Development and Evaluation of the Online Addiction Medicine Certificate: A Free Novel Program in a Canadian Setting

Gorfinkel, L.[1,2], Giesler, A.[1], Dong, H.[1,3], Wood, E.[1,4], Fairbairn, N.[1,4], Klimas, J.[1,4,5]

1. British Columbia Centre on Substance Use 400-1045 Howe Street, Vancouver, BC, CANADA, V6Z 2A9

2. Mailman School of Public Health, Columbia University, 722 W 168th St, New York, NY 10032, USA

3. School of Population and Public Health, University of British Columbia, 2206 E Mall, Vancouver, BC V6T 1Z3 E Mall, Vancouver, BC, CANADA, V6T 1Z3

4. Department of Medicine, University of British Columbia, St. Paul's Hospital, 608-1081 Burrard Street, Vancouver, BC, CANADA, V6Z 1Y6

5. School of Medicine, University College Dublin, Health Sciences Centre, Belfield, Dublin 4, Ireland

Send correspondence to: Jan Klimas, MSc, PhD
B.C. Centre on Substance Use
University of British Columbia
400-1045 Howe Street, Vancouver, B.C., V6Z 2A9
Canada
Email: jan.klimas@bccsu.ubc.ca

Word Count: 2,873
Boxes: 2
Tables: 3
Figures: 2
Revised: 21 September 2018

ABSTRACT

Background: Despite the enormous burden of disease attributable to drug and alcohol addiction, there remain major challenges in implementing evidence-based addiction care and treatment modalities. This is partly due to a persistent lack of accessible, specialized training in addiction medicine. In response, a new online certificate in addiction medicine has been established in Vancouver, Canada, free of charge to participants globally.

Objectives: To evaluate and examine changes in knowledge acquisition among health care professionals before and after completion of an online certificate in addiction medicine.

Methods: Learners enrolled in a 17-module certificate program and completed pre- and post-knowledge tests using online multiple-choice questionnaires. Knowledge acquisition was then evaluated using a repeated measures t-test of mean test scores before and after the online course. Following certificate completion, a subset of learners completed online course evaluation form.

Results: Of the total 6985 participants who registered for the online course between May 15, 2017 and February 22, 2018, 3466 (49.6%) completed the online pre-test questionnaire. A total of 1010 participants completed the full course, achieving the required 70% scores. Participants self-reported working in a broad range of health-related fields, including nursing (371), medicine (92), counselling or social work (69), community health (44), and pharmacy (34). The median graduation year was 2010 (n = 363, interquartile range 2002-2015). Knowledge of addiction medicine increased significantly post-certificate (mean difference 28.21; 95% Confidence Interval 27.32-29.10; $p<0.001$). Physicians scored significantly higher on the pre-test than any other health discipline ($p<0.01$), while the greatest improvement in scores was seen in the counselling professions ($p<0.05$) and community outreach ($p<0.01$).

Conclusions: This free, online, open-access certificate in addiction medicine was found to improve knowledge of learners from a variety of disciplines and backgrounds. Scaling up "low threshold" learning opportunities may further advance addiction medicine training, thereby helping to narrow the evidence-to-practice gap.

Word Count: 304

Keywords: medical education; substance-related disorders; online programs

INTRODUCTION

Approximately 29 million people are affected by substance use disorders (SUDs) annually [1], with an estimated 21 billion dollars lost in associated productivity costs in the U.S. alone [2]. In recent years, a sharp rise in the number of opioid-related overdose deaths has led to declaration of public health emergencies around North America, and the number of individuals affected by alcohol use disorders continues to increase [3-5]. Still, uptake of evidence-based SUD treatment is low, and people with SUDs often receive inadequate care [6]. This is despite recent progress in addiction science, which has highlighted the important role of skilled health care providers and the efficacy of established psychosocial and pharmacological therapies in improving treatment outcomes [1, 6-8]. Moreover, most health care providers frequently report feeling unprepared to effectively identify and treat SUDs, and the stigma towards persons with SUDs persists among the health professions [9-11].

