HHS Public Access

Author manuscript

Subst Abus. Author manuscript; available in PMC 2020 January 28.

Published in final edited form as:

Subst Abus. 2019 ; 40(2): 207–213. doi:10.1080/08897077.2018.1561596.

In-hospital training in addiction medicine: A mixed methods study of health care provider benefits and differences

Lauren Gorfinkel, B.ArtsSc[1], **Jan Klimas, PhD**[1,2,3], **Breanne Reel, MPH**[4], **Huiru Dong, MSc**[1,6], **Keith Ahamad, MD**[1,5], **Christopher Fairgrieve, MD**[1], **Mark McLean, MD**[1,2], **Annabel Mead, MD**[1,5], **Seonaid Nolan, MD**[1,5], **Will Small, PhD**[1,4], **Walter Cullen, MD**[3], **Evan Wood, MD, PhD**[1,2], **Nadia Fairbairn, MD**[1,2]

[1.]British Columbia Centre on Substance Use and Excellence in HIV/AIDS, St. Paul's Hospital, 400-1045 Howe Street, Vancouver, BC, Canada, V6Z 2A9 [2.]Department of Medicine, University of British Columbia, St. Paul's Hospital, 608-1081 Burrard Street, Vancouver, BC, Canada, V6Z 1Y6 [3.]School of Medicine, University College Dublin, Belfield, Dublin 8, Ireland [4.]Faculty of Health Sciences, Simon Fraser University, 8888 University Dr, Burnaby, BC, Canada V5A 1S6 [5.]Department of Family Practice, University of British Columbia, St. Paul's Hospital, Department of Family and Community Medicine, 1081 Burrard St., Vancouver, BC V6Z 1Y6, Canada [6.]School of Population and Public Health, University of British Columbia, 2206 E Mall, Vancouver, BC V6T 1Z3 E Mall, Vancouver, BC V6T 1Z3, Canada

Abstract

Background: Hospital-based clinical addiction medicine training can improve knowledge of clinical care for substance using populations. However, application of structured, self-assessment tools to evaluate differences in knowledge gained by learners who participate in such training has not yet been addressed.

Methods: Participants (N=142) of an elective with the hospital-based Addiction Medicine Consult Team (AMCT) in Vancouver, Canada, responded to an online self-evaluation survey before and immediately after the structured elective. Areas covered included substance use screening, history taking, signs and symptoms examination, withdrawal treatment, relapse prevention, nicotine use disorders, opioid use disorders, safe prescribing, and the biology of substance use disorders. A purposefully selected sample of 18 trainees were invited to participate in qualitative interviews that elicited feedback on the rotation.

Results: Of 168 invited trainees, 142 (84.5%) completed both pre- and post-rotation self-assessments between May 2015 and May 2017. Follow-up participants included medical students, residents, addiction medicine fellows, and family physicians in practice. Self-assessed knowledge of addiction medicine increased significantly post-rotation (mean difference [MD] in scores =

Send correspondence to: Jan Klimas, PhD, MSc, B.C. Centre on Substance Use, University of British Columbia, St. Paul's Hospital, 400-1045 Howe Street, Vancouver, B.C., V6Z 2A9 Canada, **Tel:** (604) 687-2797**; Fax:** (604) 806-9044, jklimas@cfenet.ubc.ca.

Author contributions

L.G. and J.K. drafted the manuscript; L.G., J.K., N.F., and E.W. [17] designed the study; and H.D. and B.R. analyzed the data. All authors were involved in data collection, study design, and reviewed the manu- script prior to submission. The authors declare they have no conflict [18] of interest.

11.87 out of the maximum possible 63 points; standard deviation = 17.00; $p < 0.0001$). Medical students were found to have the most significant improvement in addiction knowledge (estimated MD = 4.43; 95% confidence interval = 0.76 – 8.09; $p = 0.018$). The content of the qualitative interviews described the dynamics involved in the learning process among interviewees.

