain management waiting list were surveyed, 87% said they would be interested in diet as a way of managing their pain,

with professionals involved in the pain management programme also expressing interest.

The aim of this review is to establish how diet can affect chronic pain, with the hope of creating an educational resource for patients, enabling them to manage their pain through diet. This could be of particular benefit to those on the pain management waiting lists. The efficacy of this intervention could be assessed using a chronic pain assessment tool such as the brief pain inventory. [7]

Methods

An initial search about diet and chronic pain was conducted on PubMed using the following focused terms: "chronic pain", "diet", "gut microbiome" and "omega-3". Abstracts were then read and if deemed suitable, the whole paper was then analysed. In order to establish suitability, the papers needed to be published in English and no earlier than 2002, with the majority of sources included having been published in 2015 or later. Where possible, high quality papers were selected such as qualitative and systematic reviews as well as randomised control trials. One cross-sectional study was also included.

Discussion

3.1 Pain regulation via the gut microbiome

The gut microbiome (GM) is made up of trillions of bacteria, with no two persons' being the same. Its composition can be influenced by delivery mode at birth, where we live, how we were fed as babies and what we eat now as adults as well as physical and psychological stress.[8] The GM has seen a massive surge in interest in recent years, as clinicians and researchers try and identify the GM's role in health and disease, and how we can influence this through diet.

One aspect that has been identified is that the GM plays a crucial role in pain and inflammation through several different factors.[9–12] The GM produces many endotoxins such as lipopolysaccharides (LPS), which can cross through the intestinal wall, especially when this barrier is damaged or destroyed.[10] A narrative review has shown that pathogen-associated molecular pattern molecules (PAMPs) such as LPS have been shown to bind to CD14 cells, promoting the release of pro-inflammatory cytokines which can lead to peripheral sensitisation.[9] LPS from the GM binds to toll-like receptors (TLR), present on immune cells, hence indirectly regulating the neuronal excitability of primary sensory neurones in the dorsal root ganglia via the release of pro-inflammatory cytokines into the systemic circulation. LPS can also directly regulate the primary sensory neurones in the dorsal root ganglia, "through activation or sensitisation of the pain-related receptors [and] ion channels".[9] Pro-inflammatory cytokines also increase the release of cyclooxygenase-2 and prostaglandins in the central nervous system, by activating neuronal and glial cells.[13]

If this inflammatory response persists beyond normal healing time, this can lead to prolonged peripheral sensitisation as well as changes in peripheral and central neuronal structure, resulting in chronic pain.[12] This chronic inflammation is associated with conditions such as rheumatoid arthritis, osteoarthritis, chronic lower back pain, nociceptive pain and fibromyalgia.[13]

As the majority of pain syndromes are related to inflammation, it is important to note that the GM has been shown to play a key role in the development of pain and inflammation, contributing to systemic inflammation as well as inflammation in the central nervous system.[11,12] It is therefore of interest to identify how diet can contribute to inflammation mediated by the GM.

3.2 The impact of Omega-6 and Omega-6/3 ratio on the gut microbiome

Many people in the UK follow a Western diet, characterised by a high intake in saturated fats, and Omega-6, with low levels of Omega-3, as well as excessive consumption of salt and refined sugar.[14] Whilst it is well established that this type of diet can lead to conditions such as cardiovascular disease and diabetes, research has shown that it also contributes to inflammation.[14,15]

One of the key contributors to inflammation is high levels of Omega-6 and subsequent high Omega-6 to Omega-3 ratio.[13]) A Western diet has been shown to have a ratio of around 15/1, despite the recommended ratio between 1/1 and 4/1.[15] Omega-6 polyunsaturated fatty acids (PUFA) have been shown to be pro-inflammatory due to their role in prostaglandin synthesis.[16,17] Eicosanoids such as prostaglandins and thromboxanes are synthesised through the cyclooxygenase pathway from arachidonic acid, an Omega-6 PUFA.[17]

As mentioned above, LPS enter the circulation when the gut microbiome barrier is damaged. LPS are thought to enter systemic circulation through the opening of intestinal tight-junctions between two epithelial cells.[10] High fat diets, such as the Western diet, have been shown to not only increase the amount of LPS producing bacteria in the GM, but also cause intestinal barrier dysfunction as well as increased intestinal permeability, hence allowing LPS to pass into the bloodstream more easily.[10]