To address these gaps in practice, health professionals need better education and training in addiction medicine. However, such specialized training programs in addiction medicine can be inaccessible due to a limited number of available places, inability to compensate participants for their time, and the location of training (often big, urban centers) [12-15]. In addition, many of these programs accept only a particular subset of health care professionals –for instance, only physicians or social workers- and have limited resources for expansion. At the same time, effectively training a variety of health care providers in evidence-based treatment of SUDs is critical for providing quality care, as well as curbing the current opioid epidemic. One solution to overcome these challenges is through the expansion of online training programs in addiction medicine, which can reach a large number of participants, train professionals from a wide range of health disciplines, can be accessed from a wide variety of settings, and can be delivered at a relatively low cost [16,

17]. Although the literature suggests that online continuing professional development (CPD) courses in health care can be equally effective as traditional classroom-based courses [17-19], this has not been demonstrated for addiction medicine. Therefore, we sought to evaluate changes in knowledge acquisition before and after completion of a new, comprehensive and accredited online certificate in addiction medicine, accessible and free of charge to learners worldwide.

METHODS

Course description

The Online Addiction Medicine Certificate is a free online course and certificate program, is open for anyone wishing to improve their knowledge of substance use though is targeted at health professionals who are interested in learning more about care for patients with SUDs. The course involves 17 modules related to the identification, management, and treatment of SUDs. Box 1 lists the course learning objectives and topics covered. Each module consists of a 20- to 75-minute video lecture (including a slideshow with spoken voiceover) by an expert in the relevant topic. Each module (with the exception of modules 1 and 17) is then followed by a brief multiple-choice test of the module material. All multiple-choice questions were Single Best Answer with four answer options. Those looking to obtain a formal certificate and/or a Continued Medical Education (CME) certificate must complete all of the modules, achieving a minimum passing score of 70% on all post-module tests. Overall, the online course takes approximately 16 hours to complete; however, it is self-paced, so learners can complete each module in their own time. Modules do not have to be completed in chronological order, allowing learners to select the topics that most interest or benefit them. Once a learner completes the course, they must pass through an online evaluation form (with one mandatory question on potential bias in course content) in order to receive a digital certificate.

Prior to release, this course was accredited via review and approval by the University of British Columbia Division of Continuing Professional Development. This required a formal committee with representation of the target audience, a high degree of evidence and referencing throughout, and no industry bias or involvement. The course also met the certification criteria of the College of Family Physicians of Canada, as well as Maintenance of Certification Program of The Royal College of Physicians and Surgeons of Canada.

Course development and background

Based on informal and formal consultation with a range of stakeholders by the course's planning committee, it was clear that there was general lack of awareness of the range of evidence-based treatments for SUDs. Specifically, there was an unmet need for specific education and training for health care professionals on SUDs that was accessible and provided at no cost. In response to this need, the British Columbia Centre on Substance Use (BCCSU) developed this structured course in partnership with content experts throughout British Columbia. This included physicians in the areas of psychiatry, public health, internal medicine and family medicine. While the target audience of the program is primarily prescribers, modules were created to be accessible to all allied health disciplines, including nurses, social workers, psychologists, and were also accessible for a general audience.

The course design utilizes a case-based learning structure, with theoretical and academic context nested in the introductions to the chapter. The topics, content, and speakers were selected through recommendations and advice from the planning committee. Each chapter is taught by a faculty member that has extensive experience with the particular topic and would be considered an expert in the province. Physician members of the planning committee were instrumental in ensuring that all materials were evidence-based and relevant to physicians practicing in primary

care environments. Prior to beginning their presentations, the course's lead author (EW) and the planning committee required faculty members to submit detailed chapter outlines. These were thoroughly reviewed and feedback was returned to presenters for incorporation into their lecture and presentation slides. The finalized presentations were then reviewed to ensure validity and objectivity of content. The lectures were recorded between August 2015 – May 2016. The course was hosted on the host center's website using a Wordpress content management system.

The course leads and Advisory Committee guide ongoing, year-round recruitment activities. Participant recruitment strategies include disseminating advertisements through email mailing lists, posters, brochures, descriptions and links in our website, lay media advertisements, conference participation, newsletters, social media, and word of mouth. Additionally, the course was promoted through in-person seminars focused on substance use across Canada.