Conclusions: Completion of a hospital-based clinical elective was associated with improved knowledge of addiction medicine. Medical students appear to benefit more from the addiction elective with a hospital-based AMCT than other types of learners.

Keywords

Substance-Related Disorders; Medical Education; Program Evaluation; Prospective Studies

INTRODUCTION

Substance use disorders (SUDs) are a major factor in the global burden of disease,[1] and have been associated with poor health outcomes, unemployment, poverty, crime, mortality, and significant social and financial consequences.[2] Moreover, the number of SUDs globally is rising, with public health emergencies declared in the U.S. and Canada due to unprecedented rises in opioid-related deaths.[3] Despite these harms, the implementation of evidence-based addictions care has remained low in many settings.[4] Quality of care for people with SUDs varies considerably and the latest advances in addiction science are frequently underutilized in clinical practice.[4]

To some extent, this situation is rooted in a neglect of SUDs in medical curricula. Historically, there has been a lack of specialized knowledge, opportunities for hands-on experience,[5–7] and overall education in SUD care.[8] Treatment is often not provided in healthcare settings where the consequences of SUDs are most-presented, such as hospitals and emergency departments.[2,9,10] Moreover, many health care providers report stigmatizing attitudes towards people with SUDs, perceiving SUDs as a choice or crime.[11] One solution to these problems lies in addiction medicine consult services,[12] multidisciplinary teams of physicians, nurses, social workers, and counsellors, who play an important role in hospital-based addictions care.[13] These teams provide comprehensive SUD treatment at what is often the first point of entry to the health care system, and experiential learning opportunities to emerging healthcare professionals.[12]

Although hands-on experiential learning has been shown to improve provider knowledge and attitudes towards people who use drugs,[14,15] the effect of training experiences on hospital-based addiction medicine teams has not been fully characterised. It is also unclear how medical learners at different training stages (e.g. medical students, residents, fellows) benefit from these efforts.[16] Understanding of overall improvements in knowledge and differences between learners' experiences would therefore aid in developing training programs in settings where they are most needed, catering these programs to each stage of medical education, and expanding current training where it is most effective. We therefore undertook this study to prospectively evaluate whether a dedicated training elective with a hospital-based addiction medicine consult service a) impacts knowledge of addictions care among medical trainees, and b) benefits learners at different stages of medical training.

METHODS

Setting

The St. Paul's Hospital Addiction Medicine Consult Team (AMCT) is a multidisciplinary team of addiction medicine specialists in Vancouver, Canada, including physicians, nurses, and social workers. Funded through Vancouver Coastal Health, the AMCT offers an embedded clinical rotation in addiction medicine, operated by the British Columbia Centre on Substance Use.[17]

Elective Intervention

The intervention evaluated in the current study is an elective clinical rotation with the multidisciplinary AMCT for medical students, residents, fellows (physician, nursing, and social work streams), as well as family physicians in practice. The structured clinical rotation involves a four-week rotating addiction educational curriculum consisting of didactic lectures, journal clubs, mortality and morbidity rounds, and grand rounds presentations (see appended sample schedule). Trainees are supervised in learning to conduct addiction medicine consults,[18] including inpatient withdrawal management, motivational interviewing, coordination of addiction treatment for medical co-morbidities, Screening, Brief Intervention and Referral to Treatment (SBIRT), and pharmacological management of SUDs. The team then conducts all follow-up treatment recommendations and coordination. For enhanced skills learners (practicing family physicians), the rotation can last up to six months, and occasionally, shorter rotations (<1 month) are used to briefly refresh skills and knowledge pertaining to addictions care. For more details on the elective, please refer to a previous publication.[12]

In addition to clinical training, some learners opt to partake in immersive research training. Here, learners are offered an opportunity to write a research paper under the direct supervision of a Principal Investigator (PI). Those who express an interest are then paired with a clinical mentor and a statistician to help them develop case studies or data-driven manuscripts using data from studies affiliated with the British Columbia Centre on Substance Use (BCCSU).[19–21] Though these research experiences are usually offered at the first point of contact with learners, the exact start time is flexible, with many starting research training only once they express interest in a topic. Likewise, the degree of research involvement, or number of papers produced is dependent on the particular learner, who can choose to take on a greater or fewer number of research projects.

