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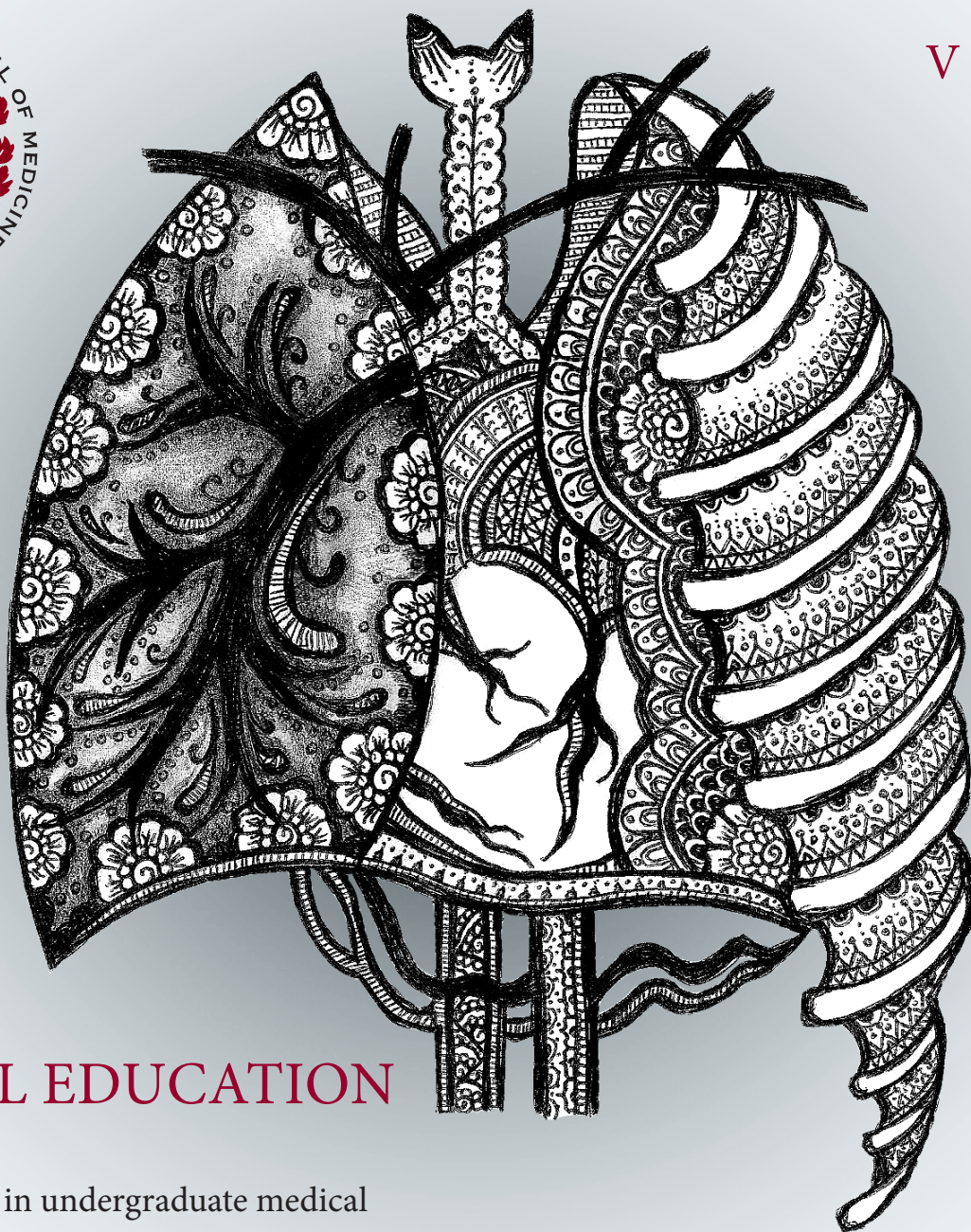
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VOLUME 4

May 2014

Issue 1



MEDICAL EDUCATION

RESEARCH

Ultrasonography in undergraduate medical education

COMMENTARY

uOttawa's Clinician Investigator Program
Reforming CBL through branched narratives and virtual patient models

INTERVIEW

Advancing medical education through simulation learning and research with Dr. Viren Naik

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The student-run medical journal of the University of Ottawa

ABOUT US

UOJM is an international peer-reviewed journal led and published by the students of the Faculty of Medicine. We welcome submissions in a variety of areas in biomedical research and feature original research, review articles, news and commentaries, case reports and opinion pieces. Our articles are written in both English and French, and represent the only bilingual medical journal in Canada.

Le **JMUO** est un journal revu, édité et publié par les étudiants de la Faculté de Médecine. Nous encourageons les soumissions d'une variété de différents domaines en recherche biomédicale et publions des articles de recherche originale, des articles de revue, des nouvelles et commentaires, des rapports de cas et des pièces d'opinion. Nos articles sont écrits en Français et en Anglais et représentent le seul journal médical bilingue au Canada.

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UOJM: Preface

On behalf of the entire editorial team, we are very pleased to present you with the fourth issue of the University of Ottawa Journal of Medicine (UOJM). This edition marks the first of two installments in Volume 4. Since its re-launch in 2011, UOJM has continued its growth thanks to the collective efforts of the UOJM Leadership Team and our enthusiastic editors. The UOJM is a student-run, peer-reviewed journal that is dedicated to showcasing the wide variety of ideas and achievement of the Faculty of Medicine students. We accept many types of articles in both English and French, including scientific and non-scientific pieces. Our goals for this year were to increase both medical and graduate student involvement with the journal, and to promote our journal to different departments within the University of Ottawa and externally to other universities. Our ambitions were successfully accomplished this year with an editorial team size of 47 members and a record number of submissions.

We are pleased to introduce that the theme for this issue is medical education. We feature four articles that explore aspects of training at different stages of medical education. One of these is a research article that takes a look at providing early exposure to ultrasonography in undergraduate medical curriculum. Another article explores new models for improving case-based learning by using branched narratives and virtual patient models. We had the opportunity to interview Dr. Viren Naik, medical director of the University of Ottawa Skills and Simulation Center (uOSSC) and a leader in developing simulation for postgraduate medical education. Also at the postgraduate level, we highlight the benefits and successes of the University of Ottawa's Clinician Investigator Program (CIP) headed by Dr. Jonathan Angel. Together, these pieces highlight a genuine enthusiasm for innovation in medical education at uOttawa.

Over the last year, interest and involvement in UOJM has grown immensely. Thanks to our promotions team headed by Alexandra Bunting, VP Promotions, we received a record number of **35 submissions** - more than double the amount received (16) in 2013. We were able to enhance the journal's development by improving its publicity within the University of Ottawa and externally to other Canadian universities by creating an updated UOJM website and a new Facebook page to facilitate the promotion of the journal. This year's editorial board also expanded to 7 associate editors and 28 section editors. We thank the editors for work-



The UOJM 2013-2014 Core Team

ing tirelessly to continuously raise the quality of content that goes into the UOJM. We are grateful for Ghadi Antoun, Managing Editor who coordinated the peer review process for the large volume of submissions. We also thank Suhair Bandaeli, our Publication Director, as well as the copy editing and layout editing team for putting the finishing touches on this beautiful issue.

It is now becoming increasingly evident that the UOJM is evolving beyond a publication. In 2014, the UOJM has established itself as a network and training ground for clinician and scientist trainees. This year, the UOJM hosted four training workshops, focusing on research writing, critical appraisal, peer review etiquette and career advice. Under the direction of Ariana Noel, VP Education, we brought in fantastic speakers including Dr. Diane Kelsall, Deputy Editor at CMAJ and Editor for CMAJ Open (Canadian Medical Association Journal), Dr. Claire Liddy, Dr. Alireza Jalali and Dr. Phil Wells. Also, our partnership with the Seminars in Medical Research and Technology (SMRT) interest group has provided students with additional enrichment through regular research seminars and journal clubs as well as having more students not directly involved with our editorial team attend the UOJM workshop events.

We are very grateful to Dr. Melissa Forgie and Dr. Phil Wells, who continuously supported us through their roles as mentors. We would like to thank our sponsors for their generous

contributions – without them this issue would not be possible. Among these sponsors, we are especially grateful to the Faculty of Medicine, The Ottawa Hospital, and the Department of Cellular and Molecular Medicine for their financial contributions. Thanks also to Nischal Ranganath, who worked tirelessly to deliver our message and solicit support as VP Finance. We would also like to thank the Bureau of Francophone Affairs for their efforts translating all the abstracts, and fulfilling our commitment to being a bilingual journal.

As we look towards the future, we are excited to announce a number of updates that we feel will position the UOJM as a leader in medical journal publishing. First of all, we are extremely excited to announce that a **second issue in UOJM Volume 4 will be released** in September 2014. To assure growth and ensure sustainability for the future, we are pleased to announce that the Faculty of Medicine has generously committed to support for the next five years. In an effort to increase our online presence in the digital age, UOJM will now be permanently digitally archived at uO Research (www.ruor.uottawa.ca), an open-access online repository that is fully indexed and searchable. Starting June, we will also be updating our peer review management platform to Open Journal Systems. This infrastructure upgrade will provide a secure and intuitive online platform for handling submissions, managing editorial workflow, and indexing. These steps are the beginning in our path towards establishing UOJM as an internationally recognized open-access medical journal.

We are extremely proud of the high quality and diverse selection of articles in this issue. We present 13, ranging from a commentary on publishing negative data, to an interview on personalized medicine, and to a humanities reflection piece of a medical student's experience of a child with Down's syndrome. We are very impressed with our editorial team's hard work and enthusiasm to showcase our students' successful work. On behalf of the entire 2013-2014 UOJM team, we invite you to explore our latest issue and we hope you enjoy it!

Sincerely,

Colin Suen and Loretta Cheung
Editors-in-Chief

JMUO: Préface

L'équipe de rédaction est très excitée de vous offrir la quatrième édition du Journal médical de l'Université d'Ottawa (JMUO). Ce numéro est le premier de deux qui seront publiés dans le volume 4. Depuis qu'il a été lancé de nouveau en 2011, la publication a poursuivi sa croissance grâce aux efforts collectifs de l'équipe de direction du JMUO et de nos rédacteurs enthousiastes. Le JMUO est une publication gérée par les étudiants, évaluée par un comité de lecture, qui a pour objectif de mettre en valeur toute la gamme d'idées et de réalisations des étudiants de la Faculté de médecine. Nous acceptons différents types d'article, en anglais et en français, y compris sur des sujets scientifiques et non scientifiques. Nos objectifs pour cette année étaient d'accroître la participation des étudiants en médecine et des études supérieures, en plus d'en faire la promotion auprès des différents départements de l'Université d'Ottawa tout comme à l'extérieur de l'université. Nous avons réalisé nos ambitions pour cette année, car nous avons une équipe de rédaction de 47 membres et un nombre record d'articles a été soumis.

Nous avons le plaisir de présenter le thème pour la présente édition : l'éducation médicale. Le présent numéro offre quatre articles qui portent sur divers aspects de la formation à différentes étapes du programme d'études médicales. Un des articles porte sur une étude portant sur la possibilité d'exposer les étudiants à l'échographie tôt dans le cursus médical de premier cycle. Un autre article porte sur les nouveaux modèles visant à améliorer l'apprentissage par cas, en faisant appel à la narration ramifiée ou aux modèles virtuels de patients. Nous avons eu la chance d'interviewer Dr Viren Naik, directeur médical du Centre de compétences et de simulation de l'Université d'Ottawa. Dr Naik est un chef de file dans le développement de la simulation pour la formation médicale postdoctorale. Également au niveau des études postdoctorales, nous mettons en lumière les avantages et les succès du Programme de cliniciens-chercheurs de l'Université d'Ottawa, dirigé par Dr Jonathan Angel. Ensemble, ces articles soulignent tout l'enthousiasme pour l'innovation en éducation médicale que l'on observe à l'Université d'Ottawa.

Au cours de la dernière année, l'intérêt pour le JMUO et la participation se sont considérablement accrus. Grâce à notre équipe de promotion dirigée par Alexandra Bunting, VP Promotion, nous avons reçu le nombre record de 35 propositions d'articles, soit plus du double des propositions (16) reçues

en 2013. Nous avons pu développer davantage la publication en améliorant la promotion au sein de l'Université d'Ottawa et auprès d'autres universités canadiennes en offrant un site Web actualisé et une nouvelle page Facebook. Cette année, le comité de rédaction a aussi été élargi pour ajouter 7 nouveaux postes de corédacteurs et 28 postes de rédacteurs de section. Nous remercions les rédacteurs pour leur travail inlassable pour continuer de rehausser la qualité du contenu du JMUO. Nous exprimons toute notre gratitude à Ghadi Antoun, rédacteur en chef, qui a coordonné le processus de relecture pour ce nombre important de propositions. Nous remercions également Suhair Bandedali, notre directrice de publication, de même que l'équipe éditoriale et l'équipe d'édition de mise en page pour le parachèvement de ce beau numéro.

Il devient maintenant de plus en plus apparent que l'évolution du JMUO va bien au-delà de la publication. En 2014, le JMUO s'est imposé comme un milieu de formation et de réseautage pour les stagiaires cliniques et scientifiques. Cette année, le JMUO a organisé quatre ateliers de formation axés sur la rédaction scientifique, l'évaluation critique, la courtoisie dans l'évaluation par les pairs et les conseils en matière de carrière. Sous la direction d'Ariana Noel, VP Éducation, nous avons attiré de merveilleux conférenciers tels que Madame Diane Kelsall, éditrice déléguée du CMAJ (Journal de l'Association médicale canadienne, JAMC) et éditrice du CMAJ Open, Dre Claire Liddy, Dr Alireza Jalali et Dr Phil Wells. De plus, notre partenariat avec le groupe d'intérêt Seminars in Medical Research and Technology (SMRT) (Groupe d'intérêt de séminaires sur la recherche et la technologie en médecine) a constitué un enrichissement supplémentaire pour les étudiants en leur offrant l'accès à des séminaires réguliers sur la recherche et à des clubs de lecture. Ces activités ont en outre permis à des étudiants qui ne participent pas directement à l'équipe de rédaction d'assister à des ateliers du JMUO.

Nous sommes particulièrement reconnaissants envers les docteurs Melissa Forgie et Phil Wells qui, à titre de mentors, nous ont toujours accordé leur appui. Nous souhaitons remercier nos commanditaires pour leurs généreuses contributions. Sans eux, il n'aurait pas été possible de publier cette édition. Parmi les commanditaires, nous sommes particulièrement reconnaissants pour la contribution financière de la Faculté de médecine, de l'Hôpital d'Ottawa et du Département de médecine cellulaire

et moléculaire. Merci à Nischal Ranganath qui, à titre de VP Finances, a travaillé sans relâche pour présenter notre message et solliciter des contributions. Finalement, nous aimerions remercier le Bureau des affaires francophones pour les efforts qu'ils ont déployés dans la traduction des résumés, nous permettant ainsi de remplir notre engagement à offrir une publication bilingue.

Lorsque nous regardons vers l'avenir, nous sommes fiers d'annoncer plusieurs mises à jour qui, nous croyons, positionneront favorablement le JMUO en tant que chef de file parmi les publications médicales. Tout d'abord, nous sommes très enthousiastes d'annoncer que le deuxième numéro du volume 4 du JMUO sera publié en septembre 2014. Pour assurer la croissance et la survie de notre publication, nous sommes heureux d'annoncer que la Faculté de médecine s'est engagée à accorder son appui pour les cinq prochaines années. Dans le but d'accroître notre présence sur Internet, le JMUO sera maintenant archivé numériquement en permanence sur le site de Recherche uO (www.ruor.uottawa.ca/fr), un dépôt en ligne en libre accès qui est entièrement indexé et interrogeable. Commencant en juin 2014, nous mettrons aussi à niveau notre plate-forme de relecture par les pairs pour adopter le Open Journal System. Cette infrastructure actualisée offrira une plate-forme en ligne sécurisée et plus intuitive pour recevoir les propositions, pour gérer le flux éditorial et l'indexation. Ces démarches visent à établir le JMUO comme une publication médicale en accès libre reconnue internationalement.

Nous sommes très fiers de la grande qualité et de la diversité des articles que vous retrouverez dans le présent numéro. Nous en présentons 13, couvrant une gamme de sujets allant d'un commentaire au sujet de la publication des données négatives, à une entrevue sur la médecine personnalisée, à un article dans les humanités portant sur la réflexion d'un étudiant en médecine face à son expérience personnelle avec un enfant atteint du syndrome de Down. Nous sommes très impressionnés par tout le travail acharné de notre équipe de rédaction et par l'enthousiasme démontré pour offrir une vitrine où présenter le travail de grande qualité de nos étudiants. Au nom de toute l'équipe du JMUO 2013-2014, nous vous invitons à explorer notre nouvelle publication. Nous espérons que vous l'aimerez!

Cordialement,

Colin Suen et Loretta Cheung
Rédacteurs en chef

Double blinding in peer review: is it worth the hype?

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INTRODUCTION

Without a doubt, peer review is the measuring stick by which science is judged. Peer review is a longstanding tradition in academic circles as the standard practice for evaluating articles for publication, grants and academic promotions. The term itself conjures up certain connotations and mixed emotions. Knowing that a body of work has successfully gone through peer review immediately increases credibility and, although academics would be hesitant to confess, it is too frequently unquestioned. A recent article by John Bohannon in *Science* tells the story of how his bogus paper full of glaring fatal flaws was accepted by an astonishing 157 out of 255 open-access “peer reviewed” journals [1], casting doubt on the level of scrutiny from journals claiming to perform peer review. Perhaps it is time to cast aside our blind faith and understand the limitations of peer review.

ASSESSING FAIRNESS OF PEER REVIEW PRACTICES

At its core, peer review is a quasi-democratic way of assessing the scientific merit of a given paper. A manuscript is received by the journal’s editor, who then selects reviewers (usually experts in the field of the article in question) to provide criticism and feedback for the editor to decide the outcome of the submission. Journals vary in their policy on controlling the author-reviewer relationship. The most common practice is a single-blinded review, in which the identity of the reviewer is unknown to the author (for more information, see Table 1). The identity of the author is not masked to the reviewer, which can potentially be a major source of bias and misconduct. The classic example against single-blinding is a submission that cruises through peer review based on the author or group’s reputation in the field. Conversely, competing interests may cause reviewers to inten-

tionally delay or hold back papers that are otherwise scientifically sound or, in the worst case, steal other’s ideas. Other factors such as institution, country, race, or even gender can also affect the reviewer’s ability to be objective. Recently, some reputable scientific journals such as *Nature Geoscience* are beginning to recognize these flaws and are moving towards double-blind review, which means that neither authors nor reviewers know each other’s identity [2].

DOUBLE-BLIND REVIEW: IS IT WORTH THE EFFORT?

If double-blinding is the standard for minimizing bias in randomized controlled trials, should we not hold our journals to the same standard? In theory, concealing the author’s identity would remove the effect of competing interests and any preconceived notions of credibility relating to author reputation. Thus, work would be assessed solely on its quality. In terms of practicality, double-blinding requires editors to spend additional time and effort to ensure anonymity. This is particularly challenging for larger international journals, which are already overwhelmed with the existing volume of submissions. Therefore, it is worthwhile to evaluate the evidence to determine whether or not investing in this practice is actually beneficial.