3.4 Dietary interventions to aid chronic pain

Whilst a high Omega-6 to Omega-3 ratio has been shown to increase inflammation, a lower ratio with

therefore higher levels of Omega-3 has been shown to reduce the risk of many chronic diseases as well as inflammation.[10,15] Indeed, Omega-3 PUFAs have been found to enhance the epithelial barrier function of the gut by modifying the lipid composition of those cells, with a study on rats showing that Omega-3 PUFA supplementation leads to decreased intestinal barrier dysfunction.[10,18] It would be of interest to see if these findings could be replicated in human studies, due to the limited ability to correlate findings in rats to those in humans. Furthermore, Omega-3 PUFAS also inhibit the arachidonic pathway by acting as competitive inhibitors for the conversion of arachidonic acid.[11] This leads to decreased production of prostaglandins, whilst also giving rise to the synthesis of low-inflammatory leukotrienes which have been found to act as antagonists to arachidonic acid derived mediators.[17]

A cross-sectional study evaluating pain in adults with knee osteoarthritis found that in those with a higher Omega-6 to Omega-3 ratio there were higher scores for clinical pain and functional limitations, whilst a lower ratio was associated with lower levels of pain and psychological distress as well as improved physical functioning.[16] These findings are of course limited due to the fact it is a cross-sectional study. It should also be noted that those in the higher ratio group had a greater body mass index compared to those in the lower ratio group.

A systematic review showed that Omega-3 PUFA supplementation was associated with a reduction in the risk of chronic pain, with a pooled random effects standardised weighted mean difference (SMD) of -0.40, which shows improvement as a value of 0 indicated absence of effect.[17] Furthermore, those supplemented with low-dose (SMD -0.55) and short duration (-0.56) Omega-3 PUFAS were shown to be the most effective.[17] Those affected by dysmenorrhoea, migraines, osteoarthritis and rheumatoid arthritis were shown to have benefitted the most from the supplementation.

Similarly, a randomised placebo control trial (RCT) showed that fish oil supplementation for 16 weeks on 32 participants significantly reduced their pain score, with a 42% reduction in overall pain compared to the placebo group.[19] Indeed, 31 participants were given placebo and reported a pain score of 0.2 +/- 1.5, whilst those taking fish oil supplementation reported a pain score of -5.4 +/- 1.6 ($P<0.012$). This study is limited by the fact it was performed in those suffering with osteoarthritis only, with 70% of those participating describing their pain as "mild". Another RCT on the role of Omega-3 PUFAs in the prevention of migraines, showed that in those receiving the Omega-3 supplements there was a reduction of over 80% per month in the number of days of headache, compared to 33% improvement in the placebo controlled group.[20] This was limited by the small sample size of 51 and once again by it specifically targeting migraines as opposed to chronic pain as a whole.

A systematic review evaluating different diets and chronic MSK pain showed that pain-reducing diets included Mediterranean, vegan and vegetarian diets but that the pain-relieving effects may be due to their anti-inflammatory characteristics.[12] It has been shown that these type of diets protect the diversity and stability of the gut microbiome, with high levels of dietary fibres, high Omega-3 PUFAs and low Omega-6 to Omega-3 ratio.[12,21]

A systematic review and meta-analysis on nutritional interventions for chronic pain showed that nutritional interventions had a significant effect on pain reduction with an overall change of -0.905 ($P = 0.000$), with the most positive effect occurring when altering a dietary pattern (-1.415, $P = 0.030$) or intake of one specific nutrient (-1.415, $P = 0.000$) compared to those who had specific supplements (-1.213, $P = 0.001$) or fasting (-0.056, $P = 0.863$) prescribed.[4] These altered diets included vegan, vegetarian and Mediterranean diets, which as previously stated, have high levels of Omega-3 and low Omega-6 to Omega-3 ratio.[12] It was noted that many of the studies included were of limited quality and explored a wide range of nutritional interventions.

Conclusion

Research has shown that the gut microbiome plays an important role in pain regulation, primarily through inflammation, with studies illustrating that Omega-6 and a high Omega-6 to Omega-3 ratio are important contributors. However, despite some RCTs showing improvement in pain with Omega-3 supplementation, systematic reviews have shown that a healthy well-balanced diet which contains high levels of Omega-3 seems to provide the most pain relief as opposed to the use of individual supplements. More research is needed in the field of nutrition and chronic pain, with more high quality interventional studies as well as those looking at nutrition advice in those with chronic pain. It would seem appropriate for nutritional advice to be included in the management of chronic pain, be that through patient information leaflets that could be distributed in general practice or pain management groups or the inclusion of a dietician in pain management programmes such as the body reprogramming one in Plymouth.

Data availability statement

The publication is supported by multiple datasets, which are openly available at locations cited in the reference section. No new data were created in this study.