Procedures

Approximately 80 medical students, residents and physicians complete a clinical rotation with the AMCT annually. Learners who choose to participate in the study complete a brief self-assessment evaluation survey before and after their rotation with the AMCT at St Paul's Hospital, Vancouver. Alumni are then followed up with the same survey annually. The study was approved by the Research Ethics Board at Providence Healthcare Research Institute, University of British Columbia. All participants were informed of the study purpose, as well as the voluntary and anonymous nature of participation before signing informed e-consent.

Survey development and data collection.—The developed survey was based on previous research and tailored to the key learning objectives of the AMCT rotation.[22]

On the first and second-to-last day of the elective, all learners were emailed a link to the online survey. In this survey, learners were asked to indicate their degree of agreement with nine statements (concerning the elective's learning objectives), using a seven-point Likert-type scale (strongly agree–strongly disagree). Each statement starts with uniform wording: "*I have a good knowledge of* …" followed by specific areas of interest, e.g., "*screening patients for risky substance use or substance use disorder*." Areas covered by the survey included substance use screening, history taking, examination of signs and symptoms, withdrawal treatment, relapse prevention, nicotine use disorders, opioid use disorders, safe prescribing, and the biology of substance use disorders.

Following completion of the rotation (4–52 weeks), a purposeful 10% sub-sample was invited to take part in 50-minute semi-structured individual interviews about their experiences in the program. Because an assumption of this analysis was that experiences on the clinical rotation may differ with learner type (i.e., medical student, resident, fellow, etc), recruitment continued until there was a roughly equal proportion of each learner type represented in the sample. This targeted sub-sample was selected to gain insight into the process of knowledge acquisition and the nuances of learning process specific to SUDs in this setting. The purposeful sampling used in this recruitment is commonly used in qualitative research for the identification and selection of information-rich cases for the most effective use of limited resources.[23] To maintain learner anonymity, all participants were given a unique subject ID, which was linked to subject names in a password-protected file on a secure hospital database. Questionnaires were also labeled using unique subject IDs and kept separate from identifying information in a locked filing cabinet. Individual interviews were conducted in a private setting by trained interviewers, and transcribed by a third-party contractor without access to subject identities. All transcripts were then imported to qualitative analysis software (NVivo 10) using anonymized subject IDs.

Data analysis.—The primary endpoint for our statistical comparisons was the mean difference between assessments at the start and at the end of the elective (out of the maximum possible 63 points). We also examined differences between groups of medical learners, and changes in self-reported learning within each of the elective's objectives. Linear regression and t-tests were used to test statistical significance of the differences with SAS 9.4 (SAS, Cary, NC). Qualitative data were analysed using NVivo 10 (www.qsrinternational.com). One researcher coded the transcripts of qualitative data (BR), followed by audit of emerging themes by another author (JK). It was hypothesized that there would be a significant difference between self-rated competency at the beginning and end of the clinical rotations, and that learner groups would differ in their qualitative reports of experiences on the rotation.

RESULTS

Quantitative analysis

Of the total 168 invited trainees, 156 (92.9%) completed the pre-rotation self-assessments from May 2015 – May 2017. A 91% (n = 142) follow-up rate was achieved post-rotation A total of 88 participants who completed both the pre- and post-rotation surveys had available demographic data, summarized in Table 1. Median age was 29 years (IQR=27–31), and median rotation length was 14 days (IQR=12–26). The quantitative cohort consisted of medical students (n=45), residents (n=34), and clinical fellows / practicing family physicians ('Enhanced Skills Learners') (n=9). Of the 56 participants with available data on location of origin, the majority were from British Columbia or Ontario, while the rest were from other Canadian provinces or countries.