Indeed, some journals have investigated the value and reception of this type of review. A survey commissioned by the Publishing Research Consortium revealed that out of 3040 academics surveyed around the world, the majority (72%) viewed double-blind review to be an effective form of review in comparison to 52% for single-blind [3]. In the 1990s, a series of reports evaluating the merits of double-blinding were featured in the *Journal of the American Medical Association (JAMA)*. A case

Table 1. Comparison of different types of peer review

Type	Identities Masked	Advantages	Disadvantages
Single-blind	Reviewer to Author	Honest, critical reviews without fear of judgment from authors	Accountability for one’s comments is minimal, subject to conflicts of interest and more prone to “scooping” since reviewer identities cannot be traced
Double-blind	Reviewer to Author Author to Reviewer	Reduces bias from knowing identity of the authors	Significant efforts are required to ensure anonymity, reviewers can often deduce the author’s identity based on citations
Open	None	Accountability is increased, lower chances of misconduct or unprofessional behaviour because identities are revealed	Reviewers may decline due to fear of fallout and potential damage to relationships that could affect career prospects, promotions and grant funding

could be made that concealing author identities improves the quality of peer review, based on the results from a double-blind randomized trial conducted at the editorial office of the Journal of General Internal Medicine [4]. In this study, manuscripts were randomly assigned to blinding versus non-blinding to a block of two reviewers. Overall, blinding significantly improved the quality of the review from the editor's perspective. However, when asked for the authors' opinion of the reviews, they found no benefit to blinding for parameters such as thoroughness, constructiveness, and fairness. In deciding whether an article is either accepted or rejected, arguably the most important outcome, Fisher et al showed that blinding had no effect [5]. This is consistent with another large randomized study conducted by the British Medical Journal (BMJ), where no differences were found between blinding and nonblinding for acceptability and author's or editor's opinion of review quality [6]. Furthermore, masking the author's identity is not always successful, as 27-46% of reviewers are able to accurately identify them from self-referencing or knowledge of work [4, 5]. It appears that, at most, there is only a marginal benefit to double-blinding over single-blinding, despite its theoretical merits.

DISCUSSION

It must be noted that the previously mentioned studies were conducted by relatively large international medical journals and may not be generalizable to all types of publications. In small academic communities such as institutional journals, the impact of professional and often, personal relationships (e.g. classmates, friends or co-workers) on the review process may be amplified. A reviewer may be sympathetic and offer more constructive feedback or be more critical depending on the nature of their relationship with the author. The University of Ottawa Journal of Medicine (UOJM) recognizes this as a legitimate issue in its close-knit medical and graduate student communities. Therefore, it has been the UOJM's policy from the very beginning to utilize double-blind peer review. Specific steps have been taken to streamline blinding procedures to be efficient and timely. For instance, UOJM is transparent about its blinding procedure and authors are required to separate all identifying information on an "Author Submission Form" outside of the manuscript. From this point forward, editors and reviewers can focus their attention on reviewing the quality and validity of the blinded manuscript. Another perceived challenge in double blinding is the tendency for reviewers to deduce author identities based on self-citation or familiarity with the group's type of research. This issue is perhaps more prevalent in major medical journals because authors tend to have established a track record in their field. The majority (we emphasize, not all) of authors submitting to UOJM are trainees at the beginning of their research careers. As a measure to prevent post-blinding identification for a given manuscript, all UOJM reviewers are asked to declare a conflict of interest and are replaced by another reviewer if they are able to identify the author.

In summary, there is no simple answer to whether there is hope or simply hype in doubleblinding. In general, the UOJM

leadership believes that double-blinding has more positive than negative impacts on the quality of peer review in the context of an institutional journal. To our knowledge, there is no compelling evidence against double-blinding, although the most convincing argument is that of practicality. However, by finding ways to integrate double-blind peer review in a practical and feasible manner, we minimize the "additional effort" that prevents its uptake in traditional journals. Therefore, journals considering double-blinding can adopt similar methods as UOJM so that practicality is no longer a deterrent. If there is a way to improve the quality of peer review and publications, however minimal, we believe it is worth the effort.

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UOJM editor training: results from the 2013 editor satisfaction survey and highlights from 2013-2014 training workshops

Colin Suen, BMSc¹, Loretta Cheung, BSc¹

¹Faculty of Medicine, University of Ottawa

BACKGROUND

UOJM recognizes that editor competency and preparedness directly impacts the quality of peer review, which holds the key to producing a great publication. We believe that success of our journal is based on a central goal of promoting physician competency in medical communication and developing leaders in medicine. In the age of evidence-based medicine, there are surprisingly few, if at all, opportunities for medical trainees to gain formal training in scientific writing and critical appraisal. Over the last two years, the UOJM has aimed to address these gaps and worked on developing a training program to equip participants with these important skills. Indeed, the merits of involvement in a peer reviewed journal at this stage of medical/research training have been recognized by its trainee participants, and have been reviewed extensively by Kevin Lee [1]. Following the success of the 2013 issue, UOJM made considerable strides to further improve the quality of content in the journal. In 2012-2013, 30 students participated as reviewers on the editorial board and received a practical experience in peer reviewed research. We conducted a year-end survey to identify issues and areas for improving the editor experience.

2013 EDITOR SATISFACTION SURVEY

Methodology: An online questionnaire was delivered by email to 30 associate editors, section and copy editors in UOJM. Responses were collected anonymously using SurveyMonkey. Participants were asked to rate their satisfaction with UOJM activities and resources, to rank a list of items based on their potential for improving the UOJM and increasing chances of submission. A total of 16 out of 30 editors responded (53%), comprised of 3 associate editors, 11 section editors, and 2 copy editors. Editors were represented by students from undergraduate MD year 1-3, PhD, and MD/PhD classes (Table 1).

Survey Results: Overall, editors were most satisfied (average score > 3) with the time provided for review (3.56), the website (3.29), and the effectiveness of the training towards career goals (3.44) (Figure 1). Editors were least satisfied (average score < 3) with the workshop/training sessions (2.62), resources on how to review articles (2.67) and getting feedback from Managing Editors (2.79). When asked to choose from a list of choices for improving the UOJM, editors ranked peer review training work-

shops from faculty advisors (1st) and writing workshops (2nd) as the most important (Figure 2). Editors also responded strongly to PubMed/MEDLINE indexing and increased awareness of the journal as factors that would increase their likelihood of submitting to the UOJM. The results of this survey formed the basis for some of UOJM's training initiatives for the 2013-2014.

Table 1. Demographics of respondents from the 2012-2013 Editor Satisfaction Survey

	Medical (MD) student	Graduate (MSc) student	Graduate (PhD) student	MD/PhD Student	Total
Year 1	3	0	1	0	4
Year 2	6	0	0	2	8
Year 3	2	0	1	0	3
Year 4+	0	0	0	0	0

UOJM'S RESPONSE TO FEEDBACK

This year (2013-2014), over 45 students involved on the editorial board and journal staff participated in four training workshops hosted by UOJM, in contrast to one in 2013. These workshops were designed with the following goals in mind: to increase communication between UOJM senior editors to the editorial staff, to equip staff with critical appraisal strategies to conduct effective peer review, and to establish criteria for accepting articles. At the beginning of the year an introductory workshop was provided by the senior editors to provide a history of the journal, outline its goals, describe roles and responsibilities of each editorial board member and detail a publication timeline for the current cycle. In addition, concepts such as blinding in peer review and the merits of practicing peer review were emphasized. The presentation is available at the following link: <http://uojm.ca/about/editorial-board>. In November, UOJM's managing editor, Ghadi Antoun, held a peer review process seminar for the editorial team. This interactive session took editors through the process of critiquing and providing feedback using an example article. During this workshop, the learning objectives were to outline a strategy for standardized peer review using the UOJM submission form, discuss peer review etiquette, provide a demonstration of the

Editorial

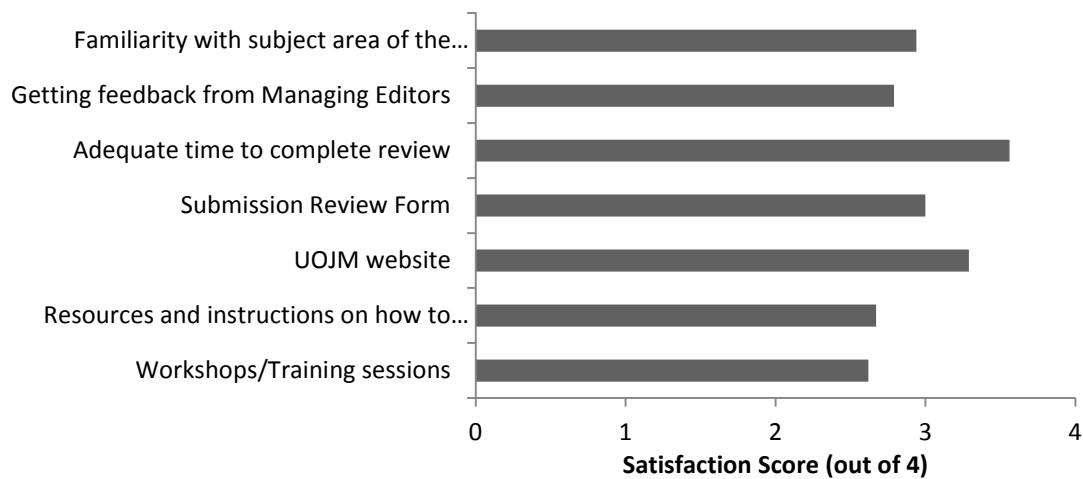


Figure 1. Results from 2012-2013 Editor's Satisfaction Poll. Editorial board members were asked to rate activities and resources provided by UOJM based on the following scale: 1 = poor, 2 = satisfactory, 3 = good, 4 = very good. The average score from 16 respondents for each parameter was recorded

electronic peer review platform, and to establish publication acceptance criteria. These steps were crucial in ensuring that the goals and visions of UOJM were effectively communicated to the editors.

Two additional workshops were offered for the staff of UOJM and made available to members of the Seminars in Medical Research and Technology (SMRT), a medical student interest group at the University of Ottawa. In an effort to bring in outside expertise, an informative and dynamic presentation on medical journal writing and editorial practices was given by Dr. Diane Kelsall, an editor at the Canadian Medical Association Journal (CMAJ). Dr. Kelsall gave the perspectives of editors and peer reviewers and provided constructive advice on how to maximize the chances of publication by emphasizing the importance of effective communication, clarity and presentation in writing manuscripts. The workshop was very well-received by attendees, and slides from her presentation are online: [University of Ottawa Medical Journal Workshop Feb 11, 2014](#). At the end of the 2013-2014 academic year, we held a career panel featuring Dr. Clare Liddy, Dr. Alireza Jalali and Dr. Phil Wells, who all shared their

research and career experiences. Dr. Liddy is an associate professor at the University of Ottawa's Department of Family Medicine with a cross-appointment to the Department of Epidemiology and Community Medicine and discussed about her research with eConsultation, an innovative electronic referral system. The eConsultation system allows primary care providers to communicate with specialists through an online media, helping to optimize the referral system in Ontario. Additionally, Dr. Jalali, a distinguished anatomy professor at the University of Ottawa, engaged us with his presentation about the value of social media in medical education and community. Lastly, Dr. Wells, the Chief and Chair of the Department of Medicine at The Ottawa Hospital, described about his successful research in clinical epidemiology and thrombosis, as well as useful career advices for the medical students in the audience. Overall, the addition of the career panel and workshops throughout this academic year has enhanced UOJM's presence as a journal and a group for medical and graduate students to develop into future leading physicians and scientists.

Table 2. Ranking of proposed recommendations for improving UOJM

	None = 0	Possible = 1	Definite = 2	Cumulative score	n	Average score	Rank
Workshops/training sessions from faculty advisors	0	5	11	27	16	1.69	1
Writing workshop for authors looking to submit	1	9	6	21	16	1.31	2
More issues per academic year (eg. two issues for 2013-2014, biannual release)	5	8	3	14	16	0.875	5
Student-organized seminars and/or a journal club	2	9	5	19	16	1.19	4
Awards for best abstract/article	2	8	6	20	16	1.25	3

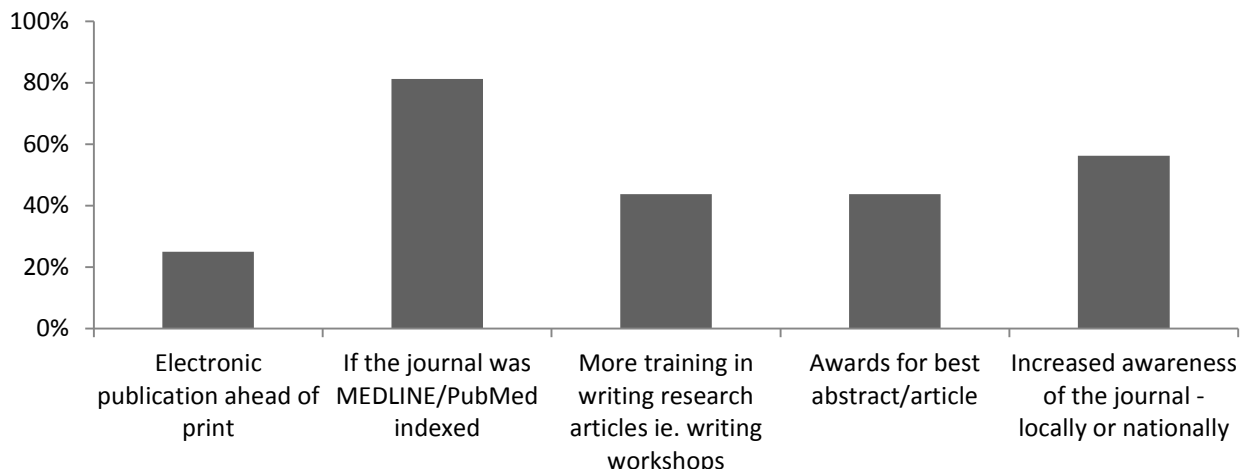


Figure 2. Editor's opinions on factors influencing the likelihood of submitting to UOJM.

OUTLOOK

After our first successful year of implementing training workshops, we are looking forward to receiving feedback from these pilot workshops as we refine our training program for future years. Amidst the continued growth of the UOJM since its re-launch it is important to recognize UOJM's identity. UOJM is defined by the collective talents of students within the Faculty of Medicine at the University of Ottawa. Students need to cultivate this high level of medical research talent, and we hope that UOJM can continue to provide opportunities to practice scientific inquiry and critical appraisal for years to come.

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Keywords: Editor training, peer review, medical education, critical appraisal, editorial, medical journal

The advancement of medical education through innovative research and simulation learning: a discussion with Dr. Viren Naik, Medical Director of the University of Ottawa Skills and Simulation Centre

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ABSTRACT

The spotlight of UOJM's 4th issue is medical education. We met with Dr. Viren Naik, anesthesiologist, associate professor at the University of Ottawa (uOttawa), and Medical Director of the University of Ottawa Skills and Simulation Centre (uOSSC). He is also a core team member of the Academy of Innovation in Medical Education (AIME), uOttawa's centre for advancing medical education research.

Dr. Naik is actively involved in research, with over 60 peer-reviewed publications and grants. He was also the previous chair of the Written Examination in Anesthesia with the Royal College of Physicians and Surgeons of Canada. In this interview, we discuss the advancement of medical education with the skills and simulation centre, the future of the medical curriculum, and how to be involved in medical education as students.

RÉSUMÉ

Dans cette 4e édition du JMUO, le sujet mis en lumière est l'éducation médicale. Nous avons rencontré le Dr Viren Naik, anesthésiologiste, professeur agrégé de l'Université d'Ottawa (uOttawa) et directeur médical du Centre de compétences et simulation de l'Université d'Ottawa (CCSUO). C'est aussi un membre important de l'Académie pour l'innovation en éducation médicale (AIME), le centre de l'Université d'Ottawa qui a pour but de faire avancer la recherche en éducation médicale.

Dr Naik est un chercheur très dynamique qui a plus de 60 publications et subventions évaluées par les pairs à son actif. Dans le passé, il a aussi présidé l'examen écrit en anesthésiologie du Collège royal des médecins et chirurgiens du Canada. Durant l'entrevue, nous avons discuté de l'avancement de l'éducation médicale au Centre de compétences et simulation, de l'avenir du cursus médical et de la façon que les étudiants peuvent participer à l'éducation médicale.



Tell us about yourself, your education background, and your research interests.

I'm an anesthesiologist; I trained and did my MD at U of T [the University of Toronto] and did my residency at U of T (I was sort of all U of T). I then went on staff at U of T. Going back a little bit further, I had some passion for teaching. I used to teach swimming lessons, tennis lessons, and I think you know if that's something you enjoy doing. What's great about medical education is that you always have an opportunity to teach below you: 2nd years (probably) have an opportunity to teach 1st years, and 4th years [to] 3rd years, and residents to medical students and it moves on. Those opportunities for teaching have always been there, essentially. So, I was lucky, and my passion for teaching was recognized; someone pointed me to the direction of furthering that interest and I did a Master's of Education degree during my residency actually, and following that, I got recruited to St. Mike's hospital in Toronto. Basically at that point, I was asked to

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run a simulation centre in Toronto and did that for a number of years at which point Dr. Kitts and Dr. Bradwejn came looking for someone to help build a simulation centre in Ottawa, and that winds me here in Ottawa. I'm actually back in school myself; I have a student number because I am doing my Executive MBA at uOttawa [University of Ottawa].

What is the Academy of Innovation in Medical Education and how did AIME's endeavors shape the curriculum at uOttawa?

What you're seeing happening at medical schools across Canada, in fact, across the world, is that medical education research centres or offices are opening up. The logic here is that we've been teaching medicine probably the same way we've taught it since the turn of the century, very apprenticeship-like. Obviously we've had some [changes] like PBL [problem-based learning] or CBL [case-based learning], but at the end of the day, we have curriculum reforms or we teach things differently, and we don't necessarily have the impact of those changes to support our thoughts that we're doing things better for the students. A fairly recent innovation over the last decade is that if we think our curriculum or assessment strategies are making a difference, we should actually measure that, and the best way of measuring things is doing research. So, AIME is one of those medical education research centres that looks at innovations in medical education and whether or not those innovations are making a difference by studying those different interventions. There are other centres across Canada that have similar mandates, but AIME was one of the first centres in Canada, created and started by the late Meridith Marks, and serves that capacity. Realistically, it is an office where clinicians who are interested in medical education, such as myself, can not only do research or have the support to do research, but can also collaborate with PhDs, who have expertise in education, on higher order research.

What are some trends in medical education from when you were a student to now?

I think the biggest trends we are seeing is that medical education is very different today based on challenges that are there that weren't there when I was a student. We know that medical knowledge and technical procedures [are] doubling every 6 years. That's an exponential growth. [How] can we teach everything that we have to know plus all the stuff that is growing exponentially in this finite (sort of) training period? There are issues of work hour reforms: no longer are you in the hospital for 48 hours in a row like I might have been in my residency. There are patient safety issues that ask whether or not we should be learning things for the first time on patients, and medical students who [you] will rightly hear saying, "I'm not comfortable doing these things". As well, we are seeing the exponential growth of technology. So how do we take all of these things and pull them together to provide a better education experience? [One] of the things we're talking about now is an outcome-based approach as op-

posed to a time-based approach. So, now [you are] working towards achieving competencies as opposed to [spending] 5 years and hoping that you have achieved those competencies. There is also the recognition that at the end of medical school and residency, you don't know everything you need to know. Learning is lifelong and you need to continue to refresh and continue to stay on top of things. We are trying to create a culture of lifelong learning as opposed to these static finite systems.

How is competency-based residency different than the current time-based residency and do you think they will produce better physicians later on?