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Preparing Course Learning Objectives Guide: A Four Stage Process

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Abstract
It is of huge importance for learning objectives to be designed thoroughly and correctly in order to teach and learn most effectively. In this article, the author proposes four stages to designing these objectives to ensure maximum effect.
Stage 1: Writing Stage
This involves the educator writing the learning objectives following the "ABCD" approach, and there should be a condition or degree of competence involved.
Stage 2: Revision Stage
This is to review the objectives and check that they are not just listing the outline of the lecture, but still tie in well with what will be covered. Here, it is good to use the "SMART" acronym to ensure the learning objective is as specific as it can be.
Stage 3: Skill Domain & Cognitive level's Classification
During this stage, the learning objective should be classified according to skill domain and to Bloom's Taxonomy of cognitive levels. Doing this in stage three is beneficial as it saves time and allows the educators to customise their learning objectives according to the learners' level.
Stage 4: Trimming Stage
During this stage, one should revise the learning objectives of his/her part of the course with his/her colleagues' learning objectives. Any unnecessary repetition should be removed.

Key Words
Learning Objectives; Learning and Teaching; Curriculum

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Introduction

Learning objectives are a concise statement that define the expected goal of a learning and teaching activity. It describes an observable and measurable skill, or knowledge that will be acquired by the learner. Writing learning objectives correctly is the key for designing learning and teaching activities[1], and it is the foundation for choosing the assessment methodology and deciding the weight of each part of the curriculum in the assessment[2]. Many papers described the process of writing learning objectives[3,4], however, during the journey of curriculum development, people need to go back and forth for their course learning objectives. Therefore, I here propose a comprehensive way in preparing learning objectives that is divided into four stages: writing stage, revising stage, stage of classification according to skill domain and cognitive level, and finally the trimming stage.

Stage 1: Writing stage

During this stage, the educator will write the learning objectives based on the "ABCD" approach, which refers to the elements in the learning objective statement. The A is for audience, B is for behavior, C is for condition, and D is for degree of skill level[5]. The audience should be able to perform the behavior within a condition or a context in a degree of competence. In the following paragraphs, each element will be described.

Write each objective beginning with the phrase "After participating in this session/attending this lecture/completing this course. etc.", then decide who are the targeted learners; the audience; (Students/learners/ 5th year medical students/ Participants/students attending the ALS course, etc.) should be able to . . . …...". Then, decide what do you want the audience to do? This should be in the form of an action verb in addition to the content, as the following examples.

- The student should be able to LIST (VERB) 3 DDX of obstructive jaundice (CONTENT)
- The student should be able to EXPLAIN

(VERB) the steps of bilirubin metabolism (CONTENT)

Choose a verb that matches the desired level of knowledge or the skill domain. The verb should be observable and measurable, and you should not use ill-defined verbs such as understand, know, learn, and grasp. After describing the targeted learners and the skill to be acquired, you should ask yourself if there is a context or condition that is required to perform the task; is there a certain situation or a specific environment for demonstration of the learned behavior? Conditions and contexts help you to make your learning objective more specific, to design your OSCE skill station, and to prepare your MCQ scenario.
Examples:

- (CONTEXT) The student should be able to design a management plan for a 65-year-old man with chronic hypertension in the emergency room when the patient presents with a headache.
- (CONDITION) The student should be able to insert successfully a peripheral IV line on a manikin in the simulation lab. (Condition can be a context too, however in this example a manikin should be provided during learning, it is a condition for learning.)

The last question is how "well" will the learner perform the task, i.e. task mastery level, time to perform the task, percentage of the task, etc. When degree is not specified, we assume 100% degree of performance. Performance degree is your friend when writing postgraduate learning objectives, specifying the degree of performance will help you to differentiate learning objectives for different level of learners. When there is an inevitable task overlap, it is difficult to differentiate learning objectives for each year of training, therefore having a performance scale is the best way to develop a post graduate learning objective.

Examples:

- The learner should be able to demonstrate insertion of a chest tube *correctly in 100% of the attempts* (5th year general surgery resident)
- The learner should be able to demonstrate insertion of a chest tube correctly in 70% of the attempts (2nd year general surgery resident)
- The learner should be able to explain at least 2 mechanisms for hepatic encephalopathy. (6th year medical student)
- The learner should be able to perform neonatal endotracheal intubation *within 20 seconds* (3rd year pediatric resident)

Stage 2: Revision Stage

Review your learning objectives and make sure that you are not listing your lecture outline, or your course activities, examples:

- The student will be taught how to perform lumbar puncture
- The life cycle of Echinococcus will be explained

Furthermore, you must make sure that you are not aiming for an objective that you did not include in the learning activity, with the exception of learning objectives that you want the student to achieve independently, like searching the literature for certain data. This should be stated clearly to the students.

Lastly, be smart and apply the "*SMART*" acronym[3], making sure your learning objectives are *specific*: that is why you should avoid the verbs 'understand, know and learn', *measurable*: you could measure achieving this objective through one of the assessment methods (MCQs. OSCE, oral exam, workplace assessment, etc.), *achievable*; within the students' predicted abilities, within the available tools, in a certain community, *relevant*; to the learner, to the course level, to the school mission, etc., and *time- based*; achieving the objective within a time limit is major part of assessing the student's level and it is important for making the objective specific.