Improvements in knowledge.—At the start of the rotation, participants' median self-reported knowledge was 33 (Interquartile range [IQR]=28–39) points. As shown in Table 2, at the end of the elective, trainees reported significantly improved overall knowledge in addiction medicine (Mean = 33.65 (pre-test) *vs.* 45.53 (post-test), p <0.001). The most and the least improved areas were Relapse Prevention (Mean difference [M] = 1.63; Standard Deviation [SD] = 2.63; p < 0.0001) and Biology of Substance Use Disorders (M = 0.85; SD = 1.87; P<0.0001), respectively. The other areas improved in the following order (from highest to lowest): Opioid use disorders, Safe prescribing, Signs and symptoms recognition, History-taking, Withdrawal management, Nicotine use disorders, Substance use screening. In all areas, differences between Pre- and Post-rotation scores were statistically significant (P<.0001). Linear regression revealed no differences in self-rated knowledge scores as a result of different rotation lengths (p>.05).

Differences between medical learners.—A linear regression of learner scores revealed that medical students self-reported significantly greater knowledge benefits than the other groups of learners on four out of nine competencies assessed. These included Substance use screening (estimated mean difference [MD] = 0.74 [95% CI 0.19, 1.29], p = 0.009), Withdrawal management (MD = 0.66 [95% CI 0.08, 1.24], p = 0.027), Opioid use disorders (MD = 0.70 [95% CI = 0.14, 1.27], p = 0.015), and Safe prescribing (MD = 0.64 [95% CI 0.02, 1.26], p = 0.044), and corresponded to an overall significant difference in knowledge gains between medical students and other groups (MD = 4.43 [95% CI = 0.76 – 8.09], p<.05).

In two of the four areas with significant differences -safe prescribing and opioid use disorder- medical students scored lower versus other types of learners at baseline (Safety: estimated MD = −0.57 [95% CI = −1.12 - −0.02], P = 0.043; Opioid: estimated MD = −0.54 [95% CI = −1.02 - −0.05], P = 0.032). No other significant differences were observed between different learner types or physician specialties.

Illustrative Quotes

A purposefully selected sample of 18 trainees (i.e., medical students [n=6], residents [n=4], clinical / research fellows [n=6], and visiting scholars [n=2]) participated in qualitative

interviews that elicited feedback on the rotation. Interview transcripts were organised into three key themes reflecting trainees' experiences and learning throughout the rotation: (i) Examination, Identification and Diagnosis, (ii) Treatment and Care, and (iii) Research experience.

Examination, Identification and Diagnosis.—Consistent with our quantitative findings, participants reported overall improvements in recognition and diagnosis of SUD following the rotation. As well, in line with the elective's vision, these improvements were a direct result of the opportunities for experiential learning:

> "I've become more comfortable, especially with alcohol, in the different diagnosis of people who use alcohol… there's differences between a mild, moderate and severe and… I can tell the difference between the three of them whereas before [the rotation] it was just an academic understanding" (Participant #37, Clinical Fellow)

Throughout the rotation, participants had the opportunity to work closely with experienced addiction medicine specialists on the AMCT. Improved recognition of less common conditions appeared to be more a result of hearing the reasoning of experienced staff, rather than silently shadowing specialists, watching examinations, or both:

> "One staff… he diagnosed a PCP overdose which I've never seen before based on some subtle observations about the way this young person was moving. I mean a lot of the good learning happens by listening to the reasoning process of someone who's more experienced than you" (Participant #25, Resident)

Treatment and Care.—Corresponding with our quantitative findings, interviewees reported improvements in their knowledge pertaining to relapse prevention, an improvement specifically associated with plans to change behaviour in practice:

> "I wasn't even aware there were medications, besides Antabuse, to use for alcohol [use disorders], and now that I've not only become aware of it, but I've seen the medications working in people, that will definitely become a part of my practice going forward" (Participant #37, Clinical Fellow).