To the first part of the question, the difference I think about competency-based training is [that] in the old system, the apprenticeship model (time-based), we had an opportunity to work with a person or people for a long period of time and essentially by immersion, you were probably getting all the competency needed. Now with all the challenges of moving around hospitals and moving around mentors and faculty, it is more difficult to make a true assessment. What competency-based medicine does is that first and foremost, it provides what it is we are trying to achieve on an outcome basis, and that's important for the faculty so they have a good idea of where we need to get a trainee to, and also [for the] students so they know where to get to. Now in it's extreme form, it would mean that once you've achieved those competencies, you're ready to move on to the next stage of your life, or to the exams, etc. That is still a bit difficult to do, as we are still in the infancy of competency-based training and there are logistics that would make it challenging. However, I think that competency-based training is helping us look at our current training critically and tease away those aspects that may not be necessary for a competent anesthesiologist or a competent internist. So maybe there [is efficiency] that can be achieved in training. Maybe training might not need to take as long; maybe it might take longer. These are the questions we are asking. So here, at the University of Ottawa, we are [going to] be starting the first competency-based training program in Anesthesia in July of 2015, and the goal of that program will be the first program in Canada that trains an anesthesiologist in one year less, a four year program as opposed to a five year [program]. We recognize that it may take longer, but our goal is to train all the trainees in one year less.

Are there any programs or procedures you would like to see implemented in medical education?

I think competency-based is the biggest change we're [going to] see in residency. When you talk about procedures, what we are seeing is more minimally invasive approaches to everything, whether it's taking a tumour out of the brain or some diseased [tissue]. Again, the challenge is that the more minimally invasive we get, the greater the learning curve and the more difficult it is for faculty to provide [and] allow the trainee to have

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some autonomy. You can imagine that it is much easier to correct a trainee in an open procedure than it is when [you have] instruments inside a closed cavity. For that reason, the biggest programs and the biggest thing you're seeing in Ottawa is using simulation to accelerate the learner through the steep part of the learning curve so that the early successes and failures can be learned through simulation. Thus, when you get to the operating room, you are now on a flatter part of that asymptote and the learning that you will have in the clinical setting will be richer.

I think the biggest challenge we still have is that we recognize that doctors do not manage patients in isolation; it is really a team sport. Our education strategies are still focused on the individual; you all do individual tests and when you go to do your OSCEs, it's individual OSCEs. But realistically, we work in teams with nurses, physio[therapists], and social workers in what we call a true inter-professional collaboration. Given that we do an inter-professional collaboration in the real world, we have to wrap our heads around and try to tackle how we can incorporate inter-professional education in all levels, from undergraduate [to] postgraduate. We hope that if we can educate [students] better with inter-professionalism, and recognize [that] it is a team sport, that will feed forward into clinical practice. What we know already from studies, [including] the Canadian Adverse Events Study, is that if you improve inter-professional collaboration, patient safety is actually improved [1].

What is the University of Ottawa Skills and Simulation Centre (UOSSC) and what kind of programs are offered for students through the centre? Which specialties are most involved with the centre?

The University of Ottawa Skills and Simulation Centre is a joint venture between the Ottawa Hospital and the University of Ottawa. We opened in October 2010 [and] we are now over 3 years old. It is officially the largest simulation centre in Canada. What we offer here is an opportunity for students to learn procedures and encounters that they will experience in the clinical setting and [we want to] accelerate them through that learning curve. More importantly, we want to expose them to rare and unexpected things that they need to know, like cardiac arrest and trauma, because clinical experiences with emergencies are more luck of the draw, and it may not be appropriate to give a trainee management autonomy. The simulation centre provides an environment to experience crises competencies that you may not have an opportunity to experience in a finite residency.

Every specialty department in the University uses the Skills and Simulation Centre, from Psychiatry, where they use the centre to learn how to do electroconvulsive therapy, to the more obvious surgical specialties that learn how to do specific procedures.

How does simulation play a role in medical education at the undergraduate level? From your experience and research, why is simulation important?

Simulation can help [give] trainees and students the opportunity [to] learn procedures that I had to learn for the first time on patients, and lets you get comfortable with them. Imagine now you have an environment that is free of the pressures of time to perform a procedure, free of the stress from a patient's discomfort, and [free of] the safety aspects for the patient. Faculty [members] are also now in an environment where they don't have the pressure of needing to see more patients and they can spend more time for that direct feedback. The nice thing about the simulation for the undergraduates is [that] instead of having a procedure or encounter intervened upon or taken away because it is taking you too long or it is not the right learning environment, you get to manage this encounter and this procedure all the way from beginning to end. What we find to be most powerful is talking about that after you have managed the entire procedure or encounter, so you get to be hands on the whole time and talk about it after in what we call a "debriefing" to learn what you did well and what you can learn from. Naturally, at the undergraduate level when you've got so much to learn, simulation works best when you have some of the basic knowledge [of] physiology and pathophysiology underneath you. Then, in second year, [or] once you have all the base knowledge of physiology and pathophysiology, you can come to the simulation centre to apply what needs to be learned.

How does Ottawa compare with other schools' simulation centres?

So, as said before, this is the largest simulation centre in Canada. I think a few things define us beyond size. I think one of the reasons I moved to Ottawa was that you have a large faculty who is dedicated to medical education. Other schools may have more faculty interested in research or other academic things, but Ottawa has a large number of people interested in medical education and that are actually interested in simulation specifically, so that is a tremendous resource for the students. As well, I would like to argue that this simulation centre is different from other centres [in that it] ... has been constructed after a formal needs assessment and has specific learning objectives. For lack of a better word, you are not coming here to play with the mannequins, the dolls, nor the pieces of equipment. You are coming here for a specific intervention or learning objective.

The last thing that defines us, as said earlier, is the collaboration with AIME, where we work to try to assess and evaluate all of our interventions and disseminate what we have learned through publications, invited lectures, and other academic forums.

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Retention of information is a hot topic among students. Your 2009 Canadian journal of anesthesia paper proposed several methods of improving long-term retention [2]. In both the classroom and in the simulation centre, which methods are most successful for information retention?

Medicine is challenging because it has so much volume really. Sometimes people ask me: "is med school hard?". I don't like to say it is difficult in terms of complexity. I certainly think I struggled more with my undergraduate course in physics. The challenge with medicine is the volume. That's tricky because with volume, we can only juggle so much. I think that [a strategy] for information gathering is to try to turn the learning from a passive conduit to active. Are you likely to remember a lecture that you just sort of sat there and got a message on your iPhone from a friend, or do you try to actively engage in the lecture? By active engagement, I mean asking questions, increasing two-way communication of the information as it is happening, trying to make it relate to cases, and asking about those cases. The more you question the information coming in, the more likely it is to be retained. As well, I talked earlier about the power of teaching and the opportunities to teach in medical school. Anyone can tell you that the minute you teach something, you remember it and you know it better than if you didn't teach it. So, if there is an opportunity to teach a junior colleague, take that opportunity, sit down and say this is what I understand about the cardiac cycle, for example. I assure you that the minute you explain it to someone, not only are they learning but you are also learning it better. Going forward into residency and practice, again we have to recognize the importance of active engagement of lifelong learning. Active engagement happens through simulation, and question-and-answer, and it is active participation in the learning as opposed to passive learning. There are so many distractions out there today that if you just take in information passively it's unlikely to stick.

Do you have any advice for students who want to be involved with medical education?

If you love teaching, don't stop doing it. Don't think that just because you are in medical school you will have to wait awhile. There are always opportunities as discussed. I think that there is a big difference between teaching and education. I think that teaching is something we should all do, but if you are interested in changing and looking at the way we teach, that's what medical education is about. If you are looking to change the systems and the way we teach things, like many of your tutors and faculty do, then medical education might be for you. I think that students at the University of Ottawa have a tremendous opportunity, given what I said about so many faculty resources with interest in medical education, to knock on someone's door. You would be surprised how willing someone is to buy you a coffee and tell you about how they got interested. Knock on those doors and find out what opportunities there are. Just like me, get mentored or

coached into what the next best steps are. There are so many available people at uOttawa to discuss that with.

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Keywords: medical Education, undergraduate, curriculum, simulation

Personalized medicine hits primary practice as genetic testing is being done for the first time in family practice to better select psychiatric medications for patients: an interview with Dr. Nicholas Voudouris

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For the first time in Canada, genetic testing done at the Centre for Addiction and Mental Health (CAMH) in Toronto is being made available to family physicians. This leading-edge research started just over a year ago at the Thornhill Medical Centre in Thornhill, Ontario. The aim of the research is to use genetic testing to better select psychiatric drugs and dosages to improve efficacy and reduce side effects in patients suffering from mental illness. Dr. Nicholas Voudouris, a family physician at the Thornhill Medical Centre who is heavily involved in this project, describes it as leading-edge science that has the possibility of having profound impact on personalized medicine at the primary care level. I spoke with Dr. Voudouris to learn more about him, this project, and the future implications genetic testing could have on personalized medicine and reducing health care spending.

Dr. Voudouris completed his undergraduate education at the University of Toronto, where he studied macroeconomics, government policy, and pre-medical sciences. He went on to complete his medical education at the University of Calgary and his residency at North York General Hospital and Sunnybrook Hospital. After residency, Dr. Voudouris spent three years providing medical care in small communities in Ontario and in the Northwest Territories. He joined the Thornhill Medical Centre in 1990 and has been there ever since. The Thornhill Medical Centre currently consists of eight family physicians and ten thousand patients.

Before the start of this current project, Dr. Voudouris was involved in other research projects, playing mainly a peripheral role in the trials of new medications. His interest and motivation for this current project started with his best friend in medical school and colleague, Dr. James Kennedy, who came to him with the idea.

Dr. Kennedy, the Head of the Neuroscience Research Department at CAMH, has done significant research throughout his career on the identification of susceptibility genes for psychiatric disorders. His previous discoveries include: the role of the D4 Dopamine receptor (DRD4) gene in ADHD, D3 Dopamine Receptor (DRD3) predicting the risk of tardive dyskinesia, and the serotonin-transporter-linked polymorphic region (5HTTLPR) genetic marker predicting the risk for antidepressant induced mania.

The idea for this current project stems from key observations about psychiatric drug prescriptions. One among these is that patients suffering from mental illness usually seek mental health treatment from their family physicians at first. In fact, it is

“Patients feel confident in knowing that their physician is prescribing them a medication based on their genes and not by trial and error”

estimated that primary care providers write 75–80% of prescriptions for psychiatric medications [1]. Another observation is that the current method used by family physicians to select psychiatric medications relies on trial and error, a process that often leads to unwanted side effects and low efficacy in patients. As a result, only 35–45% of patients achieve remission following an initial antidepressant trial [2].

In addition, some of the side effects can be significant. The use of atypical antipsychotics, for example, can lead to dangerous weight gain, potentially causing diabetes and metabolic syndrome [3]. These adverse effects are associated with more frequent physician visits and disability claims, decreased productivity, and increased health care costs. Thus, genetic testing performed at the primary care level to select a patient’s optimal psychiatric medication at the onset of treatment has the potential to have serious implications for patients and physicians.

The project involves two main steps. The first is genetically testing the patient. This involves a cheek swab that is done at the Thornhill Medical Centre and then sent to the CAMH laboratories in Toronto for analysis. The patient’s DNA sample is then genotyped for a family of liver enzymes known as cytochrome P450 (CYP450) enzymes [4]. These enzymes are responsible for the metabolism of most oral drugs and slight differences in the genetic coding of these proteins (single nucleotide polymorphisms, SNPs and gene copy number variation, CNV) impacts the metabolic properties of the specific enzymes. Depending on the genotype, drugs can be metabolized correctly, too quickly or too slowly. Therefore, genetics can greatly influence the efficacy and prevalence of side effects of the drug. There are many isoforms of these highly genetically variable enzymes: those being tested for this study are CYP1A2, CYP2C9, CYP2C19, CYP3A4, and CYP2D6. For this project, the idea is to choose drugs that are metabolized

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favourably according to the patient's most optimal enzymes.

Within two days of the completion of genetic testing, an individualized chart is created for the patient and sent back to the family physician. An example of a chart is shown in Figure 1.

RESULTS

Method: Genomic DNA was extracted from saliva. DNA specimens were analyzed using the Applied Biosystems TaqMan SNP genotyping and gene copy number detection assays.

Interpretation:

Gene	Metabolizes	Genotype	Metabolizer
CYP1A2	AP: olanzapine, clozapine AP: Haldol, Risperdal, Abilify, zuclopenthixol	*1/*1	Extensive
CYP2D6	AD: Effexor, paroxetine, fluoxetine, Luvox, Elavil, Anafranil, Norpramin, Pamelor, Tofranil, mianserin	*1/*1	Extensive
CYP2C19	AD: Celexa, Lexapro, Zoloft	*1/*2	Intermediate
CYP2C9	AD: Fluoxetine, Amitriptyline	*1/*2	Intermediate
CYP3A5	AP: risperidone	*3/*3	Poor

AP = antipsychotic; AD = antidepressant

Figure 1. An example of a patient chart that would be sent to the family physician based on the genetic test results obtained at the Centre for Mental Health and Addiction (CAMH). Green drugs are those that will have the greatest efficacy, yellow drugs are to be used with caution, red drugs are to be avoided due to low efficacy and increased risk of side effects.

The chart shows the metabolic profile based on the genotype of the enzymes as well as the psychiatric drugs that are metabolized by that enzyme. Based on the metabolic profile of the enzymes, drugs are classified as green, yellow, or red. Drugs that are classified as green drugs are the most appropriate for the patient, yellow drugs are to be used with caution, and drugs listed as red are to be avoided. A drug may be listed as red, for example, if the enzyme that is responsible for its degradation has an unfavourable metabolic profile. This means that the patient will have decreased drug elimination, resulting in a greater chance of the patient experiencing adverse side effects.

To date, between 1500 and 1600 patients have been genetically tested and all eight family physicians at the Thornhill Medical Centre are offering the genetic testing to their patients. Patients involved in the study are over the age of 16 and have a mental illness requiring medication. The project has also been expanded to another family practice, Thornhill Family Physicians, which is close to the Thornhill Medical Centre.

So far, patient's attitudes towards genetic testing has been very positive. Dr. Voudouris believes that this is due to the project's association with reputable institutions like CAMH and the University of Toronto as well as the fact that his patients understand and believe the science. He says that "[patients] feel confident in knowing that their physician is prescribing them a medication based on their genes and not by trial and error". In addition, the report sheet is very patient-friendly. Patients understand why they should be taking a green drug versus a red drug. The report sheet also explains why certain drugs did not work for them in the past. Patients are able to understand that it was their metabolic processes that were not well suited to the drug.

To date, twenty-five treatments are being studied for each patient. Examples include Cymbalta, Celexa, Cipralex,

Zoloft, Abilify, Haldol and Seroquel. These drugs target many psychiatric illnesses such as depression, anxiety, bipolar disorder and schizophrenia.

Before the start of this project, for Dr. Voudouris, the main factors in selecting a psychiatric medication for a patient were familiarity and previous success. Using this method, he found that 30% of his patients would return because the drug did not have enough of an effect or cause intolerable side effects. With genetic testing, however, he is now relying on scientific evidence and he believes that this process has already produced improvements. Dr. Voudouris has seen patients who have previously been unsuccessful with several different medications, finally have success with a "green drug" after realizing that the failed drugs fell into their "red drug" category.

If successful, this strategy can be implemented in other family medicine practices. According to Dr. Voudouris, one of the main reasons the project has been easily implemented at the Thornhill Medical Centre due to the use of Electronic Medical Records (EMR). EMR has made it easy to organise and track each patient's response. CAMH has also been given access to the patient records so that they can gather data for their own analysis from its Toronto location. In addition to EMR, Dr. Voudouris believes that educating doctors and nurses about the project is the key to transferring this approach to other practices. Physicians need to be taught how to talk to their patients about the project its implications. He says that it is "doable" but that "it has to be done right".

The project is currently expanding. Every two months, another drug is added to the master list. The drugs that can be analyzed are limited to drugs that are primarily metabolized by one of the enzymes listed previously. Treatments that have more complicated metabolism pathways, such as benzodiazepines, cannot yet be added to this list.

When asked about any advice he has for future physicians in terms of talking to their patients about mental health, Dr. Voudouris said what is most important is to be empathetic and to be completely involved in the care of the patient. He also said that when prescribing drugs, it is important to believe in the difference that drugs can make and to understand the pharmacogenetics of how they work. This is important in choosing and prescribing the best drug for patients.

In order for its results to be considered significant, the project will need to include 7000 participants. If the results are positive, this could launch genetic testing into more widespread use. A key component to its broad application will be the financial analysis. Dr. Voudouris estimates that it would cost OHIP \$305 per person to run the genetic test. Applied to millions of patients, this amounts to a significant cost. In return, however, money would be saved from reduced physician visits, disability claims, and work days lost. Dr. Voudouris believes that genetic testing will ultimately prove to be cost effective in the future when it is implemented on a large scale and more drugs have been added.

This project illustrates family physicians' important contribution on advancing health care. Psychiatric illness treatment starts with family physicians and this project exemplifies their invaluable influence on health care.

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Keywords: Personalized Medicine, Pharmacogenetics, Mental Illness, Psychiatric Medications, Genetic Testing

Reforming case-based learning with non-linear gameplay: the potential of branched narratives and virtual patient models

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INTRODUCTION

Case-Based Learning (CBL) has become a major component of medical curricula and is featured prominently at the University of Ottawa. In this article, CBL is defined as a pedagogical method that uses fictional cases to reinforce important clinical skills [1]. Cases are organized into written sections pertaining to the patient's chief complaint, a history and physical examination, laboratory and diagnostic investigations, as well as management and follow-up plans [1]. These cases are delivered through self-directed online teaching modules or through group-oriented discussions. With either method, learners are expected to identify salient points from a given section, in order to anticipate the next steps in the management plan [1]. For example, if the history section describes a patient suffering from epigastric pain, students are encouraged to identify potential pain sources and use this knowledge to recognize the components that should be included in their approach to the physical examination. The ability to synthesize information to direct decision-making is a necessary competency of medicine supported by CBL [1-2].

A shortcoming of CBL is that the cases too often encourage a linear thought process [2]. Although students may discuss what they expect to find in a given section before clicking on the section's link, there is only one way to move from start to finish in each case [2]. This approach is not comparable to the one used in medical settings: physicians come to branch points where they must make decisions surrounding investigative methods and treatment protocols. These choices and the omission of others produce a set of information that influences decisions to come [2]. This point is made with an acknowledgement that there are many ways to deliver excellent care: two doctors may take different approaches to achieve great outcomes [2]. Nevertheless, it is important to recognize that certain decisions can have far-reaching consequences and that traditional CBL may inadequately address the multidirectional aspect of medical care. Despite this limitation, group discussions and online learning modules tailored around CBL should not be abandoned. Instead, efforts should be directed towards improving CBL to give students a better opportunity to explore the consequences of medical decisions.

In order to promote decision making, linear cases can be restructured using branched narratives. Under this model, authors would first create the "critical pathway," which Conradi et al. (2007) describe as "the sequence of events that define an ideal storyline where the learner makes [the best] decisions from

beginning to end" (Figure 1) [3]. Once this critical pathway is established, authors can then add branch points to create alternative pathways (Figure 1) [4]. Decisions at these points would impact the direction of the narrative and the outcome of the patient (Figure 1) [4]. These points can be added to reflect real events experienced by on-staff clinicians, or they can be organized around points of tension and misunderstanding identified from past test results [4]. The pathways and their endpoints can be planned using the Visual Understanding Environment (VUE) software, a free public tool created by Tufts University [4]. By using tools such as VUE, authors can devise a visual representation of the case before transferring it to web-based applications (Figure 1). The end result is a branched narrative structured on the principle of decision making.