Stage 3: Skill Domain & Cognitive level's Classification

During this stage you should classify the learning objective according to the skill domain, whether it is cognitive, psychomotor, or affective[6], and according to Bloom's Taxonomy of cognitive levels[7]. These are usually done when educators design their curricular matrix, or at a later stage when they are blueprinting their assessment. I do believe that having the classification of learning objectives as early as this stage is very beneficial. It saves time, and more importantly it allows the educators to customise their learning objectives according to the learners' level and preserve the balance between the skill domains, and the balance between cognitive levels. It gives an early opportunity for curriculum modification.

Stage 4: Trimming Stage

This stage aims to eliminate redundancy in the course learning objectives. Frequent times in medical sciences, subjects overlap. During this stage you should revise the learning objectives of your part of the course with your colleagues' learning objectives. Unnecessary repetition should be

removed, intentional repetitions might be needed sometimes to consolidate certain important subjects.

Conclusion

Preparing learning objectives is the most important step when designing curricula, having a clear guide for medical educators is essential. A template could be used to apply the described stages.

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Conflict of interest:

The author has no conflict of interest to declare

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Off-pump versus On-pump Coronary Artery Bypass Grafting: A Comparison of Long-term Graft Patency in Returning Patients

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Abstract

Objective: Since its inception, coronary artery bypass grafting (CABG) has conventionally been carried out using cardiopulmonary bypass (on-pump CABG, ONCAB). While off-pump CABG (OPCAB) has been increasingly used recently, and several reports have indicated short-term success rates comparable with ONCAB, very few studies have investigated these over the longer-term. This study aims to compare the long-term graft patency of OPCAB compared with ONCAB in a population of returning patients.

Methods: Data for patients who presented for coronary angiogram investigation at our tertiary cardiac surgery centre between October 1st 2000 and July 31st 2019 were retrospectively analysed, and those patients who had also undergone CABG more than 24 months prior were identified. Only patients who received left internal mammary artery (LIMA) to left anterior descending artery (LAD) graft in addition to non-sequential saphenous vein grafts (SVGs) were included for comparability. Any patients who were found to have graft failure due to distal native disease progression were excluded from the study. A total of 235 patients were included for statistical analysis and were divided into two groups: coronary angiogram performed between 2-7 years post-CABG, and greater than 7 years post-CABG.

Results: There were 142 patients in the 2-7 years post-CABG group (30 OPCAB, 112 ONCAB). After adjusting for confounding variables, there was a statistically significant difference in SVG failure rates between OPCAB and ONCAB (49.4% and 34.5% respectively; p=0.050).

There were 93 patients in the >7 years post-CABG group (66 OPCAB, 27 ONCAB). After adjusting for confounding variables, there was a statistically significant difference in SVG failure rates between OPCAB and ONCAB (42.7% and 19.1% respectively; p=0.034).

Overall, with all patients included and after adjusting for confounding variables, there was a statistically significant difference in SVG failure rates between OPCAB and ONCAB (44.8% and 31.9% respectively; p=0.008). The mean number of SVGs per patient was 1.69 in the OPCAB, and 1.87 in the ONCAB group. The overall SVG failure rate was 37.7%.

There was no statistically significant difference in LIMA graft failure rates in either the 2-7 years post-CABG group (p=0.340), >7 years post-CABG group (p=0.140), or overall (p=0.336).

Conclusions: In patients who receive diagnostic or interventional coronary angiogram more than 2 years after CABG, patients who underwent off-pump CABG had poorer saphenous vein graft patency than patients in the on-pump CABG group. No difference between the techniques was found in left internal mammary artery graft patency. While this study is limited in only analysing data from patients who are indicated for repeat coronary angiogram in the long-term, these are an important group of patients and the results from this study have relevance when considering CABG technique.

Key Words
Cardiopulmonary Bypass; Cardiac Surgical Procedures; Coronary Angiography

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Introduction

Coronary artery bypass grafting (CABG) has been shown to be an effective treatment for patients with extensive coronary artery disease[1,2]. Over the past 30 years, many prominent and well-documented trials have shown that CABG was associated with greater incidence of long-term survival than medical therapy alone in patients with extensive coronary artery disease[3,4]. More recently, great interest has been given to the practice of off-pump CABG (OPCAB)[5]; that is, CABG without the use of cardiopulmonary bypass (CPB) with cardioplegic arrest, i.e. on-pump CABG (ONCAB). OPCAB has been shown to reduce postoperative complications

associated with CPB[6-9], including haemodynamic instability[8] and systemic inflammatory response[10,11]. Thus, OPCAB has become a promising option in patients who require CABG, but may not be physiologically suitable for the stresses of CPB.