> "Like [one staff] would be kind but also firm so … [the patient would] be like 'I tried to stop using but then I used again last week.' And he'd say 'well why?' and usually if I asked that question [the patient would] be like 'I don't know'. But he would just say 'come on, come on man,' … people would realize he's not judging them but he's really keeping them accountable. And then these people that I had just written off as kind of invalids to be honest would come up and say all this totally insightful stuff … that was a real insight for me … that's again where I can use change talk to work with [patients] wherever they're at" (Participant #28, Clinical Fellow)

Research experience.—Participants who opted to take part in the immersive research training, which was offered as part of the elective, reported an overall greater ability to carry out a research project:

> "On the research side, I definitely feel more competent in how a research question is formulated and how one would go about trying to answer it. On the qualitative side, previously, I wasn't really sure how you would collate that much data and be able to find meaningful themes and it was really helpful to see how that was worked out" (Participant #50, medical student)

However, improvements appeared to be focused on identification of meaningful opportunities for practice-oriented research, and on formulation of research questions, rather than study design or manuscript production:

> "it's heightened my awareness of opportunities for research, if they're people talking about a program change, or something like that, that's a perfect example to see if things work better or not" (Participant #2, Research fellow)

Differences between medical learners.—The observed differences between knowledge acquired by medical students versus other learners in survey results were also present in the interviews, described as a product of their early stage of medical education:

> "Learning about the medicinal supports for substance abuse issues and addiction and obviously I can't do any of that yet but I hadn't even thought about it really other than I know medications existed" (Participant #47, medical student)

Overall, at the end of the elective, fellow and resident interviews elaborated on increasing knowledge, while medical students reported increasing knowledge but still feeling that there was much more to learn:

> "I feel almost like it's a little bit above my level just right now because I am just learning how to do basic medicine. One day, I think it will be very useful" (Participant #17, medical student)

DISCUSSION

We found that medical trainees report higher levels of knowledge in addiction medicine following a month-long elective with a team of addiction consultants based in a hospital. All self-assessed competencies improved significantly. A 91% follow-up rate was achieved (142 of 156) post rotation, suggesting that hands-on experiential training in addiction medicine can be feasibly evaluated among medical students, residents and emerging physicians. In qualitative interviews, it was observed that experiential learning played an important role in participants' learning, with experienced staff sharing reasoning for their clinical decisions being particularly beneficial. Relapse prevention –both through pharmaceutical and psychosocial therapies– was also reported to be significantly improved as a result of the rotation. These experiences appeared to demonstrate the use of unfamiliar treatments and techniques in practice, and were associated with reports of integrating new knowledge into the future clinical practice of trainees. Finally, although the experience of authoring a research article was reported to be generally beneficial, knowledge gains reported by learners focused heavily around the research process and idea formulation, rather than study implementation or analysis.

An important implication of this analysis for healthcare policy is that although hands-on training in addiction medicine tends to be overlooked in medical education, both emerging and established physicians appear to be responsive to this training, as previously reported by others.[15,24] Providing this type of experiential learning in a hospital may be an unusual component in the education of healthcare providers,[8] but our findings appear to support the conclusion that it would be favourably accepted.

Overall, medical students appear to feel that they benefit most from this intervention compared to other types of learners, as suggested by significant differences in self-assessed knowledge acquired on four out of nine competencies assessed (Substance use screening, Withdrawal management, Opioid use disorders, and Safe prescribing). However, linear regression of pre-rotation scores revealed significant differences in self-assessed baseline knowledge of medical students and other trainees in two of these areas (Safe prescribing and Opioid use disorder). As well, in qualitative interviews medical students reported feeling that they still had much more to learn, suggesting that these findings may be a product of the earlier educational stage of medical students participating in the rotation. In future evaluations, it may therefore be beneficial to use methods that are tailored to each level of training to assess the relative benefits of these programs. In targeting specifically medical students, addiction medicine training may ultimately reach the broadest range of medical fields and influence the likelihood of undertaking additional training in addiction medicine. Indeed, focusing addiction medicine electives on medical students may also aid in training future health professionals who may have not independently sought out these educational opportunities at a later time. As SUDs are not limited to a single field of medicine, spanning primary care, internal medicine, pain treatment, and more, focusing education on an earlier stage of training may ultimately allow for more effective identification and treatment in a broader range of contexts. In light of the pressing need for improved knowledge of SUDs in healthcare settings,[5–7] all learner types should be targeted for training in addiction medicine; however, our study findings suggest that medical school is the optimal time to introduce this type of training.