Procedures

In order to take the online course, participants first had to register using the online registration form. Here, learners were given space to fill in their full name and email address, and were asked to select their home province from a drop-down menu (all Canadian provinces and 'Other' were listed). Providing province information became mandatory after the first month of the course. In the registration form, learners were also asked to select their professional discipline from a given list. Following registration, learners completed a multiple-choice knowledge test (the "pre-test") to evaluate baseline knowledge of course content. As well, following each module, learners completed multiple-choice knowledge tests (the "post-tests") to evaluate understanding of the material just taught.

Because two of the modules (1 and 17, the introduction and conclusion) lacked post-tests, in order to pass the online course, learners had to complete a total of 15 post-tests. When all post-tests were completed with a minimum 70% score, learners were then given the option to complete

an online evaluation form, gauging their satisfaction with the program and the applicability of course material to their clinical practice. The evaluation form also asked for further demographic information, such as professional discipline, the year that learners completed their professional degrees, and the health care settings in which they provide services.

Survey development

Questions on pre- and post-tests were developed by a combination of the course's lead author (EW) and the lecturers. Questions were updated by the course coordinator (AG), BCCSU staff, and experienced clinicians in addiction medicine. All pre- and post-tests used a multiple-choice format, and were designed to measure changes in learners' knowledge of addiction medicine and SUDs. The pre-test consists of 30 knowledge questions of material and learning objectives from all course modules. The post-tests are each 3-10 multiple-choice questions, covering only material from the relevant module. Box 2 represents the question format adhered to in this course. Although all pre-test questions were asked post-course, it was impossible for these questions to be matched item-to-item with pre-test results, due to the online platform set-up. While a minimum score of 70% is required to pass each post-test, there is no such requirement for the 30-item pre-test. Learners can also attempt post-tests multiple times, resulting in the number of learners passing each module being unequal to the number of all recorded attempts at each post-test. As a result of learner feedback, some post-test questions were altered over the course of the study period. For example, changes were made to the phrasing of questions in the module "Alcohol Use Disorder".

The current 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.

Data analysis

Data from the course registration, and pre- and post-tests were linked using participants' full names and email addresses. Using registration data, participants were divided into seven broad health-related fields: (1) "Medicine", (2) "Nursing", (3) "Pharmacy", (4) "Counselling/Social Work", (5) "Community Outreach/Support Work", (6) "Residents/Students", and (7) "Other".

We measured the effectiveness of the course using: (1) Completion rate (percentage of participants who attempted all 15 post-tests out of the total number of participants registered); (2) Success rate (percentage of participants who successfully passed all 15 post-tests out of the total number of participants who attempted *all* 15 post-tests); (3) Commitment rate (percentage of participants who passed all 15 post-tests out of the total number of participants who attempted at least *one* post-test); and (4) Mean difference between the assessments at the start (pre-test) and at the end (post-tests) of the online course. The pre-test score was used as a proxy for pre-course knowledge and the mean of all post-test scores was used as an indicator of overall post-course knowledge. A repeated measures design with t- tests of mean scores on pre- and post-tests therefore evaluated positive knowledge acquisition in participants who completed all 15 post-tests. Scores on all tests were measured in percentage terms. When a participant attempted a post-test more than once, the mean score from all of that participant's *attempts* was taken (not only those which surpassed 70%), so as to keep one post-test value per participant and module.

We also examined differences in test scores between participants in different health-related fields (e.g., nursing, pharmacy). Health professionals with significantly greater pre-test scores were taken to have greater baseline knowledge than other health professionals taking the course. As well, health professionals with a significantly greater difference in scores were taken to have had greater knowledge benefits than other health professionals taking the course. Linear regression

and paired t-tests were used to test statistical significance of these differences with SAS 9.4 (SAS, Cary, NC). All p-values were two-sided.

RESULTS

Registration and participant characteristics
Between May 15, 2017 and February 22, 2018, 6,985 persons registered for the course. During this period, there was a steady linear increase in total number of course registrations, with a particularly sharp rise in the number of nurses (Figure 1). Of those who registered, 3,466 completed the pre-test and attempted at least one module's post-test. A total of 1,010 then attempted every post-test at least once, all of whom achieved the minimum passing score of 70% on one attempt of each test. Therefore, the course had a completion rate of 14.5%, success rate of 100%, and commitment rate of 29.1%.