However, as the use of OPCAB has increased, concerns have been raised regarding the longer-term outcomes. Several studies have implicated OPCAB in incomplete vascularisation and lower rates of graft patency when compared to ONCAP[12-15]. While these works have identified a statistically significant difference in the outcomes between OPCAB and ONCAB, they typically involve patient follow-up over a relatively short term, with many of them completing follow-up for primary outcome before 2 years. As such, there is a sparsity of data from random controlled trials (RCTs) regarding the long-term outcomes of OPCAB versus ONCAB. Therefore, this study aims to focus on outcomes greater than 2 years following CABG.

Methods

Data for this report were retrieved retrospectively from the institutional database, the retrieval of which was approved by the hospital ethics review board. As such, International Review Board approval, patient consent statements, and clinical trial registration are not applicable for this study.

Data for patients who presented for coronary angiogram investigation at our tertiary cardiac surgery centre between October 1st 2000 and July 31st 2019 were retrospectively analysed, and those patients who had also undergone CABG more than 24 months prior were identified. A lower limit of 24 months was chosen, as the short-term comparison for graft patency between OPCAB and ONCAB has been thoroughly investigated previously; this study aims to investigate the long-term differences between the two techniques.

Only patients who received left internal mammary artery (LIMA) to left anterior descending artery (LAD) graft in addition to non-sequential saphenous vein grafts (SVGs) were included for comparability.

Any patients who were found to have graft failure due to distal native vessel disease progression were excluded from the study. Operations performed using minimally invasive surgical techniques, and those that included jump-grafting of vessels, were not included, to ensure an appropriate comparison. Patients without available operation notes or coronary angiogram reports were also excluded.

A total of 235 patients were included for statistical analysis. 'Graft failure' was defined as a non-patent graft at the time of coronary angiography without distal native vessel disease progression. As previous studies have shown, the average time to failure of SVGs is approximately 7 years[16,17]. As such, the patients were divided into two groups: coronary angiogram performed between 2-7 years post-CABG, and greater than 7 years post-CABG. Additional data points including age at time of CABG, time between CABG and coronary angiogram, indication for coronary angiogram, and sex were also collected for analysis.

All surgeries were performed via a standard median sternotomy approach. During the OPCAB surgeries, stabilisation devices were used to provide a stable surgical field; in all cases, either an Octopus IV or Octopus Evolution tissue stabiliser (Medtronic, Inc.) was used.

In all surgeries, the LIMA was anastomosed to the LAD. SVGs were harvested, grafted to the target vessels, and anastomosed to the ascending aorta in a non-sequential manner.

All analyses were performed using SPSS Statistics software v23.0 (IBM Corp., Armonk, NY). Statistical tests were performed using an alpha level of 0.05, with 95% confidence intervals (CI). Single-variable analysis was conducted using analysis of variance (ANOVA) to investigate the effect of individual variables on graft patency.

As this was a retrospective cohort study, there was no experimental control over variables, and no randomisation of patients. To reduce the potential for confounding variables to affect the result, logistic regression analysis was performed using analysis of covariance (ANCOVA) to adjust the outcomes for sex, age at time of CABG (in years), and time between CABG and coronary angiogram (in months). This allowed for the evaluation of the independent effect of OPCAB vs ONCAB on graft patency.

A pairwise comparison of estimated marginal means was conducted, allowing an estimate of the mean difference between the two groups.

Levene's test of equality of error variances was conducted to ensure homogeneity, with $p>0.05$ deemed acceptable, meaning the homoscedasticity assumptions of the ANCOVA could be considered valid.

Using this method, the observed statistical power of the data was 0.797; this is only fractionally below the standard accepted power of 0.8, and thus this study design and sample size can be considered relatively robust, and its results considered in context.

Results

Overall, 235 patients were included in the analysis (96 OPCAB, 139 ONCAB). The mean age at the time of CABG was 61.77 years for the OPCAB group (range 38-81; S.D. 9.69) and 61.59 years for the ONCAB group (range 39-83; S.D. 10.59). The mean time between CABG and coronary angiogram was 110.83 months for the OPCAB group (range 26 -225; S.D. 50.66) and 58.41 months for the ONCAB group (range 24-169; S.D. 33.38). The OPCAB group consisted of 20 females and 76 males; the ONCAB group consisted of 24 females and 115 males.

Of the 235 coronary angiograms performed, 151 were diagnostic, 73 were indicated for percutaneous coronary intervention, 8 were indicated for transcatheter aortic valve implantation, 1 was indicated for intra-aortic balloon pump, and 2 were indicated for rotablation.

A total of 422 SVGs were carried out (1.80 SV grafts/patient). The mean number of SVGs per patient was 1.69 in the OPCAB group (range 1-4; S.D. 0.62), and 1.87 in the ONCAB group (range 1-4; S.D. 0.71).