We acknowledge several limitations that may limit generalizability of these findings. First, the self-assessment tool captures only self-perceived competency in a certain area, and may not accurately reflect a change in knowledge or behaviour. In order to make more robust statements regarding the efficacy of particular learning experiences and programs, this tool must be validated by objective measures of learning and professional clinical practice in future research.[25] Second, inclusion of learners from a single location may have introduced bias into the observation. Third, the self-selection of trainees for the elective with the St. Paul’s hospital team may mean that study participants were more likely to have a higher level of interest or experience or both. It is indeed likely that clinicians who seek specialised training are more prone to have positive attitudes towards, and more learning experience with, people who have SUDs.[26] Fifth, although there was a clear increase in self-assessed knowledge among participants, we did not capture a corresponding change in provider behaviour following the rotation. Still, an indication of such change was present in the qualitative interviews that allowed triangulation of our survey data. Finally, it may be difficult to recreate this program in other settings, which may lack the resources and staff necessary to provide such a multidisciplinary educational opportunity. Nevertheless, this

study provides a sample structure and curriculum for expansion of similar programs to novel contexts, as well as demonstrates the feasibility and efficacy of a hospital-based rotation in addiction medicine for all types of medical learners.

Future research should examine whether there are differences in knowledge gained by medical students who voluntarily opt into versus mandatorily take part in addiction medicine electives, as well as the retention and long-term effects of this training following specialization in other medical fields. Future studies should also examine whether increased knowledge after hospital-based electives translates into changes in provider behaviour and patient outcomes, using control groups of learners who receive no hands-on experiential training, or who undergo rotations in other settings.

In sum, an elective with a hospital-based Addiction Medicine Consult Team appears to substantially improve medical trainees' knowledge, with medical students appearing to receive the greatest self-assessed benefits. Further evaluation and expansion of addiction medicine education and training is warranted to develop the next generation of skilled addiction care providers.

Acknowledgments

We thank the participants for completing the surveys and staff, Bastian Weitzel, Peter Vann, Liz Yue and Tricia Collingham, for assisting with teaching administration.

Funding

The study was supported by the US National Institutes of Health (R25DA037756). This research was undertaken, in part, thanks to [14] funding from the Canada Research Chairs program through a Tier 1 Canada Research Chair in Inner City Medicine that supports Dr. Evan Wood. A European Commission grant (701698) supported Dr. Jan Klimas. Dr. Nadia Fairbairn is supported by a Michael Smith [15] Foundation for Health Research (MSFHR)/St. Paul's Foundation Scholar award.

REFERENCES

1. Degenhardt L, Hall W. Extent of illicit drug use and dependence, and their contribution to the global burden of disease. Lancet. 2012;379(9810):55–70. [PubMed: 22225671]
2. US Burden of Disease Collaborators. The state of US health, 1990–2010: burden of diseases, injuries, and risk factors. JAMA : the journal of the American Medical Association. 2013;310(6): 591–608. [PubMed: 23842577]
3. United Nations International Drug Control Programme., United Nations Office for Drug Control and Crime Prevention., United Nations Office on Drugs and Crime. World drug report. Oxford: Oxford University Press; 2016:v.
4. The National Centre on Addiction and Substance Abuse at Columbia University. Addiction medicine: closing the gap between science and practice 2012.
5. Barss P, Grivna M, Al-Maskari F, Kershaw G. Strengthening public health medicine training for medical students: development and evaluation of a lifestyle curriculum. Med Teach. 2008;30(9–10):e196–218. [PubMed: 19117217]
6. Conroy MB, Delichatsios HK, Hafler JP, Rigotti NA. Impact of a preventive medicine and nutrition curriculum for medical students. Am J Prev Med. 2004;27(1):77–80. [PubMed: 15212779]
7. Buckley S, Coleman J, Davison I, et al. The educational effects of portfolios on undergraduate student learning: a Best Evidence Medical Education (BEME) systematic review. BEME Guide No. 11. Med Teach. 2009;31(4):282–298. [PubMed: 19404891]