Among the 1,010 course completers, participants self-reported working in a broad range of health-related fields, mostly nursing (n = 371 [36.7%]) and medicine (n = 92 [9.1%], Table 1). There was an overall difference in the province of origin between those who did and did not complete the course (*p*=0.013), with a higher proportion of Ontarians and Prairie residents among completers versus non-completers (Table 1).

TABLE 1. Sociodemographic characteristics of the sample, with *p*-values, stratified by certificate completion status

Characteristic	Total (%) (N=3466)	Completion status		*p* - value
		Completers (N=1010) n (%)	Ongoing learners[a] (N=2456) n (%)	
Province				0.013
British Columbia	1371 (39.6)	362 (35.8)	1009 (41.1)	
Prairie provinces (SK, MB, AB)[b]	716 (20.7)	237 (23.5)	479 (19.5)	

Ontario	237 (6.8)	71 (7.0)	166 (6.8)
Quebec/Atlantic regions (NB, NL, NS, PEI)[c]	101 (2.9)	24 (2.4)	77 (3.1)
Missing/Other[d]	1041 (30.0)	316 (31.3)	725 (29.5)
Self-identified discipline			<0.001
Medicine	274 (7.9)	92 (9.1)	182 (7.4)
Nursing	1265 (36.5)	371 (36.7)	894 (36.4)
Counselling or Social work	346 (10.0)	69 (6.8)	277 (11.3)
Pharmacy	124 (3.6)	34 (3.4)	90 (3.7)
Student or resident	239 (6.9)	61 (6.0)	178 (7.3)
Community outreach	167 (4.8)	44 (4.4)	123 (5.0)
Other	1051 (30.3)	339 (33.6)	712 (29.0)
Practice setting[e] (n = 475)			
Community Based Organization	-	99 (17.3)	-	-
Physician Office Based Practice	-	64 (11.2)	-
Private Drug Treatment Clinic	-	18 (3.1)	-
Provincial Health Authority	-	152 (26.6)	-
Community Health Centre	-	101 (17.7)	-
Other[f]	-	138 (24.1)	-

[a] This includes participants who may have registered but have not yet started the course, participants who had not yet completed the course at the time of data collection, and participants who completed the course but did not pass.
[b] SK=Saskatchewan, MB=Manitoba, AB=Alberta
[c] NB=New Brunswick, NL=Newfoundland, NS=Nova Scotia, PEI=Price Edward Island
[d] This includes participants from international settings as well as those with missing location data.
[e] Only participants who passed the course filled in this information in the satisfaction form; totals do not add up to 475 since participants could select more than one service setting
[f] Other settings included hospitals, mental health facilities, pharmacies, group homes and more.

Knowledge of addiction medicine

Attempting (regardless of pass/fail status) all 15 modules with post-tests was a study inclusion criterion. However, since all learners who attempted every module also passed the course, a total of 1,010 "attempters" were included in analyses.

Post-certificate, knowledge of addiction medicine increased significantly (mean difference = 28.2; 95% Confidence Interval 27.3-29.1; $p<0.001$) (Table 2). Physicians scored significantly higher on the pre-test than any other health discipline ($p<0.01$), while the greatest improvement in

scores was seen in the counselling ($p<0.05$) and community outreach ($p < 0.01$) professions (Table 3).

TABLE 2. Knowledge in addiction medicine among learners completing the free online certificate (n = 1010)

Module	Mean % score (SD)
Pre-test TOTAL	52.6 (14.5)
Post-test scores per module:	
Screening, Diagnosis and Brief Interventions	84.9 (14.3)
Opioid Use Disorder	78.1 (21.7)
Tobacco Use Disorder	88.3 (15.4)
Alcohol Use Disorder	75.1 (23.2)
Withdrawal Syndromes	79.6 (21.9)
Stimulant Use Disorder	76.5 (19.1)
Poly-Substance Use	75.1 (26.5)
Comorbid Mental Illness and Substance Use Disorder	77.1 (24.8)
Pain and Substance Use Disorders	77.8 (22.6)
Common Medical Complications	78.1 (21.9)
Safe Prescribing	74.1 (24.3)
Overdose Prevention and Harm Reduction	83.5 (22.0)
Psychosocial Interventions	81.9 (18.0)
Addiction in the Workplace	85.5 (17.5)
Recovery-Oriented Systems of Care	81.4 (18.0)
Post-test TOTAL	80.8 (8.7)
Mean diff. between total pre- and post-test scores (95% CI)	**28.2[a] (27.3-29.1)**