CBL, in the form of self-directed learning modules, can also be enriched with virtual patient (VP) cases. The VP model is best appreciated by examining the "Virtual Interactive Case" system designed by the University of Toronto [5]. Using this system, the learner is confronted with the VP's presenting complaint, and from this section they continue to the history component where they select the questions they feel are relevant to the case [5]. These questions cost time and money, and are added to the user's total money and time scores [5]. When a question is selected, the user is provided with the virtual patient's answer [5]. This framework is similarly applied as the user progresses through the complete patient work-up (e.g. physical examination, imaging) [5]. At any time, the user has the ability to go back to a previous section to acquire more information, making the cases exploratory rather than branching [5]. The user, once they are satisfied with their investigations, is then able to select a diagnosis from a list of differentials, while choosing an accompanying management plan [5]. A cornerstone of VPs is the availability of feedback [4]. At the end of the "Virtual Interactive Case" experience, the user is forwarded to a debriefing summary that lists the essential actions performed, the essential actions missed and the irrelevant actions completed [5]. The summary lists the estimated time and cost of the case, with each component compared to recommended values and broken down into the decisions made [5]. Although the recommended values are somewhat arbitrary, these gameplay elements encourage users to think about time and cost, variables that are underemphasized in linear CBL. The most powerful tool for feedback is often the patient's state of health, which is dependent on the learner's medical decisions

Commentary

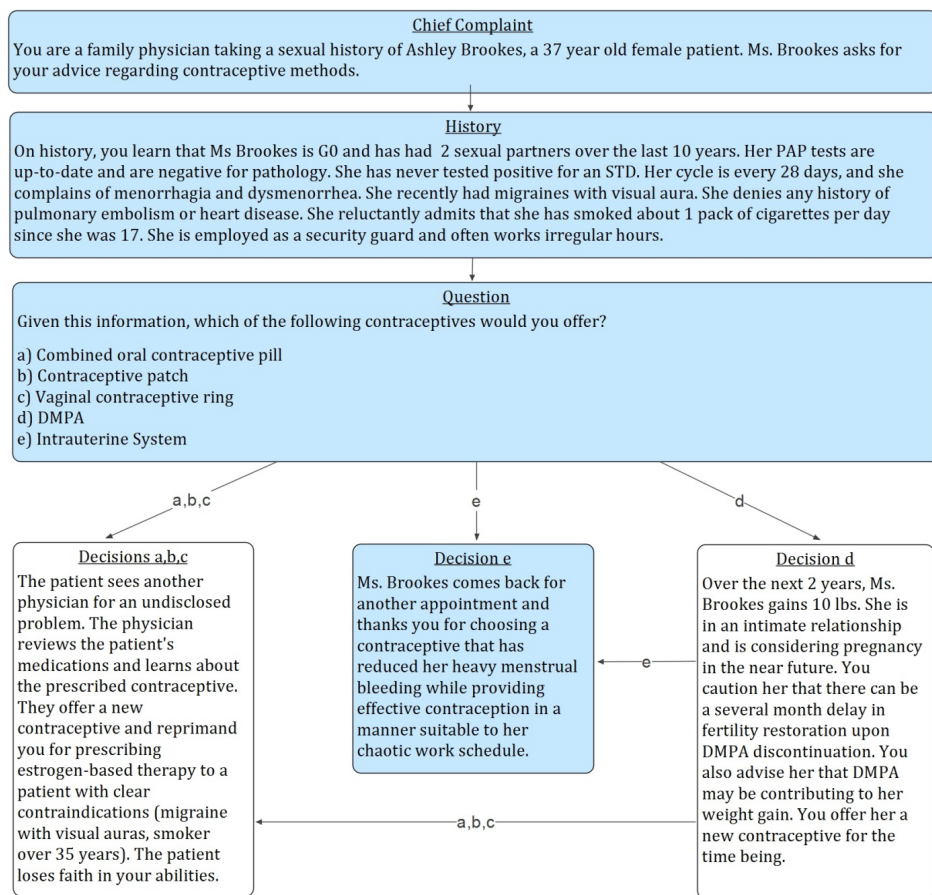


Figure 1. Contraceptive Care: An Example of a Branched Narrative. This case is formatted with a branched storyline. The user, based on the provided history, is required to make a decision regarding the appropriateness of five contraceptive methods. Decision “e” results in the best outcome for the patient in the shortest time, and hence it represents the critical pathway (labelled in blue). Decision “d” is an acceptable alternative, but it results in unexpected information that forces the user to select another contraceptive method. The “d to e” pathway highlights the ability of branched narratives to show the slightly different routes that clinicians may take to reach similar favorable outcomes. Decisions “a,b,c” result in an undesirable outcome for both the patient and the family physician, allowing the user to experience the ramifications of poor decision making in a safe environment. The outcomes of every decision were linked with explicit educational information (e.g. “there can be a several month delay in fertility restoration upon DMPA discontinuation”) to bolster the teaching value of the case. Although it was not included in this example, the case could be created so that each outcome is linked with a numerical score, with the best outcomes producing the best score. Gameplasticity would allow competition between CBL groups in order to encourage debate and participation. This storyline was not based on any real case, and was created using VUE to show the ability of branched narratives to teach the indications and contraindications surrounding medical treatment. The case was created using contraceptive information found in Williams Gynecology, 2nd 223 edition (13).

[4]. VP cases, although slightly different from branched narratives, are structured to offer equally stimulating environments predicated on decision making and feedback.

An evaluation of the merits of non-linear CBL

In order to determine whether branched narratives and VP models are appropriate learning tools worth adopting, one must evaluate these methods based on the following factors: student attitudes, economic feasibility, and clinical skill development

If a program is to be adopted it must be endorsed by the student population. There are several studies that examine student attitudes towards these teaching models. At St. George’s University of London (SGUL), educators created VP cases to teach the ethical competencies of medicine [6]. Of the 601 students who completed the online cases, 85% believed that this educational tool was effective at improving their confidence with medical ethics and professionalism [6]. The same school experimented by replacing group-oriented linear cases with prototypes of a branched nature [2]. Upon review, 70% of students responded that group discussions were more engaging when a branched narrative was offered, since the decision points provided a better

opportunity for debate [2]. This experience has not been common to all studies. Students from the University of Pittsburgh School of Pharmacy (UPSP) preferred traditional styled lectures as opposed to self-learning modules designed with branched narratives [7]. These findings may reflect the notion that users are uncomfortable with active learning environments, since students have been indoctrinated with passive lecture-based teaching methods since primary school [7]. Despite their preference, these students found the branched learning modules to be challenging, organized and helpful in fostering their understanding of course content [7]. In general, students seem to react positively to cases delivered through branched story-telling and VP cases.

Secondly, a program must be delivered in a cost – and time – effective manner to be adopted by the administrative staff. The production of branched narratives at SGUL took about 10 hours per case [2]. At UPSP, directors commented that the largest obstacle to program development was that of design and production: it required 50 hours to create the initial webbased VP template [7]. The authors did note, however, that once the initial template was produced, the extra time needed to design the cases was quite reasonable [7]. Huang et al. (2007) noted that there were extensive time and budgetary restrictions sur-

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rounding VP case development [8]. Of the 108 U.S and Canadian medical schools that responded to their survey, only 26 had incorporated VPs into their curricula. This may reflect the fact that each case took on average 16.6 months to create, with 84% of the cases requiring more than 10000 dollars to develop [8]. This study was conducted in 2005 and the substantial investment of time and money may reflect the lack of open resource technology available at that time

Although these investments may seem unjustifiable, there are several proven strategies that can be used to mitigate costs. The production demands imposed by the transition from linear to branched narratives can be lessened by re-using the linear cases as critical pathways [2]. The rate-limiting step in VP case development is often template production [7]. Through due diligence, these costs can be minimized by using open resource platforms like OpenLabyrinth, as they offer user-friendly VP templates [4]. It is recommended that schools share cases using open resource databases or develop collective cases through strengthened institutional collaboration [4]. This cost reduction strategy is starting to take hold across the country. In fact, the Pathways for Interactive Narrative Education (PINE) project was developed in partnership between the Northern Ontario School of Medicine and other health professional schools found within Ontario [9]. This collaborative venture has generated 60 virtual patient cases that are available for general public access at <http://pine.nosm.ca/pine/> [9]. Endeavors such as the PINE project are very promising and demonstrate that branched narrative and VP case development can be delivered in volume with reasonable cost and time projections.

The decision to implement non-linear CBL ultimately depends on the ability of branched narratives and VP models to effectively train students in the core competencies of medicine. Unfortunately, there is little data objectively comparing the effectiveness of these teaching models with other learning styles, with respect to knowledge retention and patient outcome. One study found that there was no significant difference in examination results between those students who were taught through traditional lectures and those assigned to branched cases [10]. Comparisons such as these may be flawed since examination methods at the undergraduate level often focus on information recall, rather than on the high order skills emphasized in branched narratives and VP cases [10]. Despite the lack of data comparing teaching methods, branched narratives and VP cases are likely an ideal instructional modality for clinical reasoning. This skill is defined by Cook and Triola (2009) as the “application of knowledge to collect and integrate information from various sources to arrive at a diagnosis and management plan” [11]. Experts believe that clinical reasoning is best promoted by teaching methods that make learners commit to their decisions, in a nature that probes their reasoning and offers feedback as to what they did well and what they did poorly [12]. As compared to linear CBL, learners using branched narratives and VP cases must be more committed to their decisions, as they live out the consequences of actions taken. By experiencing the repercussions of their deci-

sions, users receive more effective feedback via the outcome of their patient. Using this paradigm, branched narratives and VP cases would appear to be superior instructional modalities for promoting clinical reasoning, as compared to linear CBL. More research is needed, however, to determine whether this paradigm holds true in practice.

What role should these models play in medical training?

It is important to consider the role that branched narratives and VP cases should play in pre-clerkship medical curricula. Although a theoretical argument can be made that these methods are better training modalities for clinical reasoning than linear CBL, more research is needed to evaluate these methods based on endpoints of knowledge retention and healthcare delivery. At this point, pilot programs focused on branched narratives and VP cases should be initiated since these methods appeal to the desires of students and can be feasibly delivered using options that help reduce the costs to administration [2, 6, 7, 9]. Despite the potential benefits of these teaching models, we must recognize that they are not a replacement for all other teaching styles. Standardized patients are likely a more effective modality for strengthening communication skills, since it is difficult to practice empathy in the artificial environment of virtual cases [10-11]. Lectures are better adapted for providing core knowledge, whereas human patient simulators are a superior tool for promoting procedural skills [11]. If pilot programs are initiated, every effort should be made to ensure that branched narratives and virtual patient cases are integrated with lectures, simulators and standardized patients in pre-clerkship curricula, in order to develop the wide range of competencies required for real-life scenarios

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Keywords: case-based learning, CBL, branched narrative, virtual patient, VP, non-linear gameplay, branched story telling, non-linear CBL, interactive case, critical pathway, linear narrative

The Clinician Investigator Program at the University of Ottawa

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ABSTRACT

Clinician investigators play a critical role in developing new approaches and improving upon existing approaches to medical care, ultimately resulting in improved health of Canadians. Such individuals are uniquely suited to conduct research that addresses clinical observations as well as translates research findings into novel approaches to disease management and prevention. The need for such individuals has long been recognized and in 1995, the Royal College of Physician and Surgeons of Canada (RCPSC) developed the first formal training program in the country to help support the development of clinician investigators. Since its inception, over 200 trainees have completed the RCPSC Clinician Investigator Program (CIP), the details of which are communicated in a review by Cathy Hayward et al. [1] in *Clinical and Investigative Medicine*. Currently, the CIP is active at 15 (almost all) medical schools across the country.

Dr. Andrew Badley, a clinician scientist in the Division of Infectious Disease, led the development of the application for the CIP at the University of Ottawa (U of O), which was ultimately approved in 2002. In 2003 Jonathan Angel became the Director of the CIP at U of O and in 2004, the first trainee was accepted into the program. Since then, approximately 40 trainees have enrolled in the CIP, and as of April 2014, 25 trainees have completed the program. While a few of the recent trainees have resumed clinical training following their research activities, the majority of the graduates (n=14) have gone on to assume academic positions at the University of Ottawa and elsewhere.

RÉSUMÉ

Les cliniciens-chercheurs jouent un rôle clé dans le développement de nouvelles méthodes et dans l'amélioration des méthodes existantes dans les soins médicaux. Le but est, ultimement, d'améliorer la santé des Canadiens et Canadiennes. Ces personnes sont bien placées pour mener des projets de recherche qui portent sur des observations cliniques et qui traduisent les résultats de recherche en approches novatrices pour la prévention et la prise en charge des maladies. Le besoin pour ces professionnels est reconnu depuis longtemps. En 1995, le Collège royal des médecins et chirurgiens du Canada (CRMCC) a créé le premier programme officiel pour appuyer le perfectionnement des cliniciens-chercheurs. Depuis sa création, plus de 200 personnes ont complété le Programme de cliniciens-chercheurs (PCC) du CRMCC. Une revue du programme a été publiée par Cathy Hayward et coll., dans la revue *Clinical and Investigative Medicine*. Actuellement, le PCC est offert dans 15 facultés de médecine au Canada, soit presque la totalité d'entre elles.

Dr Andrew Badley, un clinicien-scientifique de la Division des maladies infectieuses, a mené l'intégration du PCC à l'Université d'Ottawa, programme qui a été approuvé ultimement en 2002. En 2003, Jonathan Angel est devenu le directeur du PCC de l'Université d'Ottawa et, en 2004, le premier stagiaire du programme était admis. Depuis cette date, environ 40 stagiaires se sont inscrits au PCC et, en avril 2014, 25 d'entre eux avaient terminé le programme. Bien que quelques-uns des plus récents stagiaires aient repris leur formation clinique après avoir achevé leur recherche, la majorité des finissants (n=14) ont accepté des fonctions universitaires à l'Université d'Ottawa ou ailleurs.

DESCRIPTION OF THE CIP PROGRAM

As clearly outlined in the RCPSC Specific Standards of Accreditation [2]:

“The major goal of the Clinician Investigator Program (CIP) is to assist in the career development of clinician investigators in Canada. The training involves a minimum of two years of research intensive training that involves enrolment in a graduate degree program (graduate stream), to complete a thesis or equivalent, or in a postdoctoral fellowship program if the resident already has a graduate degree (postdoctoral stream). For the purpose of

this program, health research includes not only the traditional areas of laboratory and clinical biomedical research, but also such fields as economics and management, and social, behavioural, and information sciences as they apply to health and disease.”

In addition to facilitating access to dedicated research activities, the CIP provides additional educational activities for trainees, another benefit of enrolment in this program. An important part of the CIP curriculum is a seminar series covering topics that are not otherwise formally taught. Examples of seminar topics include: submitting a proposal to the Research Ethics Board, understanding intellectual property, negotiating your first

Commentary

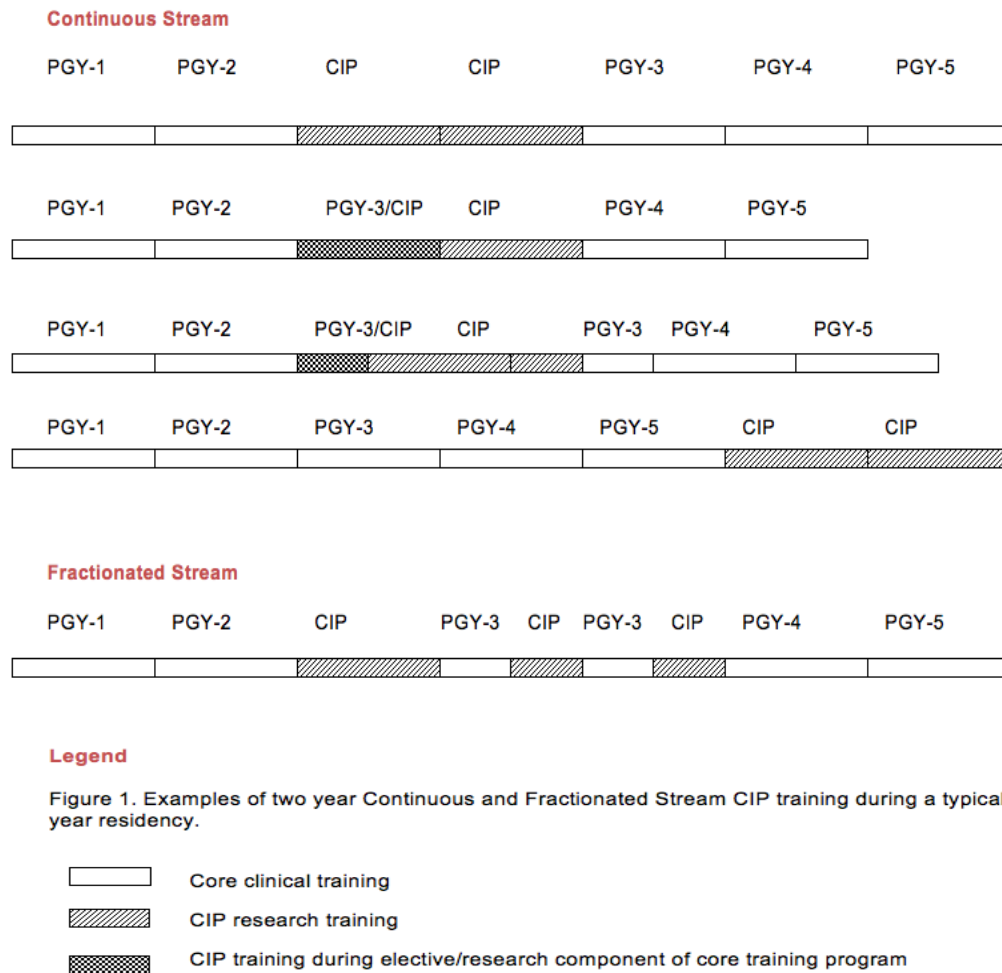


Figure 1. Examples of two year Continuous and Fractionated Stream CIP training during a typical 5 year residency.

Figure 1. Schematic of continuous and fractionated training pathway in the CIP

contract, and establishing a career as a clinician investigator. An additional significant benefit of these seminars is that they provide an environment for clinician researchers-in-training to gather and share ideas and discuss issues that are specific to them.

The CIP has been designed to accommodate trainees with varying degrees of previous research experience. Those that have little research experience must be registered in the Faculty of Graduate and Post-Doctoral Studies and co-enrolled in a thesis-based graduate program. At the University of Ottawa, most trainees will do an MSc or PhD in the Department of Epidemiology, Biochemistry, Microbiology and Immunology or Cellular and Molecular Medicine. However, training opportunities are not limited to these Departments, or even the Faculty of Medicine for that matter. Past CIP trainees, for example, have also pursued graduate degrees in the Faculty of Education and in the Telfer School of Management. Enrolment in these graduate programs provides the structure and supervision required to achieve a productive, valuable research experience. For trainees that already have a relevant graduate degree, the CIP offers

a post-graduate stream. These select trainees must establish a Research Advisory Committee (analogous to a Thesis Advisory Committee that is required within graduate training) and establish clear research objectives and milestones that must be met for successful completion of their training.

At the University of Ottawa, there are two potential pathways for CIP training: The Continuous Training pathway and the Fractionated Training pathway (Figure 1). The vast majority of trainees undertake the Continuous Training pathway, which involves a minimum of 24 months of continuous, intensive research training. The Fractionated Training pathway, on the other hand, is intended to allow for a distribution of a minimum 24 months of research in periods of three months or longer, with at least one year of continuous research training. The Fractionated Training option was developed for individuals who wish to pursue research that requires several years to plan a research project, obtain research ethics board approval, and complete the project, which may involve patient recruitment. This pathway is particularly suitable for clinical epidemiology research, where intensive research activities may be separated by periods

of waiting or inactivity.