The most commonly grafted vessel was the posterior descending artery (n=159; 37.7%), followed by the first obtuse marginal artery (n=149; 35.3%), the first diagonal artery (n=41; 9.7%), the second obtuse marginal artery (n=34; 8.1%), the intermediate artery (n=17; 4.0%), the circumflex artery (n=16; 3.8%), and the third obtuse marginal and right coronary artery stem (n=3 for each; 0.7% for each).

One-way analysis of variable effects of all patients found a significant difference between the on-pump and off-pump groups (p=0.019) and between male and female (p=0.041). No significant effect was found with time between CABG and coronary angiogram (p=0.386), or age at time of CABG (p=0.625).

When performing ANCOVA analysis, all groups had a Levene's test of equality of error variances p-value >0.05. Thus, there is no significant difference between the variances of the groups, indicating homogeneity of variances, and all ANCOVA results can be considered valid.

With all patients included and after adjusting for confounding variables, there was a statistically significant different in SVG failure rates between OPCAB and ONCAB (44.8% and 31.9% respectively; p=0.008). The estimated marginal mean difference between OPCAB and ONCAB SVG failure rates was 17.36% (95% CI: 4.67-30.05).

The overall SVG failure rate for all patients was 37.2%.

There were 142 patients in the 2-7 years post-CABG group (30 OPCAB, 112 ONCAB). The mean age at the time of CABG was 67.73 years for the OPCAB group (range 48-81; S.D. 9.12) and 61.62 years for the ONCAB group (range 39-81; S.D. 11.06). The mean time between CABG and coronary angiogram was 54.30 months for the OPCAB group (range 26-83; S.D. 19.04) and 44.55 months for the ONCAB group (range 22-81; S.D. 16.02). The overall SVG failure rate in the 2-7 years post-CABG group was 37.7%.

One-way analysis of variable effects in the 2-7 years post-CABG group found no significant difference between ONCAB and OPCAB (p=0.082), male and female (p=0.115), age at CABG (p=0.694), or time between CABG and coronary angiogram (p=0.234). After adjusting for confounding variables, there was a statistically significant difference in SVG failure rates between OPCAB and ONCAB (49.4% and 34.5% respectively; p=0.050). The estimated marginal mean difference between OPCAB and ONCAB SVG failure rates was 17.75% (95% CI: 0.01-35.50).

There were 93 patients in the >7 years post-CABG group (66 OPCAB, 27 ONCAB). The mean age at the time of CABG was 59.06 years for the OPCAB group (range 38-80; S.D. 8.74) and 61.44 years for the ONCAB group (range 46-77; S.D. 8.56). The mean time between CABG and coronary angiogram was 136.53 months for the OPCAB group (range 84 -225; S.D. 37.99) and 115.44 months for the ONCAB group (range 84-169; S.D. 25.37). The overall SVG failure rate in the >7 years post-CABG group was 35.8%.

One-way analysis of variable effects in the >7 years post-CABG group found a significant difference between the ONCAB and OPCAB groups (p=0.011). No significant effect was found with sex (p=0.177), age at time of CABG (p=0.499), or time between CABG and coronary angiogram (p=0.518). After adjusting for confounding variables, there was a statistically significant difference in SVG failure rates between OPCAB and ONCAB (42.7% and 19.1% respectively; p=0.034). The estimated marginal mean difference between OPCAB and ONCAB SVG failure rates was 20.91% (95% CI: 1.58-40.24).

After adjusting for sex, age at time of CABG, and time between CABG and coronary angiogram, there was no statistically significant difference in LIMA graft failure rates in either the 2-7 years post-CABG group (OPCAB 10.0%, ONCAB 17.0%; p=0.340),

>7 years post-CABG group (OPCAB 12.1%, ONCAB 11.1%; p=0.140), or overall (OPCAB 13.5%, ONCAB 10.1%; p=0.336).

The overall LIMA-LAD failure rate for all patients was 11.5%.

Discussion

In this contemporary cohort of previous CABG patients who had undergone coronary angiography, the failure rates of saphenous venous grafts were greater in the off-pump CABG group than in the on -pump CABG group. This relationship held true for those patients who had angiography 2-7 years post-CABG, those who had angiography greater than 7 years post-CABG, and for all patients included in the study.

These results should be taken in context with other studies that have been performed comparing the two techniques. Several other large-scale observational studies, as well as several meta-analyses, have found that patients who underwent OPCAB have worse outcomes for short- and long-term survival than those who underwent ONCAB[14,18-21]. This advantage that ONCAB has consistently been seen to have over OPCAB has been attributed to lower rates of incomplete revascularisation, and greater rates of graft patency[22]. There have been several explanations for this discrepancy, including the greater technical difficulty of completing anastomoses of coronary vessels in a heart that has not undergone cardioplegia. It has also been proffered that as ONCAB was the earlier developed technique, there have been more advances in technology and surgical practice that have addressed shortcomings in ONCAB as opposed to OPCAB[22]. We believe that our results, in conjunction with other studies done on the topic, suggest that on-pump CABG is the optimal choice for coronary artery bypass grafting in patients who are not contraindicated for cardiopulmonary bypass.