[a]P<0.001; CI = Confidence Interval

TABLE 3 Correlations between self-identified discipline, and (A) pre-test scores and (B) change in score from pre- to post-test (n=1010)

Discipline	Pre-test scores: Mean Diff. (95% CI)	Change in pre- and post-test scores: Mean Diff. (95% CI)
Medicine	Ref	Ref
Nursing	-8.4[a] (-14.1, -2.8)	2.6 (-0.7, 5.8)
Pharmacy	-8.2[b] (-12.8, -3.6)	5.0 (-0.7, 10.6)
Resident / Student	-7.9[a] (-11.1, -4.6)	3.3 (-1.4, 7.9)
Counselling / Social work	-9.9[a] (-14.3, -5.4)	5.6[c] (1.1, 10.0)
Community outreach / Support worker	-10.6[a] (-15.8, -5.5)	7.9[d] (2.7, 13.0)

Other	-6.9[c] (-10.2, -3.6)	2.3 (-1.0, 5.6)

Note. Negative mean difference signifies a score / change in scores lower than that of the reference group. Positive mean difference signifies a score / change in scores higher than that of the reference group. CI = Confidence Interval; Diff = difference

[a]P<0.001
[b]P=0.003
[c]P=0.015
[d]P=0.003

A subset of 475 participants (47.0%) completed the course satisfaction form. The most commonly reported service settings were provincial health authorities, community health centres, and community-based organizations (Figure 1). The median graduation year was 2010 (n = 363, interquartile range 2002-2015). Most (89%) of participants who completed the course evaluation either agreed or strongly agreed that the course successfully met their learning needs. In addition, the majority of participants rated the course's relevance to their practice (83%) and incorporation of evidence-based research (93%) as "above average" or "excellent" (Figure 2).

DISCUSSION

We sought to evaluate changes in knowledge acquisition before and after completion of a comprehensive online certificate in addiction medicine. Following the course, knowledge of addiction medicine increased significantly, with a completion rate of 14.5% (percentage of participants who attempted all 15 post-tests out of the total number of participants registered), success rate of 100% (percentage of participants who successfully passed all 15 post-tests out of the total number of participants who attempted *all* 15 post-tests), and commitment rate of 29.1% (percentage of participants who passed all 15 post-tests out of the total number of participants who attempted at least *one* post-test). Physicians scored significantly higher on the pre-test than any other health discipline, while the greatest improvement in scores was seen in the counselling professions and community outreach. The large majority of participants reported that the course

was effective in meeting their learning needs, was relevant to their practice, and well-incorporated evidence-based research.

This course is a novel online training program in addiction medicine – a field in urgent need of expanded educational opportunities for health care providers [9, 10, 20]. As of February 2018, the course had nearly 7000 registrants, confirming the strength of low threshold, online models for facilitating rapid scale-up of evidence-informed training in addiction medicine, and a high demand [21-23]. This demand was particularly notable among nurses who composed the largest proportion of health providers in our sample and saw the sharpest increase in registrations. As reported in previous articles [24], completion rates of open online courses are often lower than those of traditional in-person training, and may be more a product of participants' individual preferences and/or needs, rather than the course material or structure. As such, the observed completion rate of this course is in line with previous studies of open online courses, which report completion rates from 0.9 – 36.1% (median 6.5%) [24, 25]. It is also important to note that the online certificate in addiction medicine was intentionally structured for participants to select the modules most relevant to them.