The CIP is also designed to accommodate trainees at any stage during or following their clinical training. The ideal time for research training is highly dependant on the individual trainee and their career goals. Coordinating 24 months of dedicated research time with clinical training requires advanced planning and coordination with clinical Program Directors and Division Heads. Because of this, trainees are typically first enrolled in, or are concurrently completing, a Royal College residency at the University of Ottawa before they are able to pursue CIP training. This coordination must also ensure that while CIP trainees are committed to spend the majority of their time engaging in research activities (a minimum 80% of time), they are also maintaining/developing clinical expertise and dealing with aspects of time management, which are important skills for the development of clinician researchers.

SUMMARY

Since the introduction of the CIP in Ottawa, recognition of its importance has grown, as has the demand for enrolment in the program. In recognition of this, support from the office of Postgraduate Medical Education has steadily increased and, importantly, the Ontario Ministry of Health and Long-Term Care now provides dedicated funding for a number of trainees in this program. Both of these factors contribute to the ongoing and future success of this important program.

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Keywords: Royal College of Physicians and Surgeons of Canada, Research, Residency, Clinician Scientist, Competency-Based, Inter-professional

Neglecting the null: the pitfalls of underreporting negative results in preclinical research

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ABSTRACT

Heightened competition for funding and increased pressure to publish in high-impact journals has led to a modern-day publication culture that favours positive results. The underreporting of negative, or null, results is a form of publication bias that occurs when researchers and/or reviewers fail to communicate findings due to unfavourable directionality or perceived unimportance. For nearly three decades, recognition of this bias in clinical research has led to revised policies and guidelines in an effort to improve reporting transparency and accuracy. Only recently has the existence of this reporting bias been fully appreciated as a formidable problem in preclinical research. Considering that preclinical research provides the foundation on which many clinical trials are conceived, finding solutions to increase the reporting accuracy of preclinical studies is of paramount importance. In this commentary, we will explore how the underreporting of negative results in preclinical research distorts scientific knowledge and subsequently misguides clinical research. We will conclude with several suggestions for reducing this bias with the intention of transitioning towards a truly transparent and objective publishing landscape.

INTRODUCTION

A recent study of over 4,600 papers encompassing a broad spectrum of research disciplines found that the overall frequency of positive reports increased by over 20% between 1990 and 2007 [1]. Potentially even more disconcerting, the same study reported that when compared to other disciplines, the absence of publications with negative results was significantly more frequent in areas such as clinical medicine, pharmacology, toxicology, and molecular biology [1].

The underreporting of negative, or null, results in a form of publication bias that occurs when researchers and/or journal editors fail to communicate research findings from well-designed, sufficiently powered studies due to unfavourable directionality or perceived unimportance [2]. Unlike the deliberate falsification of data, underreporting of negative results is not widely considered to be a form of scientific misconduct. However, it has been suggested that the selective exclusion of negative results may represent an even greater threat to scientific integrity as it is difficult to detect and the cumulative disservice to end-users may exceed that of falsified data [3].

In clinical research, the underreporting of unfavourable data or adverse events has been the subject of intense scrutiny

for nearly three decades [2,4-7]. In response to this shortcoming, there has been a systemic effort to improve clinical trial reporting transparency and foster unabridged dissemination of results [8-10]. One of the most impactful and successful policy changes was implemented in 2005 when the International Committee of Medical Journal Editors (ICMJE) stated that in order for a clinical trial to qualify for publication in an ICMJE member journal, the trial must be registered in a publically accessible database prior to the onset of participant recruitment [8,11,12]. Currently, no similar initiatives exist for addressing positive reporting bias in preclinical research despite mounting evidence and calls to remedy the problem [13-16].

UNDERREPORTING OF NEGATIVE RESULTS IN PRECLINICAL RESEARCH

Knowledge gleaned from preclinical research provides the foundation on which clinical research priorities are set and evidence-based decisions are made. When negative results are not published, those who rely on biomedical literature for objective information are provided with only a fraction of the relevant evidence. This distortion of scientific knowledge skews meta-analyses and decreases the validity of comprehensive literature reviews [13,14,17]. Ultimately, this bias can lead to the overestimation of intervention efficacy and has thus been implicated as a factor responsible for the historically low rate of successful clinical translation from preclinical findings [15,16,18-21].

It is estimated that one-third of reported efficacy detected in systematic reviews of animal trials may be due to positive outcome reporting bias [14]. Evidence of this type of bias has been identified in preclinical studies that have led to clinical trials involving thousands of patients [22]. A primary example is the misconceived succession of the nitro-based drug NXY-059 to phase III clinical trials for the treatment of acute stroke [23]. Following the publication of several promising preclinical findings, which identified the ability of NXY-059 to reduce infarct volume and motor impairment in animal stroke models, over 5000 acute stroke patients were recruited to participate in multiple large-scale clinical trials [23]. Upon completion of the trials, the benefits of NXY-059 identified in preclinical studies failed to translate to a successful clinical intervention and the development of the drug was abandoned [24]. In an attempt to determine why NXY-059 failed, a retrospective meta-analysis of individual animal data from published preclinical studies was conducted [23]. Us-

ing a funnel plot and Egger's test to assess publication bias, the authors of this meta-analysis found a significant bias favouring reports describing the beneficial effects of NXY-059 [23,25].

Such discrepancies between preclinical and clinical findings, especially those due to misinformation caused by incomplete reporting, may expose patients to undue risk, and in the long term, could discourage patients from enrolling in clinical trials. Furthermore, failing to fully utilize all knowledge gained from studies using animal subjects raises similar ethical concerns to those initially raised by proponents of increasing reporting transparency for human clinical trials [15].

While animal studies provide the bulk of the evidence required for new interventions to advance to clinical testing, a large proportion of preclinical discoveries are also made using *in vitro* models or *ex vivo* patient samples. In April 2013 at the Experimental Biology Conference in Boston, Dr. Keith Flaherty, Director of Developmental Therapeutics at the Massachusetts Cancer Center, provided a poignant example of how the failure of several groups to report an irreproducible *in vitro* finding may currently be leading to an unwarranted clinical trial for the treatment of melanoma [26]. In 2010, Flaherty's colleagues published a novel report in *Cancer Cell* describing a marked increase in insulin-like growth factor 1 receptor expression both in a BRAF inhibitor-treated melanoma cell line and in a small portion of *ex vivo* patient tumour samples [27]. Following the publication of this high-impact report, at least five laboratories were unable to independently reproduce the results and subsequently failed to publish their inability to do so [26]. In his presentation, Flaherty speculates that the reason for these discrepancies may be as simple as the addition of insulin to the growth media used to culture the melanoma cell line in the original study. Regardless, the *Cancer Cell* report remains uncontested and interestingly, a phase Ib/II clinical trial testing the efficacy of an insulin growth factor receptor antagonist in patients with mutant BRAFV600 melanoma is currently recruiting participants [28].

Initiatives such as ARRIVE (Animal Research: Reporting In Vivo Experiments) guidelines, CAMARADES (Collaborative Approach to Meta-Analysis and Review of Animal Data from Experimental Studies), and GSPC (Gold Standard Publication Checklist) have been developed with the common goal of improving the completeness, accuracy, and analysis of preclinical studies [29-31]. However, adoption of these guidelines has been brought into question and may be falling short [32]. A review of over 160 CAMARADES meta-analyses (combining 4445 data sets from six different fields of neurological disease research) indicated that a staggering 40% of the studies analyzed reported statistically significant results [33]. In addition, it was recently estimated that 50% of laboratory animal research is never published and that this number may be far greater in for-profit organizations [18]. Thus, while efforts such as ARRIVE, CAMARADES, and GSPC are steps in the right direction to remedy current issues, there is still plenty of room for improvement.

RECOMMENDATIONS

The transition to more transparent and efficient reporting in preclinical research will require a combined effort from all parties involved in the research reporting process. In the following sections, we will outline recommendations for publishers and peer-reviewers, academic and non-academic research institutions, and individual researchers for achieving more transparent, efficient, and accurate reporting of preclinical research with a focus on strategies for enhancing the publication of negative results.

For publishers and peer-reviewers: Publishers and peer-reviewers of biomedical journals will play a key role in equalizing the publication landscape. While an increased awareness of the aforementioned pitfalls may encourage the submission of manuscripts with negative or null results, determining which studies make it to press will ultimately still be at the discretion of publishers and peer-reviewers. Educating all personnel involved in the publication process on the importance of communicating negative results will be instrumental for the publication of such findings [34,35]. Peer-reviewers should be instructed to evaluate submissions based on scientific merit rather than direction or significance of the reported outcomes [18]. Furthermore, the utilization of initiatives such as the ARRIVE guidelines, CAMARADES, and the GSPC will promote increased transparency of all preclinical studies submitted for peer-review.

Some journals have already been established solely for the purpose of publishing negative data. Some examples include: The Journal of Negative Results, The Journal of Negative Results in Biomedicine, and the All Results Journal. These peer-reviewed journals compliment the commitment of open-access journals, such as The British Medical Journal (BMJ) and PLoS One, to communicate all manner of high-quality scientific research [36,37]. However, it is worth noting that two major shortcomings of these publishing outlets include a perceived lack of prestige and publishing surcharges, which may further discourage researchers from publishing their negative data [38].

For institutions: Both academic and non-academic institutions can offer and promote conferences, seminars, and courses that teach researchers how to fully and accurately report their findings. The University of Ottawa has taken a leadership role in this initiative by offering the first course on Journalology. Dr. David Moher, the course instructor and a steering member of the international EQUATOR (Enhancing the Quality and Transparency Of Health Research) Network defines Journalology as "the study of the publication process" [35]. The objectives of the course will be to inform students entering research-related fields of publication bias, reporting guidelines, and different publication trends (e.g. green vs. gold open-access and predatory vs. old-fashioned journals). Among selected topics, students will learn about writing journal articles that are 'fit for purpose' and develop core-

competencies for peer-review [35]. The two-week intensive course will be offered in 2014-2015 through the Department of Epidemiology and Community Medicine.

For students and researchers: Students and researchers are at the heart of primary data generation. Researchers should feel a moral obligation, and an obligation to one another, to organize their results and make them available, even if they are not published [35]. This prevents others from unknowingly duplicating experiments, which can waste time and resources [39]. Awareness is a critical first step. Students can request that their University invite guest speakers or hold events to increase awareness of publication biases. We suggest that rather than only pursuing significant results, individuals performing frontline research place an increased emphasis on generating scientifically robust data and demonstrating sustained productivity.

CONCLUSION

Throughout this commentary we have used the terms 'negative' and 'null' to describe results that are considered insignificant or unimportant. However, the use of this terminology itself perpetuates the biased manner in which researchers perceive their findings [35]. Rather than segregating 'positive' from 'negative' data in publication, what needs to be changed is the scientific community's perception of research results as a whole. As biomedical researchers, it is important to remember that research is conducted for the benefit of patients, and that each laboratory is a small component of a much larger effort to enhance the healthcare system. Both investigators and end-users have a right to know what has been tried and tested, and that means sharing both 'successes' and 'failures'.

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Between a rock and a hard place: the incommensurate ethics of emotionally-related living organ donation

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ABSTRACT

At the end of 2007, over 71,000 candidates in the United States were awaiting a kidney transplant. That same year, 16,622 kidney transplants took place [1]. The growing shortage of organs in the face of escalating need has placed pressure on transplant centers to accept organs from voluntary living donors. Emotionally-related living organ donation (ERLOD) is becoming increasingly common. In ERLOD, donors and recipients are genetically unrelated but linked by close emotional ties. In the case of kidney transplants, ERLOD achieved over 90% success rates after only one year [2]. However, the significant need and efficacy of this practice are not sufficient for its justification; this program must also be ethically acceptable [3]. Living organ donation in general raises concerns regarding the acceptable standards of medical practice and ERLOD in particular poses unique challenges. This article examines, within a clinical care framework, the ethical concerns surrounding ERLOD and why these concerns may be difficult to reconcile from this perspective alone. Discussion may benefit from using the ethical framework of clinical research in adjunction with the clinical care framework to offer a more flexible scope of analysis.

The following case will form the focal point of this article:

Mr. A is a middle aged man with chronic renal failure and has been on continuous ambulatory peritoneal dialysis (CAPD) for the last three years[1]. Since then, Mr. A has experienced bouts of depression and chronic fatigue. He often lacks the energy required to perform simple tasks. This frustrates him and adds tension to his family dynamic. His romantic relationship with his wife has also suffered. Recently, a consulting nephrologist mentioned the possibility of unrelated kidney donation from his wife. The A's have been happily married for 25 years and care very deeply for each other. While Mrs. A was enthusiastic, Mr. A was initially reluctant for fear of the risks involved. Mrs. A did not try to pressure him. After a month's deliberation, Mr. A. accepted the offer because he believed that they would both benefit enormously in the long term. The couple has two teenage daughters, but has not yet discussed the potential donation with them [4].

The major ethical dilemma in ERLOD is determining whether it is ethical for a healthy person to be permanently in-

jured for the benefit of another [3]. Central to this debate are considerations of autonomy, risk/benefit proportionality, and the nature of the relationship between the donor and the transplant physician. Ethical guidelines for medical practices differ depending on the context, as demonstrated by the distinct duties of physicians and investigators in clinical care versus clinical research. These differences are mainly due to the different goals of these practices. The primary aim of clinical care is to provide optimal treatment for an individual patient. Physicians assume a therapeutic obligation as well as a duty to act in the best medical interest of their patients [5]. In contrast, the ultimate goal of clinical research is to improve the health of future patients through the generation of generalizable knowledge [6]. Researchers are ethically exempt from the therapeutic obligation and that of beneficence [7]. Instead, they must demonstrate respect for their subjects as persons by minimizing harm, respecting autonomy, and protecting them from exploitation [8].

As a clinical procedure, ERLOD opposes the traditional goals of clinical care. It neither serves the donor's best medical interest nor provides individualized care, as the health needs of another patient are the driving force behind the transplant. In this way, the goals of ERLOD may be more aligned with those of clinical research as the ultimate benefactor is not the patient being treated. However, ERLOD remains a clinical endeavor because the outcome is therapeutically rather than experimentally oriented [9]. This same inconsistency exists in the donor-physician relationship. It is distinct from the traditional fiduciary relationship of clinical medicine because the mutual aim is to benefit the recipient while minimizing harm to the donor [10]. However, their interaction remains a "clinical encounter" [11], so the traditional obligations of the physician cannot be entirely overlooked. Given these complexities, examining Mrs. A's case from a single ethical perspective does not allow for an appropriate scope of analysis. Rather, it is more fitting to use the fundamental principles of medical ethics as a basis to incorporate perspectives from both clinical care and clinical research. Evaluating the ethics of ERLOD requires consideration of patient autonomy. This analysis is limited to the framework of clinical care because respect for autonomy must be balanced against the physician's therapeutic obligation and duty to act in the donor's best interest [3]. Conversely,

1 This is a portable system in which waste is filtered into a sac that is permanently attached to the abdomen, which must be drained 4 – 7 times a day (www.renalpatients.co.uk/capd)

Commentary

within the framework of clinical research, the key question is not whether to prioritize donor autonomy over beneficence but whether their autonomy is being expressed [12]. Allowing the subject to determine the limit of acceptable risk is part of respect for autonomy, provided that the standards of informed consent are maintained [13].

An essential component of informed consent is the concept of competence. Questions have been raised regarding the competence of emotionally-related living donors because of their relationship to the recipient. As Mrs. A clearly values her husband, she may not fully consider the risks to her own health before offering to donate. Consequently, her decision may be based on limited understanding. However, competent decision-making is based on an evaluation of risks and consequences according to one's own priorities and values. In addition to a patient's health, this includes consideration of how their lifestyle, family, and friends will be impacted by a given procedure [14]. From Mrs. A's perspective, the welfare of her husband may take priority over risks to her own medical health, and the relative value of the two is entirely subjective.

A second component of informed consent is voluntariness. In order to be voluntary, the donor's consent must be free from undue influence and constraint [15]. In the current case, Mrs. A could feel obligated to donate due to external pressure from other family members or by an internal sense of duty towards her husband and their relationship. However, this does not necessarily constrain her voluntariness. The concept of autonomy within the context of family is not independent, as the interests of family members are often inextricably connected [16]. Because Mrs. A values her husband so highly, fulfilling a sense of duty by donating to him may be an expression of her autonomy, rather than a constraint [3].

While the above considerations are necessary for ethical ERLOD, they are not sufficient. Since the interaction between donor and transplant physician is deemed a "clinical encounter", the donor is considered a patient [17]. Consequently, the physician must analyze the risks and potential benefits of transplantation to the donor individually. The medical risks involved in unilateral nephrectomy are relatively low, with good recovery rates and minimal post-operative reduction in renal function [1]. However, the operation causes definite harm by removing a healthy organ [16], and exposes the donor to the general risks of surgery. Should the donation fail, Mrs. A could also experience psychological harm from depression, anxiety, or regret [2]. According to ethics of clinical care, these harms are justified only if outweighed by potential benefits to the donor, rather than the recipient [14]. While there are no medical benefits to Mrs. A, donation may improve her overall welfare. Because of her relationship to Mr. A, she would likely receive significant psychological benefit from his restored health. Mrs. A's quality of life would also likely improve. Chronic organ failure disrupts the family dynamic, and can lead to caregiver burnout [18]. This demonstrates how assessments of risk/benefit proportionality depend on personal value judgments [19]. The physician's medical expertise does not render

him better able to assess the donor's "best interest overall" [20]. While he can empathize and acknowledge the risks and potential benefits, only Mrs. A can judge their relative proportionality.

A further limitation within the 'care' framework is the transplant physician's duty to provide individualized care to the donor. In ERLOD, it is difficult to view the donor in isolation from the recipient because the medical outcome of one patient affects the welfare of the other, and vice versa. Rather, the donor ought to make decisions that take into consideration the impact on themselves as well as their family; not only in terms of health benefits but overall quality of life [14]. The interdependent nature of risks and benefits in this case further limits the ability of the physician to determine 'best interest overall' and subsequently, the applicability of the traditional 'care' framework.

The above issues may be circumvented if considered within the ethical paradigm of clinical research, where the physician's actions may be ethically undertaken for a purpose other than serving the medical interest of the patient. In this context, the patient-physician relationship is protective rather than fiduciary [21]. This shifts the duty of the physician from tailoring treatment to the donor's best medical interest to demonstrating respect for their welfare [22]. In Canada, the Tri-Council Policy serves as the benchmark for ethical conduct in clinical research. The foundational premise of this policy is the duty to demonstrate respect for persons, concern for welfare, and justice. Respect for persons incorporates obligations to respect autonomy. Concern for welfare requires a favorable risk/benefit ratio, but "in keeping with the principle of respect for persons, participants make the final judgment about the acceptability of this balance to them" [23]. This approach intrinsically respects both the importance of quality of life values in risks/benefit analysis and the doctor's limited capacity to make these judgments. Instead, the physician takes on a role that he is competent to fulfill: facilitating patient decisionmaking by communicating the necessary medical information. Finally, the clinical research framework allows for the integration of donor and recipient risk/benefit analysis. Because of the intimate relationship between Mr. and Mrs. A, it is appropriate to consider recipient benefit in relation to donor risk in a similar manner.