While the statistical power of this study design provided useable results with regards to the comparison in this patient population, this study was only carried out on patients who had previously undergone CABG and were also requested to have coronary angiography for clinical reasons. As such, there will be a number of patients who have undergone CABG, whether on-pump or off-pump, who did not require further angiography, and therefore the patency of their grafts could not be assessed.

While this is a limitation of the study design, it is an unavoidable consequence of conducting a retrospective analysis of patient data. However, there has been considerable work done to indicate that a large proportion of patients who undergo CABG for revascularisation will require future investigation or intervention. One study found that 16.7% of patients who underwent CABG will require clinical angiography within 10 years[21], while others found that 19% require re-bypass after 20 years[22], and 36% require coronary reintervention after 30 years[23]. As such, while this study is limited in its selection of patient population, the results can be presumed to represent a significant proportion of patients who have undergone CABG during the time period.

Conclusions

Of those previous CABG patients who underwent coronary angiography in our tertiary cardiac centre during the study period, those who underwent off-pump CABG had a significantly worse saphenous venous graft patency rate than those who underwent on-pump CABG. There was no difference in the LIMA-LAD graft patency rates. While this study is limited in covering only those CABG patients who underwent repeat angiography, it provides ample basis to conduct a more thorough long-term study inviting all patients to return for coronary angiography, to ascertain whether the results found here and elsewhere remain true.

Authors' contributions.¾ Oliver Darwin and Ezmee R Butterfield have given substantial contributions to the conception or the design of the manuscript, Oliver Darwin to acquisition, analysis and interpretation of the data. All authors have participated to drafting the manuscript, Oliver Darwin revised it critically. All authors read and approved the final version of the manuscript.

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Effect of an Educational Meeting on the Understanding by Patients of the Results of Laboratory Test

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Abstract
Aim: To evaluate the effect of educational meetings on the awareness of elderly subjects to understand the results of some laboratory tests.
Methods: Participants at two educational meetings, carried out at recreative centres for the elderly, filled out two identical anonymous questionnaires, at the beginning and at the end of the meeting. The items concerned the understanding of the results and the normal values of some common laboratory tests.
Results: Before the meeting, 80.8% of participants declared to have a good understanding of the results of the most common laboratory tests, however the real correct understanding varied from 65% (HDL cholesterol) to 22.3% (blood glucose). A total of 69.2% declared they quickly contact a doctor in the presence of an "abnormal" (flagged) test, and, after the meeting, this percentage decreased to 56.0%.
After the meeting, the subjects showed a better understanding of normal values of blood glucose, haemoglobin and HDL cholesterol.
Conclusions: Elderly subjects overestimate abnormality of the results of the most common laboratory tests. Simple community-based educational interventions can improve the understanding of the results of these tests.

Key Words
Laboratory Tests; Primary Care; Patient Empowerment; Health Education

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Introduction

Communication and understanding of the results of laboratory tests represent frequent activities in primary care, mainly aimed at the management of chronic diseases and therefore involving a mostly elderly population.[1] These processes are influenced by the physician's communication characteristics, by the type of results to be communicated, by the organisational model of communication, as well as by numerous factors of the patient such as age, literacy, expectations and emotional state.[2,5] Factors belonging to the patient's sphere affect the timing of the request for evaluation.[5] Among these factors, an important role can be played by the patient's awareness to understand the results of the tests.[1]

Objective

To evaluate the effect of simple educational meetings on the awareness of elderly subjects to understand the results of some laboratory tests.

Methods

Participants at two educational meetings on the importance of the periodic monitoring of chronic diseases, carried out at recreative centres for the elderly, were invited to fill out two identical anonymous questionnaires at the beginning and at the end of the meeting. The forms were numbered to allow pre-post matching. Personal data were reduced to a minimum (age, sex) to ensure anonymity and an acceptable number of responses. The items concerned the understanding of the results and the normal values of some common laboratory tests. Results were expressed as mean (standard deviation) and percentage. The analysis was carried out by non-parametric and chi-square tests. A p value < 0.05 was chosen as statistical significance. The study was conducted according to the indications of the Helsinki Declaration. Since this study consisted of a totally anonymous survey without the use of clinical data, it was not necessary to request explicit consent from the participants, according to national legislation.

Results

Seventy-eight subjects (36 males, 42 females) filled out the two questionnaires (80% of the audience). The median age was 70.5 years (standard deviation = 8.5 years) without significant difference between males (72.2 years; standard deviation = 9.3 years)

and females (68.9 years; standard deviation = 7.5 years).