Similar to previous studies of online courses on SUDs, we found a significant increase in knowledge of addiction medicine post-certificate [22, 23, 26, 27]. In addition, this study highlighted which health professions may derive the most benefit from such a course. Aligned with prior literature, which has shown that education in SUD care is often lacking in social work and counselling curricula [22, 28], participants in counselling/social work and community outreach demonstrated the greatest improvement in scores. For example, in one study of university-level counselling and social work programs, it was found that just 69% of masters-level counselling programs, 3% of bachelors-level social work programs, and 2% of masters-level social work

programs required a course in SUD care [29]. Although it is clear that professionals in counseling/social work and community outreach should be targeted for similar training in the future, the online format can present unique barriers - including time- and schedule-constraints - as noted by previous studies of online training in SUDs [30].

Several limitations may reduce generalizability of our findings. First, due to inconsistencies in the data, for some participants, it was impossible to link their course registration data and test scores. Second, the large number of participants from western Canada may have introduced bias into the results, as health care professional' knowledge and training in addiction medicine may vary by setting. Promoting the course to a more international audience could improve training and highlight the needs of healthcare professionals in a wider range of contexts. Third, the self-selection of registrants for the course may mean that study participants were more likely to have a higher level of interest and/or experience in addiction medicine— it is likely that practitioners who seek specialized training are more prone to positive attitudes towards, and learning experiences with people who have SUDs [31]. Fourth, as participants were able to attempt each post-module test as many times as they liked, and a minimum score of 70% was required to pass each test, our overall post-test value may have been positively skewed. This limitation was carefully considered prior to analyses, balancing perspectives that a participant's final passing attempt at each post-test (1) represented new retained knowledge, and (2) was the product of selecting the correct answer by chance. Therefore, we averaged the scores from all attempts by a single participant at each post-test. This mean score was then used to calculate a total group mean score for the course. Finally, we did not capture a corresponding change in provider behaviour following the course. Future research examining the impact of the current course in addiction care settings would be valuable.

In the present study, over 6000 participants embarked on and over 1000 participants completed online training in addiction medicine. Overall, our analyses suggest that the course can feasibly increase knowledge in addiction medicine to a wide range of health care providers. Scaling up "low threshold" learning opportunities may further advance addiction medicine training, thereby helping to narrow the evidence-to-practice gap.

Acknowledgments:

REFERENCES

1.   United Nations International Drug Control Programme. United Nations Office for Drug Control and Crime Prevention., U.N.O.o.D.a.C., *World Drug Report*. 2016.

2.   Florence, C.L., F; Xu, L; Zhou, C, *The Economic Burden of Prescription Opioid Overdose, Abuse and Dependence in the United States, 2013*. Med Care, 2018. **54**(10): p. 901-906.

3.   WHO, *The Global status report on alcohol and health 2014*. . 2014: Geneva.

4.   The, L., *The opioid crisis in the USA: a public health emergency*. Lancet, 2017. **390**(10107): p. 2016.

5.   (BCCDC), B.C.f.D.C. *Public health emergency in BC*. 2017 August 1, 2018].

6.   University, T.N.C.o.A.a.S.A.a.C., *Addiction medicine: closing the gap between science and practice*. 2012.

7.   van Boekel, L.C., et al., *Healthcare professionals' regard towards working with patients with substance use disorders: comparison of primary care, general psychiatry and specialist addiction services*. Drug Alcohol Depend, 2014. **134**: p. 92-98.

8.   O'Connor, P.G., R.J. Sokol, and G. D'Onofrio, *Addiction medicine: the birth of a new discipline*. JAMA Intern Med, 2014. **174**(11): p. 1717-8.

9.   Herbeck, D.M., Y.I. Hser, and C. Teruya, *Empirically supported substance abuse treatment approaches: a survey of treatment providers' perspectives and practices*. Addict Behav, 2008. **33**(5): p. 699-712.

10.   Ayu, A.P., et al., *Effectiveness and Organization of Addiction Medicine Training Across the Globe*. Eur Addict Res, 2015. **21**(5): p. 223-39.

11. Wakeman, S.E., G. Pham-Kanter, and K. Donelan, *Attitudes, practices, and preparedness to care for patients with substance use disorder: Results from a survey of general internists*. Subst Abus, 2016. **37**(4): p. 635-641.

12. Ayu, A.P., Arnt FA Schellekens, Shelly Iskandar, Lucas Pinxten, and Cornelis AJ de Jong, *The Development of a National Training Program on Addiction Medicine in Indonesia*. Textbook of Addiction Treatment: International Perspectives. 2015, Milano: Springer.