In the real world, most transplant centers adopt a highly nuanced approach to evaluating the acceptability of ERLOD and consider potential donors on a case-specific basis. In addition to the factors listed above, this involves assessment of donor motivation, relation to recipient, and psychosocial and physical health. Donor assessment does not fall to the transplant physician alone, but to healthcare teams that include social workers, consultants, and psychiatrists. Furthermore, transplant centers across North America determine their own parameters for the acceptability of ERLOD. This approach maximizes the autonomy of both the donor and the transplant team and avoids many of the conflicts encountered above. However, establishing guidelines with respect to ERLOD is necessary to ensure ethical consistency and fair treatment of all patients [24]. Many of the issues raised by ERLOD result from the restrictions placed on the

patient physician relationship within the framework of clinical care; namely, the duty to act in the patient's best interest (and therefore determine what the best interest is), and to provide individualized care. Due to the distinctive goals and outcomes of ERLOD, this may not be the most appropriate framework to use. This is not to say that the ethical framework of clinical care should be abandoned, but rather that the exceptional nature of ERLOD may necessitate an adjusted approach. By removing the requirements for individually beneficial care, the ethical paradigm of clinical research provides a more flexible framework for consideration of the non-medical factors involved in ERLOD.

AUTHOR'S NOTE

A full discussion of ERLOD within the framework of clinical research would include considerations of justice and fairness. However, this is beyond the scope (and page limit) of this case analysis. Should you be interested in reading this section, please contact the author.

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The challenges facing Ontario's health care system moving forward: a health policy perspective

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INTRODUCTION

The purpose of this commentary is to inform Ontario's Deputy Minister of Health and Long-Term Care on the province's current top health priorities and the factors that have pushed these priorities to the top of the agenda. It will include the three most important health policy priorities that should top the health agenda in Ontario over the next 5 years, outlining their incentives and challenges and stating Ontario's number one top health policy priority

BACKGROUND

Priorities that currently top Ontario's health policy agenda include:

1. Managing the rising costs of public health care

Budgetary deficits at the federal and provincial levels have raised questions concerning the sustainability of Ontario's publicly funded system of health insurance [1]. Recommendations have been put forth in order to manage the rising costs of public health care, as the current deal of federal-provincial transfer payments is set to end in 2014. A review of the quantitative evidence demonstrates that if interest costs were omitted, 46% of all Ontario spending would be devoted to health care [2]. Ontario is at the upper end of the provincial rankings in terms of percentage increase in overall health spending, only behind Alberta and British Columbia. The major drivers of health spending growth include: demographics, inflation, medical technology, treatment decisions by physicians and hospitals, and drug coverage. Containment of these driving factors as the population ages is a major concern [2].

2. Improving access to quality family healthcare and certain medical specialists

Access to primary care continues to be a concern for many people living in Ontario. The percentage of general practitioners accepting new patients is only 9.6%, down from 39% only seven years ago [3]. On a national scale, Canada has a doctor-patient ratio of just 2.3 per 1,000 (1.76 in Ontario) and is ranked 24th on a list of 28 industrialized countries. Notwithstanding our family doctor shortage, there is also a growing risk of unemployment and underemployment facing new medical school graduates in several specialties (i.e. nephrology, neurosurgery, plastic

surgery, public health and preventive medicine), in addition to cardiac surgery where the employment concerns first surfaced. The Royal College of Physicians and Surgeons of Canada published surprising data showing the impact the recent economy has had on hospitals and their attempt to decrease additional costs by avoiding hiring more medical specialists [4]. Finding cost-effective and efficient ways to remedy this problem has proven difficult, pushing it to the top of Ontario's health policy agenda.

3. Reducing wait times

In recent years, there have been continued warnings from physicians regarding the tragic human cost of waiting for care. Long wait times for joint replacement, cataract surgery, heart bypass grafts, and MRI scans costs, as calculated for all provinces, from \$2,900 to over \$26,000 per patient [5]. The cumulative cost of waiting for treatment in just four areas was \$14.8 billion and the reduced economic activity lowered government revenues by \$4.4 billion in one year. Reduction in economic activity includes the impact of the patient's inability to work while waiting, direct losses from decreased production of goods and services, reduced income, and lowered discretionary spending. In addition to the benefit reduced waiting time has on patient health, there also exists a financial incentive for the government to improve wait times and access to healthcare, pushing it to the top of the health care agenda.

ANALYSIS

The following section includes the incentives and challenges of addressing each of the abovementioned three priorities in Ontario over the next five years.

1. Managing the rising costs of public health care.

Incentives: A sustainable strategy to reduce health care costs can improve the health of Ontario's citizens. The funds saved could instead be used to improve the health of the province's most vulnerable citizens (i.e. children with mental health problems) and would go the furthest in lowering the cost of health care over time [2]. Some sustainable strategies include a provincial system for pharmacare and bulk purchasing of medical equipment. Purchasing in bulk instead of purchases done by individual hospitals establishes considerably lower price structures and can save

the government billions of dollars [6]. An innovative strategy for health promotion to reduce the rising rate of obesity and diabetes in our population would also go a long way toward ensuring our system is sustainable for future generations. Any new funds given to the province for health care should be tied to accountability measures that include improving outcomes.

Challenges: In a report from the C.D. Howe Institute (a respected economic think tank), former Bank of Canada governor David Dodge suggested that in order to manage the rising costs of public health care, there must be severe cuts to health care services, increased taxes, or increased personal payments [2]. Many believe that Ontario's position of deficit is an opportunity for the federal government to suspend the Canada Health Act, let individuals buy private insurance, allow health providers to charge fees in addition to what Medicare covers, and allow for personal payments for publicly funded medical goods and services [2]. However, a TD Economics report on health care published in 2010 cautions that private financing does not lead to large public savings [6]. For example, multiple-payer systems are more expensive to administer. The OECD conservatively estimates that the US spends 8% of its budget for health care on administration, compared with 2% spent in Canada. In addition to the public and political resistance to private financing, there are risks to the overall quality if health care providers shift resources away from the public toward private financing. A more compelling reason is seen in a report published by the Ontario Hospital Association analyzing the use of health care in Ontario [7]. They found that 5% of the Ontario population accounts for 84% of all spending on health care. This portion of the population often comprises of patients with chronic diseases and people from vulnerable populations such as the frail elderly and the economically disadvantaged. None of these Canadians would likely be able to afford private insurance; therefore, the bulk of health care costs would continue to rest with the public system.

2. Improving Access to Primary and Specialist Care

Incentives: In 2003 the First Ministers established a 10-year plan to strengthen health care across the nation, focusing on improving both the access to quality health care, and reducing waiting times [3]. Improving access to care primarily involves increasing the number of health care professionals such as family physicians and certain specialists and encouraging health care workers to work more closely together and efficiently [5]. This is important because of the province's changing physician demographics. The average age of an Ontario practicing physician is 50.9, nearing the age of retirement [3]. The impact of a substantial amount of physicians retiring in the near future could be concerning.

Another benefit of making this policy a top priority is that it is highly supported by the public. A recent report by the Health Council of Canada reports that Canada ranks last in an international comparison that analyzed how quickly patients

can access their family doctors, and that patients are frustrated that care is not better integrated or more patient-centered [8]. Therefore, improving access to care is a goal perceived as important by the public. It follows then that a provincial government will strive to resolve these issues to gain public support and may therefore be compelled to follow through with this policy implementation in order to remain in office the subsequent term. The Canada Health Act of 1984 states that if each province's health-care system is accessible, portable, comprehensive, universal, and publicly administered, the federal government will put money towards provincial healthcare expenditure [3]. Making improved access to care a top priority coincides with improving accessibility, and may persuade the federal government to allot more money to the province of Ontario.

Challenges: One cost associated with making improved access to care a top priority is the cost of paying more health professionals as well as the cost to change the healthcare infrastructure. This places an additional financial burden to the province's already high expenditure on health care.

One proposed solution to increase jobs for the affected medical specialties such as cardiac surgery is to urge older practitioners to cut back on the number of procedures they are performing in order to provide opportunities for younger medical specialists. This would spread the same number of procedures over more surgeons and allow for better access to more rural areas for those surgeons not located in large tertiary centers [6]. However, practitioners may perceive this as a loss of status and social power and be resistant to this change [9]. When a similar threat to physician autonomy occurred in 1984 upon introduction of the Canada Health Act, which forbade user fees, balanced billing by doctors, and private clinics and hospitals, physicians began moving to the United States by the hundreds every year [9]. It is crucial moving forward that we find innovative ways to improve access to care while avoiding these past policy mistakes

3. Reducing Waiting Times

Incentives: Addressing wait times offers similar benefits to improving access to care. Both policies coincide with Canada's First Ministers' 10-year plan, both have public support, and both are in accordance with the Canada Health Act [3]. Focusing on reducing waiting times is an important way to deal with Ontario's aging population. As the baby-boomer generation ages, they will require more medical attention since prevalence of disease increases with age. Reducing waiting times would meet increasing demand for healthcare services more effectively and therefore, the government's healthcare expenses would be more efficiently utilized.

Challenges: In addition to the financial cost discussed in the previous section, health care professionals may be resistant to changes required to accommodate an effective reduction in

waiting times. Former Canadian Medical Association President Dr. Jeff Turnbull suggested that in order to significantly decrease waiting times, the healthcare system must be reformed [5]. A clinic in Saskatchewan was able to reduce its average wait times from 36 days to 2 days by completely remodeling its infrastructure by using a pooled referral system and restricting physician autonomy [10]. This change may be more difficult to implement in Ontario because physicians might be hesitant to accept it and lack of cooperation could lead to longer wait times.

RANKING and RECOMMENDATIONS

Based on the aforementioned analysis and the recommendations of top health policy experts, managing the rising health care costs should be Ontario's top health policy priority over the next five years [1,5,11]. Health care costs are increasing at a faster rate than the revenue of the government and the scramble by the provincial government to fund health care means that other critical priorities are being underfunded (i.e. education, social programs and the environment) [2]. Funding cuts unaccompanied by thoughtful infrastructure redesign was seen in Ontario in the 1990s and only led to a decrease in quality of healthcare and short-term, not long-term savings. For long-term cost savings, investments must be made in prevention, cost-effective treatments, and quality/accessibility. The final conclusion is that our provincial health system, like other health systems around the world, needs to continue to invest and modernize its delivery systems to improve the health of our citizens, which in turn will make our future health care sustainable.

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Dying young: Excess morbidity and mortality in individuals with severe mental illness and what we should be doing about it

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“We talk about people with mental illness, and people with diabetes, and smokers and the obese, and so on and so on. We’re talking about the same people – just with different labels.” – Health care professional [1, p. 6]

Severe mental illness (SMI) most commonly refers to mental disorders with a psychotic component and significantly reduced functioning despite the presence of inherent differences in risk factors, etiologies, and treatments [1]. The most common disorders that fall under this term include schizophrenia and bipolar disorder [1]. Over a decade of research into the morbidity and mortality of individuals with SMI has consistently revealed mortality rates two to three times higher and a life expectancy of 25-30 years shorter compared to the general population [1-4]. Contrary to popular belief, the main causes of early death are not drug overdose or suicide, but rather, preventable illnesses such as cardiovascular disease, diabetes, and HIV/AIDS [1,3,5-7]. Incidence of other preventable conditions, such as obesity and respiratory disease, is also much higher among patients with SMI, and when present, is associated with a more severe course of mental illness and a reduced quality of life [3,8]. Such findings bring significant questions: what is the cause of this disparity in mortality/morbidity? What can health care professionals do to help reduce this gap?

A recent report by the Early Onset Illness and Mortality Working Group [1] outlines several factors that may contribute to poor physical health of people with SMI. Some factors, such as those related to the mental illness itself (e.g., cognitive impairment, a lack of communication skills, medication side-effects) and socioeconomic status (e.g., poverty, poor education) may be less amenable to modification, but should nevertheless be a target for action. Other contributing factors include behaviour and lifestyle (e.g., physical inactivity, obesity, tobacco smoking), and poor preventative medical care (e.g., disparity in quality of medical care), both of which are more easily modifiable with the assistance of medical care practitioners. Here we will summarize the factors responsible for poor physical health in SMI, specifically focusing on the mental illness itself, socioeconomic status, behaviour and lifestyle, health care system barriers, and insufficient preventative medical care. We will then propose future directions and ways in which medical students and current medical professionals can help reduce this gap.

Factors Related to the mental illness itself

“Sometimes depression gets in the way. I have to work my way through the maze of it. If I’m not feeling okay emotionally, it’s hard to care about the physical.” – Patient [1, p 13].

There is significant evidence that the presence of mental illness may impact individuals’ help-seeking behaviour, thus contributing to excess mortality and increased physical health problems [3]. For example, patients with SMI make fewer medical visits than the general population [9], are more functionally impaired [10], and are less likely to spontaneously report physical symptoms or seek adequate physical care [11]. This lack of help-seeking behaviour may be due to the symptoms of the SMI like social isolation and suspicion [11,12], a general lack of awareness of physical problems because of cognitive deficits [12], reduced pain sensitivity from psychotropic medication [11,12], and/or difficulty in communicating physical needs [12,13]. The side effects of medications used to treat SMI in particular may also not only hinder help-seeking behaviour, but also may directly contribute to obesity and cardiovascular disease [14]. For example, while treating depression may alleviate apathy and lack of motivation, thereby enhancing patients’ ability to seek medical care for physical illnesses, psychotropic medications for schizophrenia and bipolar disorder not only directly increase the risk of physical side effects, but also increase apathy and further contribute to decreased help-seeking behaviour [14].

Physicians must therefore be aware of the potential impact of mental illness and medications on help-seeking behaviour and physical health of patients with SMI, and respond accordingly. This act by physicians is especially important since findings show both primary and mental health care practitioners (including psychiatrists) as being less likely to inquire about their patients with SMI. For example, the smoking status of patients with SMI may not even be asked, thereby suggesting that these patients are treated differently as a result of their mental illness. In addition, there is evidence that physicians immediately jump to prescribing medications before inquiring about basic needs such as access to proper nutrition [1]. In order to decrease the excessive obesity associated with SMI, medical students and health care professionals must alter their approach to patient care

Socioeconomic Factors

“I used to have a family doctor, but he was so far away, and I wouldn’t have bus fare, so I stopped going. At first I stopped taking my medication because I couldn’t pay bus fare to go to the doctor.” – Patient [1, p. 10].

Poverty makes it difficult to afford nutritional food, transportation for grocery shopping or medical appointments, and to take advantage of recreational opportunities [1, 15]. Poverty-related stress results in a greater risk for acquiring mental illness [16], while financial disparity significantly impacts food security and the ability to access a healthy diet [17,18]. Even though individuals with SMI can come from either a low or high socioeconomic status, a disproportionate number end up living in poverty as a result of their illness [1]. Poverty is associated with poor diets that are high in fat and low in fruits and vegetables, which are predictors of obesity and other negative health consequences [17]. Disadvantaged populations are also more likely to reside in obesogenic environments, or ‘food deserts’, that contain few supermarkets and places to exercise. Food supercenters, which are frequently located in areas of more advantaged populations, are often geographically and practically inaccessible to individuals with SMI [19].

Additionally, mortality from the most common diseases tends to be higher in areas characterized by low socioeconomic status [20]. Men in Canada’s wealthiest 20% of neighbourhoods live more than four years longer than men in the poorest 20% of neighbourhoods, with the latter having a 28% higher mortality rate [15]. Many preventable diseases, such as adult-onset diabetes and heart disease, are more prevalent among Canadians living in poverty [15]. Cigarette smoking, the leading cause of preventable deaths in high-income countries, is also more prevalent in low-income populations and a significant comorbidity in people suffering from SMI [21]. Given these findings, it is essential that medical care professionals inquire about their patients’ living situation and understand situational factors that may influence the physical health of patients with SMI. On a broader level, physicians can advocate for their patients by fighting for policy changes affecting food security in lower income areas.

Behaviour and Lifestyle Factors

Although poverty and the resulting limited ability to afford a nutritious diet create almost certain barriers to a healthy lifestyle, patients with SMI are significantly more likely to report poor exercise habits (e.g., walking infrequently), poor eating behaviours (often consuming fewer than two daily meals), and weight gain even after income has been accounted for [22]. Health care providers are also less likely to discuss eating habits or physical activity with patients with SMI, pointing to poor preventive care [22]. This absence of counselling leads to a lack of knowledge regarding what constitutes a healthy diet [23], and patients consuming foods higher in refined sugar, fat, and salt as a result [24].

Physical inactivity and poor diet greatly contribute to the development of obesity, hypertension, raised blood cholesterol/dyslipidemia, and high fasting blood sugar, all of which are risk factors for metabolic syndrome, a condition associated with cardiovascular disease, diabetes, and stroke [3]. People with SMI, who are approximately two to three times more likely to be overweight and to have diabetes, hypertension, or dyslipidemia, are therefore also at much greater risk for developing heart disease, diabetes, and stroke from metabolic syndrome [4,25]. People with SMI are also more likely to use substances such as alcohol and cannabis [26]. Prevalence of alcohol abuse is three to four times higher in patients with SMI [27,28], and both alcohol and cannabis use is associated with a variety of adverse health outcomes including diabetes, hypertension, congestive heart failure, stroke, and dementia [29,30]. Individuals with SMI also report exceptionally high rates of cigarette smoking and tobacco dependence [25,28,31]. In individuals with SMI, international prevalence rates of smoking range from 58% to 88%, up to three times higher than the general population [32]. The high rates of smoking not only increase mortality in individuals with SMI, but also result in higher prevalence of chronic respiratory diseases such as chronic bronchitis and asthma [13]. The high level of co-occurring substance use also has significant financial implications. Dependent individuals may choose to purchase tobacco or alcohol over food, leading to food insecurity regardless of whether there is enough reported income to purchase food. Moreover, this also impacts income available for transportation, which has more direct effects on how much social and physical activity these individuals engage in. The resulting lower rates of activity lead to decreased fitness, increased stress, social isolation, and ultimately even greater substance consumption.

Health Care System Barriers and Poor Preventative Medicine

“Doctors don’t take you seriously when you have ‘mental health’ issues. I went to the doctor to get antibiotics for an infection and was told ‘if you came here for pills, you’ve got another thing coming.’ It turns out I had pneumonia.” - Patient [1, p. 14].

In Canada, over 50% of people with SMI receive care from their primary physician [33,34]. However, lack of specialized knowledge regarding mental health issues by primary care physicians, pre-existing stigma, and poor communication when referring to psychiatrists can result in mismanagement of these patients [33]. Care of patients with SMI faces a double-edged sword: primary care physicians may not be comfortable or have the necessary skills to treat the health issues of patients with SMI, while psychiatrists may not believe that physical health is their domain to treat [34]. Additionally, physicians may not take complaints seriously from those suffering with SMI, who may, in addition to being stigmatized, experience difficulty communicating their symptoms to the physician [1]. Moreover, the fee-for-service billing model commonly used in Canada favours patients

of low complexity that can be dealt with in a short time period, thereby putting patients with SMI at a significant disadvantage [1].

Fewer than 10% of people with a SMI received services such as vocational rehabilitation, day treatment, or case management [35] and patients with SMI experience higher emergency care use, fewer routine preventative check-ups, and increased risk of post-operative infections and complications [36]. They are also less likely to receive the standard of care for diabetic monitoring. There is some evidence that mortality increases by anywhere from 19% to 34% for patient with SMI following a myocardial infarction [36]. The disparities in standard of care extend beyond primary care – people with SMI encounter poor treatment in emergency rooms, unrealistic discharge, and poor follow-up post-hospitalization [1]. Such health care inconsistencies and limited access to preventative care for individuals with SMI significantly increase the risk of early death and speak to the need for health care professionals to maintain high standard of care irrespective of patient mental health status

Health Care System Barriers and Poor Preventative Medicine

“You know how everyone knows a street corner is dangerous, but nobody builds the crosswalk until somebody dies? Well, a lot of people have already died. And now we’ve got to act.” – Health care professional [1, p. 19].