Table 1 shows the results of the questionnaires. Before the meeting, a high percentage of participants (80.8%) declared to have an overall good understanding of the results of the most common laboratory tests, with differences according to single tests (cholesterol test = 80.0%; urine test = 70.8%; glucose test = 59.0%, blood count = 45.8%).

A total of 69.2% of participants declared to contact a doctor in the presence of an "abnormal" (flagged) test. Regarding the evaluation of simulated results, 77.3% said they consider blood glucose = 100 mg / dL always as alarming, compared to 70.6% for a normal value of haemoglobin, 60.0% for a normal value of total cholesterol and 35.0% for a normal value of HDL cholesterol. No differences were found in the responses to the pre-meeting test according to sex or age.

The answers after the meeting did not show significant differences with respect to the percentage of participants who said they had a good ability to understand the results of the laboratory tests, but there was an increased frequency of positive response to understanding single tests. The percentage of those who said they quickly contact a doctor in the presence of an "abnormal" result decreased from 69.2% to 56.0%, without significant statistical difference. Regarding the evaluation of simulated results, blood glucose = 100 mg / dL was considered alarming by 34.8% of the participants (p = 0.001 compared to pre-meeting), haemoglobin = 14.6 g / dL by 25.0% (p = 0.001 compared to pre-meeting), HDL cholesterol = 60 mg / dL by17.4% (p = 0.037 compared to pre-meeting) and total cholesterol = 190 mg / dL by 45.3% (p = ns compared to pre-meeting) of the participants.

Table 1: *Results of the questionnaires before and after the intervention (educational meeting)*

Item	Before the meeting		After the meeting		P value
	Yes (%)	No (%)	Yes (%)	No (%)	
Do you think you can understand the results of the common laboratory tests?	63 (80.8)	15 (19.2)	66 (84.6)	12 (15.4)	>0.05
Do you think you can understand a blood count result?	33 (45.8)	39 (54.2)	63 (84.0)	12 (16.0)	0.001
Do you think you can understand a urine test result?	51 (70.8)	21 (29.2)	75 (96.1)	3 (3.9)	0.001
Do you think you can understand a cholesterol test result?	60 (80.0)	15 (20.0)	78 (100.0)	0 (0.0)	0.001
Do you think you can understand a glucose test result?	39 (59.0)	27 (31.0)	66 (88.0)	9 (12.0)	0.001
If tests are "abnormal*" do you always contact a doctor immediately?	54 (69.2)	24 (30.8)	42 (56.0)	33 (44.0)	>0.05
Blood glucose = 100 mg/dL is always an alarming result?	51 (77.3)	15 (22.7)	24 (34.8)	45 (65.2)	0.001
Blood total cholesterol = 180 mg/dL is always an alarming result?	45 (60.0)	30 (40.0)	33 (45.3)	39 (54.7)	>0.05
Blood HDL cholesterol = 60 mg/dL is always an alarming result?	21 (35.0)	39 (65.0)	12 (17.4)	57 (82.6)	0.037
Blood hemoglobin = 14.6 g/dL is is always an alarming result?	36 (70.6)	15 (29.4)	15 (25.0)	45 (75.0)	0.001

* "Abnormality" = presence of a flag on the results

Discussion

The clinical management of the results of laboratory tests represents a relevant workload in primary care that is further aggravated in the case of misinterpretation or anxiety caused by understanding difficulties.[2,6] This study was carried out among the participants of health educational meetings in two recreative centres for the elderly. Although the participants chose to complete the questionnaire themselves, we think that the data may reflect a large portion of subjects who weigh on primary care clinics as ambulant patients.

The results of the study show that these subjects, while declaring a good ability to understand the results of laboratory tests, overestimate the abnormality and often consult their doctor quickly. These results do not differ according to the gender and age of the participants. Previous studies showed that the understanding of the results of laboratory tests is around 50%, slightly higher than the comprehension of radiological reports, and in about 60% of cases the citizen turned to a healthcare professional to obtain an explanation.[2,7]

Given the simple design of the study, it was not possible to consider the health literacy skills of the participants. Limited health literacy and numeracy skills are demonstrated to be significant barriers to basic use of laboratory test result data.[2,7,8]

The results of the study also showed that a simple community-based educational intervention can improve the understanding of the results of laboratory tests. Moreover, the percentage of participants who declared that they always contact a doctor quickly in the event of an "abnormal" laboratory result decreased after the meeting, without reaching levels of significance. This can be explained not only by residual uncertainty by the subjects about the correct meaning of the results of the laboratory tests but also in the contest of the close relationship established between patient and family doctor in the Italian Health System.

Conclusions

Elderly subjects overestimate abnormality of the results of the most common laboratory tests. Simple community-based educational interventions can improve the understanding of the results of these tests.

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