8. Ayu AP, Schellekens AFA, Iskandar S, Pinxten L, De Jong CAJ. Effectiveness and Organization of Addiction Medicine Training Across the Globe. European Addiction Research. 2015;21(5):223–239. [PubMed: 25966903]
9. O'Toole TP, Pollini RA, Ford DE, Bigelow G. The health encounter as a treatable moment for homeless substance-using adults: The role of homelessness, health seeking behavior, readiness for behavior change and motivation for treatment. Addictive Behaviors. 2008;33(9):1239–1243. [PubMed: 18562126]
10. O'Toole TP, Conde-Martel A, Gibbon JL, Hanusa BH, Freyder PJ, Fine MJ. Where do people go when they first become homeless? A survey of homeless adults in the USA. Health and Social Care in the Community. 2007;15(5):446–453. [PubMed: 17685990]
11. Wakeman SE, Pham-Kanter G, Donelan K. Attitudes, practices, and preparedness to care for patients with substance use disorder: Results from a survey of general internists. Subst Abus. 2016;37(4):635–641. [PubMed: 27164025]
12. Klimas J, Ahamad K, Fairgrieve C, et al. Impact of a brief addiction medicine training experience on knowledge self-assessment among medical learners. Substance Abuse. 2017;38(2):141–144. [PubMed: 28394732]
13. Warner ML, Mooney AJ 3rd. The hospital treatment of alcoholism and drug addiction. Prim Care. 1993;20(1):95–105. [PubMed: 8464951]
14. Kokotailo PK, Langhough R, Neary EJ, Matson SC, Fleming MF. Improving pediatric residents' alcohol and other drug use clinical skills: use of an experiential curriculum. Pediatrics. 1995;96(1): 99–104. [PubMed: 7596731]
15. Barron R, Frank E, Gitlow S. Evaluation of an Experiential Curriculum for Addiction Education Among Medical Students. Journal of Addiction Medicine. 2012;6(2):131–136. [PubMed: 22534417]
16. Wakeman SE, Pham-Kanter G, Baggett MV, Campbell EG. Medicine Resident Preparedness to Diagnose and Treat Substance Use Disorders: Impact of an Enhanced Curriculum. Subst Abus. 2015;36(4):427–433. [PubMed: 25257796]
17. Wood E, Sakakibara T, McIver G, McLean M. A UBC, Vancouver Coastal Health and St. Paul s Hospital Strategy for Education in Addiction Medicine. UBC Medical Journal. 2013;5(1):5–7.
18. Rieb L, Wood E. The Evolution of Addiction Medicine Education in British Columbia. Canadian Journal of Addiction. 2014;5(3):17–20.
19. Strathdee SA, Palepu A, Cornelisse PG, et al. Barriers to use of free antiretroviral therapy in injection drug users. JAMA : the journal of the American Medical Association. 1998;280(6):547–549. [PubMed: 9707146]
20. Wood E, Hogg RS, Bonner S, et al. Staging for antiretroviral therapy among HIV-infected drug users. JAMA : the journal of the American Medical Association. 2004;292(10):1175–1177. [PubMed: 15353528]
21. Kerr T, Small W, Johnston C, Li K, Montaner JS, Wood E. Characteristics of injection drug users who participate in drug dealing: implications for drug policy. Journal of psychoactive drugs. 2008;40(2):147–152. [PubMed: 18720663]
22. Wakeman SE, Baggett MV, Pham-Kanter G, Campbell EG. Internal Medicine Residents' Training in Substance Use Disorders: A Survey of the Quality of Instruction and Residents' Self-Perceived Preparedness to Diagnose and Treat Addiction. Substance Abuse. 2013;34(4):363–370. [PubMed: 24159907]
23. Palinkas LA, Horwitz SM, Green CA, Wisdom JP, Duan N, Hoagwood K. Purposeful Sampling for Qualitative Data Collection and Analysis in Mixed Method Implementation Research. Adm Policy Ment Health. 2015;42(5):533–544. [PubMed: 24193818]
24. Cole B, Clark DC, Seale JP, et al. Reinventing the Reel: An Innovative Approach to Resident Skill-Building in Motivational Interviewing for Brief Intervention. Substance Abuse. 2012;33(3):278–281. [PubMed: 22738005]
25. Colthart I, Bagnall G, Evans A, et al. The effectiveness of self-assessment on the identification of learner needs, learner activity, and impact on clinical practice: BEME Guide no. 10. Med Teach. 2008;30(2):124–145. [PubMed: 18464136]