On average, individuals with mental illness are dying an astounding 25 years earlier than the general population – a rate that has yet to change over the past decade [1,36]. Often, this premature death is from preventable conditions such as cardiovascular disease. A complex interplay of factors related to mental illness, behaviour and lifestyle, poverty, and insufficient preventative care contribute to this disparity. Not only are many individuals with SMI not engaging in healthy lifestyle behaviours, but economic circumstances, such as poverty, prevent them from doing so. Individuals with SMI are thus “choice disabled” [37] in that they “might like to benefit from prevention but are unable to do so because they do not have the power to make and to act on prevention decisions” [37], a situation exacerbated by a health care system with billing practices that deter general practitioners from taking on complex patients with SMI.

Unfortunately, despite the recent call for action [1], the excess mortality/morbidity of individuals with SMI remains high. The establishment of advocacy groups to assist individuals with SMI, including the Canadian Mental Health Association (CMHA) and the Canadian Alliance on Mental Illness and Mental Health (CAMIMH), are great initial steps towards driving change on an individual, societal, and political level. Yet if our society and our health care system do not begin to reflect the changes necessary to better meet the needs of individuals with SMI, including more integrated mental and physical health care and reimbursement practices that reward complex care, such efforts will be futile.

Change must also begin with medical education, a place where future health care professionals and advocates are made. The time for moving forward in lowering the striking disparities in mortality rates in SMI is now, and it starts with greater recognition of this issue by medical students and other health professionals who are the future of health care.

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Healthcare is political: case example of physician advocacy in response to the cuts to refugees' and claimants' healthcare coverage under the Interim Federal Health Program

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INTRODUCTION

“Healthcare is political.” That phrase seems obvious. While healthcare is constitutionally a provincial responsibility, it has become a hallmark of Canadian federalism with all levels of government taking part in its function. Furthermore, it has become one of the core Canadian values, with Canadians continuing to place healthcare as the strongest symbol of their national identity. Yet, as future physicians, medical students are wary of “getting political” in fear of taking sides, losing impartiality, and losing focus on patient care. However, political actions and issues can have a significant impact on the clinical practices of all physicians. This article will argue that changes to the Interim Federal Health Program (IFHP) have hindered the ability of physicians to provide best practice, evidence-based medicine, and will outline how members of the medical profession, including University of Ottawa medical students, have played an important role in advocating for those affected by the changes to the IFHP.

In April of 2012 the federal government announced changes to the IFHP, a health insurance program developed in 1957, intended to provide temporary coverage to refugees, refugee claimants, and protected persons who are not covered by provincial or territorial health insurance plans. Prior to June 2012, the IFHP covered medical care, diagnostics and laboratory testing similar to that covered by provincial health plans. The IFHP also covered medications, emergency dental and vision, similar to what is available to people on provincial social assistance plans [1].

The changes announced in 2012 created different tiers of coverage for eligible individuals based on their refugee status in Canada. Most refugees (those found by the Government of Canada to be refugees or persons in need of Canada’s protection following an examination of their case) and refugee claimants (those awaiting a decision on their case in Canada) lost supplemental coverage for prescription medication, vision and dental care. Refugee claimants from countries designated by the Government of Canada to not normally produce refugees and failed claimants [2], and those whose cases are determined to not fit the definition of a refugee, retained coverage only for issues posing a risk to public health and safety [3].

The reduction in coverage is resulting in negative health outcomes for refugees and claimants, while also making it difficult for health practitioners to follow best practices and provide evidence-based care. The following case study describes a hypothetical case that illustrates the challenges facing individuals and

practitioners affected by the changes to the IFHP.

CASE

You are a third year medical student working at a family medicine clinic seeing Ahmad Awatt, a 30 year old male. The doctor agrees to see him despite the fact that he does not have a valid OHIP card. He gives a vague history of being born with a disease involving copper build-up in his body and his older brother having the same condition. You think of Wilson’s disease. Ahmad outlines that, beginning at age 20, he progressively developed difficulty pronouncing his words and developed a resting tremor in his right hand. Back at home, his doctor gave him daily pills and he had regular tests of his urine and blood, but his speech impediment persisted despite treatment [4].

His physical exam was unremarkable, with the exception of a pigmented ring around the outer rim of his cornea. On further history, Ahmad tells you he came to Canada last year. He says he had brought medication with him, but he only has a few pills left. He has tried to see a doctor to refill his prescription, but has been turned away at the reception of 5 other clinics. He says he is grateful you are seeing him today.

While waiting to review your history and physical examination with your supervising physician, you look up some information on Wilson’s disease. Your search supports your suspicion that Mr. Awatt has primarily pseudosclerotic neurologic Wilson’s disease [5,6]. For investigations, you plan to suggest a urine test looking for copper, and genetic testing to confirm the diagnosis, and then a workup for hepatic and neurologic complications with consults to specialists, and re-initiation of chelation therapy as soon as possible [7].

You review this case with your preceptor and she explains that Ahmad is lucky because the neuropsychiatric manifestations of Wilson’s disease has better prognostics than the hepatic manifestations, and Ahmad is typical in that 50% of neurologic symptoms, like his speech impediment, worsen or do not improve with chelation therapy. Your preceptor agrees with your suggested plan to re-initiate chelation therapy with D-penicillamine or Trientine (the pills he is likely taking), but notes that this requires close follow-up for dose titration to target urinary copper excretion, therefore Ahmad will need to return to the clinic for more follow-up. If he does not return for follow-up and receives a sub-therapeutic dose or no chelation at all, the natural course of Wilson’s disease is fulminant liver failure, progressive

neurologic dysfunction, and death.

Your preceptor starts filling out some lab requisitions and you step back into the room. You ask Ahmad some more questions about why he was turned away at other clinics. Ahmad reveals that he arrived in Canada from Iraq and claimed refugee status. His claim was denied. Usually, a failed refugee claimant would face removal from Canada, which may lead to deportation. However, in Ahmad's case, because the Government of Canada does not remove individuals to Iraq due to the ongoing insecurity in that country, Ahmad is able to remain in Canada until the insecurity in his home country resolves. He had previously been able to access healthcare with IFHP, but since the decision on his claim, he is only covered for treatment related to risks to public health and safety. As a medical student, you wonder how this lack of insurance coverage will affect the management plan you proposed to your preceptor.

DISCUSSION

The case illustrates a tension between what the physician (and medical student) plans to provide as best practice care, and the level of care available through the patient's insurance. Given that the patient does not present a risk to public health or safety, diagnostic testing and follow-up care is not covered by the IFHP. As a result, the physician cannot run the appropriate tests to confirm Wilson's disease or provide the patient with preventative care. The standard of care in this case, assuming confirmation of Wilson's disease, would be to provide chelation therapy. However, without insurance coverage, the physician is forced to either refuse care, compromising her professional responsibility [8], or seek funding from other community sources for the investigations and treatments, which is scarce. Without the chelation therapy to prevent the continued deposition of copper in the liver, the patient will likely progress to liver failure and will die without a liver transplant.

Many physicians, when presented with such situations, have refused to compromise patient care and their professional and ethical standards. Rather than accepting these changes and turning patients away, physicians have taken on an important role in health advocacy for people affected by the IFHP changes. Advocacy efforts in opposition of the IFHP changes have taken a number of forms, including petitioning the government, initiating legal challenges, and creating strategies to mitigate the impacts on patients and patient care.

Physicians have used a number of different forums to petition the federal government, asking for reversal of the changes to the IFHP. First, healthcare practitioners and their representative organizations have released position statements against the changes, lobbying the federal government to reconsider their policy. In fact, 21 national healthcare organizations, including the Canadian Medical Association, which represents all physicians in Canada, have denounced the changes [9]. Individuals

have also petitioned the government by writing letters, meeting with members of parliament, and by publishing opinion pieces in the mainstream media [10]. Perhaps, the most well publicized campaigns have been the physician and community member led protests, which have resulted in an annual National Day of Action (this year occurring on June 16th) [11].

Additionally, a group of Canadian physicians and lawyers have challenged the constitutionality of the changes. This team, comprised of the Canadian Doctors for Refugee Care, the Canadian Association of Refugee Lawyers, and a number of refugee claimants, is arguing in a court of law that the changes to the IFHP are inconsistent with the Canadian Charter of Rights and Freedoms [12]. While legal proceedings can be arduous and unfamiliar to the physicians involved, the best outcome would be a decision invalidating the IFHP changes, benefitting every refugee and refugee claimant across the country.

While these lobbying and legal efforts continue, physicians have also worked to mitigate the potential effects of the IFHP changes on patient health. Physicians in leadership positions of hospitals are organizing capacity to be able to respond to refugee patients without coverage. For example, The Ottawa Hospital has set up a unique review panel, whose members include an ethicist and financial expert, to assess how the hospital should deal with individual cases of refugees with limited coverage and non-urgent or life threatening health needs [13]. Local Health Integration Networks and individual physicians have also been collaborating to create low barrier clinics and compiling resources to provide best care to the under-insured [14].

Following the example of physicians, physicians-in-training have also taken up the challenge to advocate for those affected by the changes to the IFHP. Like their physician mentors, University of Ottawa medical students have taken a multifaceted approach, including organizing protests against inflammatory language used in flyers sent out by MP Kelly Block, and raising the issue with speakers invited to the University of Ottawa by various interest groups. A large number of students also participated in letter writing campaigns to Canada's Citizenship and Immigration Minister. Students also participated in various community activities and awareness events, such as performing a skit at Refugee Night at the University of Ottawa, in collaboration with the law school [see figures below].



Figure 1. June 2013 silent banner drop with Dr Danielle Grondin at the North American Refugee Health Conference

1 Organizations opposing IFHP changes: i. College of Family Physicians of Canada ii. Royal College of Physicians and Surgeons of Canada iii. Canadian Association of Optometrists iv. Canadian Association of Social Workers v. Canadian Dental Association vi. Canadian Medical Association vii. Canadian Nurses Association viii. Canadian Pharmacists Association ix. Canadian Association of Community Health Centres x. Canadian Doctors for Medicare xi. Canadian Association of Midwives xii. Registered Nurses Association of Ontario xiii. Canadian Federation of Nurses Union xiv. Canadian Psychiatric Association xv. Canadian Paediatric Society xvi. Association of Medical Microbiology and Infectious Diseases Canada xvii. Médecins du Monde xviii. Public Physicians of Canada xix. Ontario's Council of Medical Officers of Health xx. Canadian Association of Occupational Therapists xxi. Canadian Association of Emergency Physicians

Students took a broad interest in advocating for those affected by the IFHP changes. Most notably, students began developing long-term strategies on how to help mitigate the effects of these changes with the Refugee Health Initiative Community Service Learning Program (RHI CSL). With RHI CSL, students were able to facilitate the integration of newly arrived refugees into the Canadian healthcare system and Ottawa community, collaborate with community services and organizations, and gain hands-on experience that helped develop an understanding of the barriers faced by marginalized populations to accessing health services. Through the training provided by the program, students are able to advocate for the refugees with whom they are working, and through their experience, learn how to become better physician advocates in the future.



Figure 2. November 2012 awareness campaign for IFHP with Jason Kenney's University of Haifa honorary degree.

The student advocacy efforts relied heavily on support from the University of Ottawa Faculty of Medicine, which was provided through both curricular and extracurricular programs. Pre-clerkship electives and family medicine preceptorships provided students the ability to receive close mentorship from community physicians who have been involved in advocacy projects. Additionally, the Office of Global Health and the global health curriculum provided a variety of learning opportunities and tangible training on how to be advocates in the real world. Interest groups, as part of the medical education structure, provide a forum to foster student interest. The implementation of the community service-learning program provided structure to community outreach activities that are otherwise more difficult to attain. Through the mentorship provided by community physicians and faculty members in the field, medical education components, and administrative support for projects, programs and events, students have been given the tools to become successful advocates in their communities and globally.

As the changes to the IFHP continue to pose a barrier to physicians providing best practice and evidence-based medicine, the need for the healthcare profession to be more involved in advocacy efforts regarding this issue persists. Medical students have the opportunity to develop the skills necessary to be effective

advocates, in large part through university and faculty support, and should be encouraged to continue to engage in advocacy. We hope for the continued support of the faculty and the continued involvement of students as we sustain our advocacy for a reversal of the changes to the Interim Federal Health Program.

Next protest National Day of Action June 16, 2014. Email docsforrefugeecare@gmail.com to learn more.

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Keywords: Advocacy, Refugee health, Refugee claimant, interim federal health (IFH), interim federal health cuts, Health policy, Public health, Community Service Learning, Medical Education, medical student, Case study, Social determinants, medication compliance



Figure 3. October 2012 protest of MP Kelly Block's flyers.



Figure 6. December 2012 winter holiday petitions to Jason Kenney



Figure 4. March 2013 medical students present at Refugee Night at University of Ottawa Forum with the Canadian Association of Refugee Lawyers.

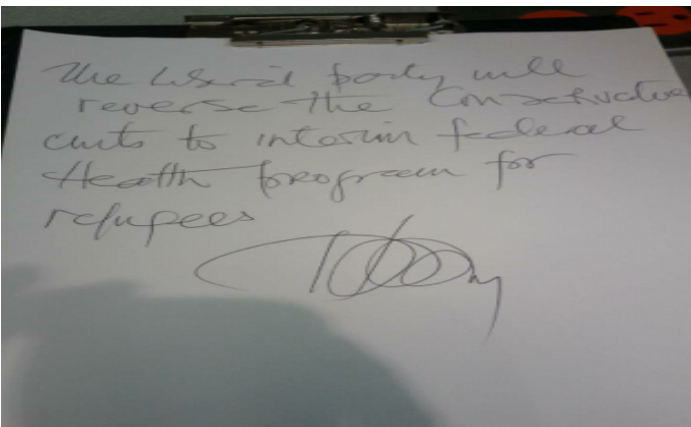


Figure 5. February 2013 Dr Hedy Fry speaks to University of Ottawa medical students about IFHP changes and promises changes by the liberal party

Designing a multi-disciplinary undergraduate medical school ultrasonography curriculum

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ABSTRACT

Objectives: Although there is increasing demand for physicians from various specialties to be trained in ultrasonography (US), it is currently not being taught at most Canadian undergraduate medical schools in a comprehensive manner. The purpose of this study was to develop objectives to form the foundation of a comprehensive undergraduate US curriculum.

Methods: After completing an environmental assessment, which included a review of our current undergraduate objectives, a literature review was performed to identify published undergraduate US objectives. Using this information, a preliminary list of objectives was developed. The list was distributed electronically to 12 content experts from 10 disciplines and, using a two-round modified Delphi process, consensus about the inclusion of educational objectives was obtained. An a priori consensus criterion of 75% agreement was used to determine objectives that would be included in the curriculum. Objectives that met consensus in the first round of the survey were excluded from second round evaluation.

Results: Review of our undergraduate curriculum revealed that there were already 10 objectives relating to US. Combining existing objectives with those found during the literature review, an initial list of 79 objectives was produced. Sixteen of these were approved during the first Delphi round, while the remaining 63 objectives required rating during a second round. A final list of 25 objectives was produced.

Conclusions: Using a modified Delphi process, physicians from diverse backgrounds reflecting current and future use of US developed 25 multi-disciplinary objectives for a comprehensive undergraduate medical school US curriculum.

RÉSUMÉ

Objectifs: Bien qu'on demande de plus en plus que les médecins de diverses disciplines suivent une formation en échographie, cette méthode d'exploration n'est pas encore enseignée de façon exhaustive dans la plupart des programmes d'études de premier cycle des facultés de médecine canadiennes. Le but de cette étude est d'élaborer des objectifs qui serviront de fondation à la création d'un programme d'enseignement de l'échographie au premier cycle.

Méthodes: Après avoir terminé une analyse de contexte qui incluait une revue de nos objectifs d'apprentissage actuels, une revue de la littérature a été effectuée afin de faire ressortir les objectifs publiés pour l'enseignement de l'échographie au premier cycle de médecine. Avec cette information, une liste préliminaire d'objectifs a ensuite été élaborée. La liste a été envoyée électroniquement à 12 experts de contenu dans 10 disciplines différentes. Utilisant un processus de Delphi modifié en deux étapes, un consensus a été établi pour l'inclusion des objectifs d'apprentissage. Un consensus a priori de 75 % approuvant les objectifs a été utilisé pour choisir ceux qui seraient inclus dans le cursus. Les objectifs qui avaient satisfait au consensus lors de la première étape ont été exclus des évaluations lors de la deuxième étape.

Résultats: La revue de notre programme d'études de premier cycle a démontré qu'il y avait déjà dix objectifs portant sur l'échographie. En combinant les objectifs actuels et ceux qui ont été relevés lors de la revue de la littérature, une liste initiale de 79 objectifs a été produite. Seize de ces objectifs ont été approuvés lors du premier tour Delphi. Les 63 autres objectifs ont dû être évalués dans le cadre du deuxième tour. Une liste finale de 25 objectifs a été produite.

Conclusion: À l'aide d'un processus de Delphi modifié, des médecins provenant de diverses disciplines reflétant l'utilisation courante et éventuelle de l'échographie ont élaboré 25 objectifs multidisciplinaires pour offrir un programme complet de formation en échographie dans le cursus du programme de premier cycle de médecine.

INTRODUCTION

Ultrasonography (US) has been shown to be a safe and effective method for diagnosing a number of medical problems [1-2]. With increasing technology, equipment has become more

portable, compact and less expensive, allowing US use to grow in many different medical specialties [1,3]. When applied appropriately, point-of-care ultrasonography (PoCUS) can provide efficient real-time diagnosis while supplementing or replacing more

advanced imaging in specific situations [1].

Studies have consistently demonstrated that undergraduate medical students are capable of learning and performing US exam skills [4-6], and that both junior and senior students find that using US can help reinforce theoretical and anatomical concepts [7-8]. Currently, the majority of US training takes place at the postgraduate level in specific residency programs (eg. Radiology, Cardiology, Obstetrics/Gynecology, and Emergency Medicine).

While several integrated US curricula at the undergraduate level do exist in the United States [9-10], based on the results of a literature review, only a few Canadian medical schools have recently attempted to introduce comprehensive undergraduate US training. At the University of Ottawa, current US teaching is mainly limited to theory presented during radiology and obstetric lectures [11]. The purpose of this study was to determine the objectives that would form a longitudinal undergraduate US curriculum..

METHODS

Preliminary bank of objectives: A preliminary list of objectives was developed using a variety of sources. An environmental assessment was completed that included a comprehensive review of the current undergraduate medicine objectives at the University of Ottawa to identify any current objectives relating to US. This was accomplished through a keyword analysis and manual search of the university's published objectives. A literature review was then performed using both MESH and general search terms in PubMed and Scopus (Appendix 1) to identify any papers related to the teaching of US in undergraduate medical education. In addition to scholarly papers, publicly available online material as well as individual American and Canadian medical school websites were also searched for all existing undergraduate US curricula accessible through their respective internal search engines [10,13]. Finally, faculty members at the University of Ottawa representing 10 different specialties (Table 1) were asked to identify any objectives related to the current use of US in their respective specialties. The information gathered was collated to form a preliminary list of objectives.

Modified Delphi Method: A two-round modified Delphi process was utilized in order to achieve consensus about the educational objectives to be included in the curriculum. The Delphi technique uses multiple rounds of surveys to gain consensus amongst participants about a topic with which they are perceived to have expertise [12]. Using a purposive sample, a local group of 12 experts representing 10 different medical specialties were invited to participate in evaluating a comprehensive list of prospective objectives (Table 1). Experts from different departments were identified as those that were heads of US programs or identified as having a significant interest in US. Many different variations on the modified Delphi design have been published [12]. We chose to have two rounds of evaluation as this allowed the survey to be completed in a timely manner while still meeting the recom-

mended range of rounds suggested by the literature [10]. The process was administered via a web-based electronic survey (SurveyMonkey Inc., Palo Alto, California, USA). In each round, a priori consensus criteria were established to determine which objectives would meet the criteria for inclusion, exclusion or for further consideration. Prior to the first round of the Delphi process, three physicians not participating in the study piloted the survey. Minor adjustments and edits were made based on their feedback.

Round One: In the first round, the 12 content experts were asked to rate each objective from the preliminary bank of objectives. An e-mail was sent to each participant providing a web link to complete the online survey. Individual participant ratings were kept anonymous from the other content experts and were only identifiable to the principal investigator and the research medical student following the completion of the survey. This allowed participants to evaluate each objective free of external influence. Reminder emails were sent to participants with outstanding surveys on a biweekly basis. The survey included a description of the process and a list of considerations to make prior to ranking the objectives (Appendix 2).

In the first round, each item was evaluated with a 7-point Likert scale, ranging from "strongly agree" to "strongly disagree", accompanied by a comment box for each item as well as a comment section for the overall survey. For an objective to meet the predefined inclusion or exclusion criteria, 75% of participants had to agree in their ratings. Objectives that were rated either 6 (Agree) or 7 (Strongly Agree) by 75% of the survey participants were considered to have met the consensus criterion for inclusion. Conversely, items that were rated 1 (Strongly Disagree) or 2 (Disagree) by 75% of participants were considered to have met the exclusion criterion. While no definite cutoff is agreed upon in the literature [10], recent studies relevant to our own have used a 75% cutoff for their own curriculum and devel-

Table 1. List of Content Experts and their specialty

Dr. Chris Johnson	Division of Cardiology
Dr Griffith Jones	Division of Obstetrics and Gynecology
Dr. Jacinthe Lamprom	Division of Surgery
Dr. David Mai	Department of Family Medicine
Dr. Mathew McInnes	Department of Radiology
Dr. Scott Millington	Division of Critical Care
Dr. Rebecca Peterson	Department of Radiology
Dr. Debra Pugh	Division of General Internal Medicine
Dr. Wael Shabana	Department of Radiology
Dr. Ron Tam	Department of Pediatrics
Dr. Calvin Thompson	Department of Anesthesiology
Dr. Michael Woo	Department of Emergency Medicine

opment of competencies [14-16].

Round Two: Only objectives that did not meet either the inclusion or exclusion criteria in the first round of the survey were reevaluated in the second round of the modified Delphi process. For the second round, the survey was adapted to a 3-point scale that included the following options: Do Not Include, For Consideration and Include. With each objective, the mean numerical score from the first round of ratings was provided to provide participants with information about the collective opinion, a technique recommended by Hasson et al. [14]. It also aided with rating some of the objectives that may not have been pertinent to the individuals' respective specialties.

The second round procedure remained the same as the first round with the exception of the 3-point Likert scale that was used instead of the 7-point Likert scale employed in the first round. Again, a priori consensus criteria were used: an objective met the inclusion or exclusion criteria if 75% of participants rated it as "Include" or "Do Not Include" respectively. Any objective that did not meet the above criteria was placed in a category "For Consideration." Objectives remaining in the "For Consideration" category would receive subsequent review by a curriculum committee regarding their inclusion at a later date.

RESULTS

79 US objectives were generated through expert submission and literature review of the current University of Ottawa curriculum. Of these 79 US objectives, 10 were generated from pre-existing objectives in the current University of Ottawa curriculum. The US content experts represented a broad background in terms of education, practice type and specialty (Table 2). In the first round of the modified Delphi process, a 100% response rate was achieved. Sixteen of the 79 objectives met the consensus criterion for inclusion (Table 3). No item met the exclusion criterion; the remaining objectives were reevaluated in the second round of the modified Delphi process. In the second round of the modified Delphi process 63 objectives were reevaluated with a 100% response rate. Following the second round of evaluation, nine additional objectives met the inclusion consensus criterion, (Figure 2) while two objectives met the exclusion criterion. The remaining 52 objectives did not meet either consensus criteria and required further consideration. Following the Delphi process, these objectives were sent for review by curriculum experts to determine which objectives were reasonable and or feasible to be implemented in the curriculum.

DISCUSSION

The modified Delphi process we successful at identifying 25 multi-disciplinary objectives to form the core of an undergraduate medicine US curriculum. Approved objectives were both theoretical and practical in nature and spanned the entire undergraduate medical curriculum at the University of Ottawa. As expected, the objectives regarding basic foundational theory were amongst the most highly agreed upon. Beyond this obser-

Table 2. Ultrasound Expert Profile

Characteristic	No. (%)
Years of Practice	
Less than 5	2 (17)
5-10	3 (25)
10-15	4 (33)
More than 15	3 (25)
University Rank	
Assistant Professor	10 (83)
Associate Professor	2 (17)
Practice center	
Academic health science center	11 (92)
Community hospital	1 (8)
Practice Type	
Almost exclusively adult	10 (83)
Almost exclusively pediatric	1 (8)
Mixture of adult and pediatrics	1 (8)
Experience with ultrasonography	
Director	4 (33)
Teaching	7 (58)
General use	10 (83)
Course Development	7 (58)

vation, there did not seem to be any observable trends or patterns to ratings based on individual participant or objective topic. This likely reflects the broad multidisciplinary background of our participants.

At the conclusion of the modified Delphi process, 52 of the 79 objectives were left in the category "For Consideration." Several factors likely contributed to this result. Where our study gained strength from having a multi-disciplinary group of participants, this feature likely prevented most objectives from being rated either too positively or too negatively, leaving some undecided. With the varied initial bank of objectives and the broad representation of specialties, there were instances where an objective had strong support, but only for a few individuals. Combined with the reasonably strict inclusion criterion, many objectives finished in the "For Consideration" category.

Compared to the work of Penciner et al, who approved 62 of a possible 152 (41%) emergency medicine clerkship competencies using a similar modified Delphi process [15], we were able to approve a similar proportion of curriculum objectives (32%). However, a key difference in the methods of our study was that we allowed participants three options in the final round of evaluation as opposed to requiring a dichotomous decision. Allowing for a more moderate survey choice allows raters to be indecisive when they are not certain and likely prevented objec-

Table 3. Objectives meeting positive consensus criterion for inclusion in undergraduate medical ultrasound curriculum (% agreement)

Pre-Clerkship

- Describe the risks, benefits and limitations of US as a diagnostic modality. (100%)
- Recognize the differences and limitations of point of care US (PoCUS) compared to Cardiology/Ob-Gyn/Radiology performed US. (100%)
- Explain the basic terminology used in describing US (ex: hyper/hypo/isoechoic). (75%)
- Recognize the relationship between depth, frequency and gain on an image. (75%)
- Describe the difference between in-plane (longitudinal) and out-of-plane (transverse) technique for procedures. (75%)
- Describe the difference between static (landmarking) and dynamic (real-time) use of ultrasound for procedures. (83%)
- Describe the proper sterile technique required when performing scans to assist with procedures. (75%)
- Recognize the appearance of a pleural effusion and the role of US in thoracentesis. (75%)
- Recognize the appearance of a pericardial effusion and the role of US in pericardiocentesis. (83%)
- Demonstrate and identify the appearance of the carotid artery and internal jugular vein. (83%)
- Demonstrate and identify the appearance of the femoral artery and vein. (75%)
- Demonstrate and identify the right and left ventricle and right and left atrium. (75%)
- Recognize the appearance of peritoneal fluid and the role of US in paracentesis. (92%)
- Explain the role of ultrasound examination in the diagnosis of early pregnancy. (83%)
- Recognize the role of ultrasound in abscess drainage. (75%)

Clerkship

- Demonstrate proper documentation of scan results in a patient's chart. (92%)
- Recognize areas of uncertainty and personal limitations in performing scans and understand when to seek the appropriate help and additional imaging. (100%)
- Describe the proper disclosure and documentation of critical incidents. (82%)
- Demonstrate efficient communication of critical findings to an attending physician. (75%)
- Recognize the role of US in the evaluation of hepatosplenomegaly in pediatrics. (75%)
- Recognize the role of US in evaluation of patients of different age groups presenting with acute scrotal pain. (75%)
- List the advantages and limitations for US-guided central line insertion. (75%)
- List the advantages and disadvantages of US-guided peripheral IV insertion. (75%)
- Recognize the role of ultrasound in assisting with the placement of an arterial line. (75%)
- Recognize the role of US as part of ACLS to rule out pneumothorax and pericardial effusion in pulseless electric activity (PEA) arrest. (83%)

tives from meeting inclusion and exclusion criteria [17].

Other explanations as for why some objectives did not meet either consensus criteria speak to the limitations of our study. Our group of participants was limited in size to 12. Similar studies using the Delphi process at a regional or national level have been able to secure larger participant numbers [18-19]. While we aimed to create a curriculum that could be generalizable across Canada, as well as schools beyond Canada, our survey's participants were limited to the University of Ottawa. The number of local US experts was limiting to our sample size. Within this sample, our recruitment criteria resulted in increased radiologist representation that may have added an additional source of bias to the results. In addition, despite pre-survey instructions (Appendix 2), it was evident from some of the additional comments that participants were still concerned with the feasibility of a minority of the resource intensive objectives while rating them. Our goal in asking participants to ignore resource considerations while evaluating objectives was to identify the ideal content for the curriculum through the Delphi process. Further committees would deal with the practical aspects of implementing the curriculum at a later date. Inability to look past feasibility concerns likely led to several objectives not meeting the positive consensus criterion that would have otherwise.

While the survey process was designed to promote curriculum development free of external pressure, it should be noted that the process was not completely blinded. While this

incomplete blinding was a likely a source of bias, the anonymous nature of the responses during the survey process may have minimized the extent of this bias. As seen in similar studies, an external review could have been completed to evaluate the validity of the results and extent of bias within our methodology [15]. This step was omitted, as our results required further external review locally prior to being implemented into a curriculum..

CONCLUSION

The modified Delphi process was able to systematically achieve consensus with 25 core objectives to form an undergraduate medical US curriculum. The process was successful at obtaining multidisciplinary input representing the current and future landscape of US use in medicine. We were also able to attain this information in a manner that minimized external pressure or influence and promoted participant opinion. Although the majority of curriculum objectives will require further consideration, our study was not intended to be a final step. Further consideration and analysis of our results is needed to determine which of the undecided objectives are required to ensure the final curriculum is comprehensive and consistent. Next steps will include the development of educational strategies to implement and deliver the proposed curriculum. Following implementation, further efforts will be taken to evaluate its efficacy and make any required modifications. Ultimately, we were able to achieve consensus with 25 curriculum objectives amongst a diverse group of experts

Original Research

Table 4. Objectives needing further consideration for inclusion in undergraduate medical ultrasound curriculum

Pre-Clerkship

- List and explain the characteristics of an ideal ultrasound machine.
- Recognize the following artifacts on an image: low and high attenuation, refraction, reverberation and mirror image.
- Recognize the proper care required to maintain ultrasound equipment.
- Describe the most appropriate transducer and machine settings to identify the appropriate structure.
- Demonstrate and identify the appearance of a bone, muscle, tendon and nerve.
- Demonstrate and identify the appearance of a joint space for the elbow, hip, knee, and ankle in adults and children.
- Recognize the role of ultrasound in arthrocentesis.
- Describe the standard 2-D echocardiographic views.
- Explain the principles of cardiac ultrasound with emphasis on the assessment of left ventricular function.
- Identify intima-media thickness of the carotid artery on an image with colour Doppler.
- Recognize the appearance of a deep venous thrombosis.
- Demonstrate the parasternal long, parasternal short, subxiphoid and apical views of the heart.
- Demonstrate and identify the mitral, tricuspid and aortic valves.
- Identify the height of the jugular venous pressure (JVP).
- Demonstrate and identify the appearance of the abdominal aorta and inferior vena cava.
- Demonstrate and identify the appearance of the ribs, lungs, pleura and diaphragm.
- Interpret global left ventricular function (normal/mildly depressed/severely depressed/hyperdynamic) using ultrasound.
- Recognize the appearance of hydronephrosis.
- Recognize the appearance and describe the limitations of obtaining images of the gall bladder, kidneys and intestines.
- Recognize the appearance of a fetal heartbeat.
- Recognize the appearance of the uterus and bladder.
- Assess the post-void residual volume of a patient using ultrasound.
- Demonstrate and identify the appearance of the liver, gall bladder, spleen and pancreas in both an adult and pediatric population.
- Demonstrate and identify the appearance of the kidneys and bladder in both an adult and pediatric population and recognize the role of ultrasound in suprapubic aspiration of urine.
- Demonstrate and identify the appearance of the intestine.
- Demonstrate and identify the appearance of the normal uterus.
- Demonstrate, identify and measure the abdominal aorta using ultrasound.
- Describe the sonographic features of cholecystitis.
- Describe the advantages, disadvantages and limitations of ultrasound as a method of locating nerves.
- Recognize the differences between cervical lymphadenitis, cellulitis, and abscess in adults and children.
- Demonstrate and identify the appearance of skin abscesses and cellulitis.

Clerkship

- Demonstrate proper archiving of scanned images.
- Demonstrate proper logging of all ultrasound-guided procedures.
- Recognize the role of ultrasound in evaluation of anatomy and pathology of the eye.
- Recognize the role of ultrasound in evaluation of sinusitis.
- Recognize the role of ultrasound in evaluation of a peritonsillar abscess.
- Demonstrate the use of M-mode to assess the fetal heartbeat.
- Identify appearance of pneumonia using point of care ultrasound (PoCUS) in a pediatric population.
- Recognize the role of ultrasound in the evaluation of abdominal symptoms in a young child including gastroenteritis, intussusception, pyloric stenosis and appendicitis.
- Recognize the role of ultrasound in the evaluation of neonates for intraventricular bleeds.
- Recognize the appearance of acute thoracic aortic dissection.
- Recognize the appearance of gallstones.
- Demonstrate proper technique for ultrasound-guided peripheral IV insertion.
- Recognize the role of ultrasound in performing regional nerve blocks.
- Recognize the role of ultrasound in performing a lumbar puncture.
- Perform an extended focused assessment with sonography for trauma (eFAST – Checking for free fluid in the abdomen and a pneumothorax).
- Demonstrate the use of M-mode to assess a pneumothorax.
- Confirm the placement of an endotracheal tube using ultrasound.
- Describe the algorithmic approach using ultrasound to assist in undifferentiated shock (R.U.S.H. exam, Rapid Ultrasound for Shock and Hypotension – Heart, IVC, Morison's Pouch/FAST, Aorta, Pneumothorax).
- Determine and identify superficial foreign bodies and help with their removal using ultrasound.
- Recognize the ultrasound appearance of cardiac standstill.
- Recognize the appearance of pulmonary edema on ultrasound

using a modified Delphi process to form the core of an undergraduate US curriculum.

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Table 5. Objectives meeting negative consensus for exclusion from undergraduate medical ultrasound curriculum

- Recognize normal appearance of the thyroid gland.
- Demonstrate and identify the appearance of a normal thyroid gland

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Keywords: Ultrasound, Ultrasonography, PoCUS, Point-of-care-ultrasound, Curriculum, Delphi, Undergraduate, Multi-disciplinary, Medical Education

APPENDIX 1 : Literature Search Strategies

- PubMed - ultrasound AND medical school curriculum – 320 results
- PubMed - undergraduate medical education AND ultrasound – 67 results
- PubMed - MeSH (Ultrasonography) + MeSH (Undergraduate Medical Education) – 34 results
- PubMed - ultrasound curriculum + MeSH (Undergraduate Medical Education) – 53 results
- Scopus – undergraduate AND ultrasound curriculum – 26 results
- Scopus – ultrasound AND undergraduate curriculum – 29 results

APPENDIX 2 : Survey instructions for content experts

When rating the following objectives please consider the following:

1. The following objectives are intended for undergraduate medical students both in pre-clerkship and clerkship.
2. Ratings should reflect the knowledge and skills that every medical student should have upon graduation regardless of chosen specialty or career path.
3. Objectives can be obtained through a variety of education modalities (eg. clinical, workshops, simulation, online learning).
4. The purpose is to determine the objectives and not how they will be delivered. The objectives will be further refined with curriculum experts after the Delphi process to determine how and where each objective will be taught. With this in mind, please try to rank objectives on content rather than how and where they are currently written.

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Beyond Words

Kayla Simms¹

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Every now and then, I am humbly reminded that to be an effective medical communicator, one must exceed the bounds of words.

Words are, in essence, binding.

By that statement, I do not mean to imply that words are a replacement for a signed agreement, or that words are to be taken at face value as verbally spoken contracts continuously falling from our tongues onto others' ears.

By the binding of words, I am referring to the bounds they place on our emotions. Words ask us to put what we're feeling into a communicable context that is somehow supposed to accommodate for our indescribable sentiments. Words provide us with a prison in which to place our deepest thoughts and most moving stories, and force us to express them to others in ways that are meant to effectively convey what we authentically feel.

In both a literal and figurative context, many things in medicine are beyond words.

One moment, in particular, stands out amongst the rest. This isn't a moment, per se, but a person. A beautiful six year-old boy with Down's Syndrome, severe developmental delay, and Acute Lymphoblastic Leukemia who came into my life about one year ago.

He looks up at me with big eyes and a curious smile. He doesn't say much, but when he does, it's usually the name of his favourite animal or a call to "Mommy".

I was matched to this incredible boy through the Children's Hospital of Eastern Ontario's (CHEO) "Buddy program" at the University of Ottawa. Dedicated to enriching the lives of both the young patient and medical student, the CHEO Buddy program has been the best experience of my medical school endeavour thus far.

Stepping in to meet my CHEO buddy and his family for the first time, I was immediately greeted with respect and gratitude. Slowly learning sign language in order to meet his communicative needs, I quickly developed quite a remarkable non-verbal relationship with a six year-old boy in but a few short months.

It was a Tuesday afternoon, when I visited my CHEO buddy in his hospital bed that it happened.

Showing him different animal puppets and signing their names, he touched my hand and said it; my name.

With all the effort he could muster to sound out the letters and put them together; he said my name.

It is moments like these where I realize being a medical communicator is truly beyond words. I hear my name on a daily basis, from the classroom to my home-life, to talking on the phone. I have read and written my name in every e-mail, text, and test I've ever endured. But one simple attempt to say my name, from a six year-old boy who barely speaks at all, was enough to give me pause and bring me to tears.

In the medical school curriculum, communication is not only the bread and butter of being an effective physician, but a skill that must be practiced in order to be mastered. Words like "pallor" and "erythema" and "effusion" fly past our tongues in daily conversation over smoked meat sandwiches in the hospital cafeteria. We learn the medical vocabulary and then struggle to refrain from using such words when communicating with patients. We systematically categorize terms and definitions into long-winded algorithms in order to keep everything straight in our minds.

But then we return to moments like these. Moments where we are speechless and left without the terms we know so well. Moments where 'beautiful' is not measured by any pattern on an MRI or a well-stitched wound, but where the words are lost, yet their meanings have never felt so real.

"Yes", I say, choking back the urge to burst into hysterics, "that's my name."

And in that moment, not even all the medical vocabulary in the world could be enough to describe the smile on his face.

Keywords: Communication, Pediatrics, Children, Language, Medicine, Humanities, Competency, Social, Compassion, Care

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