26. Strang J, Hunt C, Gerada C, Marsden J. What difference does training make? A randomized trial with waiting-list control of general practitioners seeking advanced training in drug misuse. Addiction. 2007;102(10):1637–1647. [PubMed: 17662105]

TABLE 1.

Characteristics of the study participants who completed both the pre- and post-rotation surveys and who had available demographic data (n=88)

Characteristic	n (%) 88 (62.0)
Age (median years, IQR *)	29 (27–31)
Length of rotation (median days, IQR)	14 (12–26)
Type of Medical Trainee	
Medical student	45 (51.1)
Resident	34 (38.6)
Addiction Medicine Fellows / Enhanced Skills Learners	9 (10.2)
Specialty (for non-medical students)	**n = 43 (30.3)**
Emergency medicine	1 (2.3)
Family Medicine	14 (32.6)
Internal Medicine	6 (14.0)
Psychiatry	8 (18.6)
Public Health &Prevention	1 (2.3)
Unknown	12 (27.9)
Addiction Medicine Nursing	1 (2.3)
Province of origin (with data available)	**n = 56 (39.4)**
British Columbia	29 (51.8)
Ontario	16 (28.6)
Nova Scotia	2 (3.6)
Manitoba	1 (1.8)
Newfoundland	4 (7.1)
Quebec	2 (3.6)
International	2 (3.6)

* IQR= inter quartile range

TABLE 2.

Self-assessment of knowledge in addiction medicine among trainees with matched pre and post test scores undergoing an addiction medicine rotation, with *p*-values, stratified by competency before and after rotation (n=142).

Competency[§]	Before rotation	After rotation	Mean difference M (SD)
Substance use screening	4.06	5.20	1.15 (1.84) ***
History taking	4.00	5.33	1.33 (2.15) ***
Signs and symptoms examining	3.70	5.12	1.42 (1.93) ***
Treating withdrawal	3.63	4.85	1.23 (2.05) ***
Relapse prevention	3.41	5.04	1.63 (2.63) ***
Nicotine use disorders	3.85	5.06	1.20 (2.02) ***
Opioid use disorders	3.65	5.25	1.60 (2.28) ***
Safe prescribing	3.47	4.94	1.47 (2.48) ***
Biology of substance use disorders	3.88	4.73	0.85 (1.86) ***
TOTAL	**33.65**	**45.53**	**11.87 (17.0)** ***

[§]Please see Klimas et al (2017) for full details of competencies assessed.[12]

***P-value < 0.0001;

Each competency was measured with a Likert-type scale, ranging from 1 (strongly disagree) – 7 (strongly agree), total possible score range: 9–63.