13. Klimas, J., et al., *Impact of a brief addiction medicine training experience on knowledge self-assessment among medical learners*. Subst Abus, 2017. **38**(2): p. 141-144.

14. Tong, S., et al., *Assessment of Addiction Medicine Training in Family Medicine Residency Programs: A CERA Study*. Fam Med, 2017. **49**(7): p. 537-543.

15. Voon, P., et al., *Nursing Fellowship in Addiction Medicine: A Novel Program in a Canadian Setting*. J Addict Nurs, 2017. **28**(3): p. 148-149.

16. Selby, P., et al., *Review and evaluation of online tobacco dependence treatment training programs for health care practitioners*. J Med Internet Res, 2015. **17**(4): p. e97.

17. Liyanagunawardena, T.R. and S.A. Williams, *Massive open online courses on health and medicine: review*. J Med Internet Res, 2014. **16**(8): p. e191.

18. Cook, D.A., et al., *Internet-based learning in the health professions: a meta-analysis*. JAMA, 2008. **300**(10): p. 1181-96.

19. Lam-Antoniades, M., S. Ratnapalan, and G. Tait, *Electronic continuing education in the health professions: an update on evidence from RCTs*. J Contin Educ Health Prof, 2009. **29**(1): p. 44-51.

20.   Klimas, J., *Training in addiction medicine should be standardised and scaled up*. BMJ, 2015. **351**: p. h4027.

21.   Nancy H. Covell, P.J.M., Melinda F. Smith, Matthew R. Merrens, & Susan M. Essock, *Distance Training and Implementation Supports to Scale Up Integrated Treatment for People With Co-occurring Mental Health and Substance Use Disorders*. Journal of Dual Diagnosis, 2011. **7**(3): p. 162-172.

22.   Larson, M.J., et al., *A novel CBT Web course for the substance abuse workforce: community counselors' perceptions*. Subst Abus, 2009. **30**(1): p. 26-39.

23.   Weingardt, K.R., et al., *A randomized trial comparing two models of web-based training in cognitive-behavioral therapy for substance abuse counselors*. J Subst Abuse Treat, 2009. **37**(3): p. 219-27.

24.   Onah, D.F.O.S., Jane; Boyatt, Russell *Dropout rates of massive open online courses : behavioural patterns*, in *6th International Conference on Education and New Learning Technologies*. 2014, EDULEARN14 Proceedings: Barcelona, Spain. p. 5825-5834.

25.   Jordan, K., *Initial trends in enrolment and completion of massive open online courses*. The International Review of Research in Open and Distributed Learning 2014. **15**(1).

26.   Matejkowski, J., Karen L. Dugosh, Nicolle T. Clements, and David S. Festinger., *Pilot Testing of an Online Training for Criminal Justice Professionals on Medication-Assisted Treatment*. Journal of Addictions & Offender Counseling, 2015. **36**(1): p. 13-27.

27.   Sholomskas, D.E. and K.M. Carroll, *One small step for manuals: Computer-assisted training in twelve-step facilitation*. J Stud Alcohol, 2006. **67**(6): p. 939-45.

28.   Bartholomew, N.G., et al., *Counselor assessments of training and adoption barriers*. J Subst Abuse Treat, 2007. **33**(2): p. 193-9.

29.   Russett, J.L. and A. Williams, *An exploration of substance abuse course offerings for students in counseling and social work programs*. Subst Abus, 2015. **36**(1): p. 51-8.

30.   Curran, G.M., Stephanie M. Woo, Kimberly A. Hepner, Wen Pin Lai, Teresa L. Kramer, Karen L. Drummond, and Ken Weingardt., *Training substance use disorder counselors in cognitive behavioral therapy for depression: Development and initial exploration of an online training program*. Journal of substance abuse treatment, 2015. **58**: p. 33-42.

31.   Strang, J., et al., *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): p. 1637-47.

Box 1. Learning objectives and topics covered in the online addiction medicine certificate

#	Learning objectives
1	Incorporating screening diagnosis, and brief intervention and referral to treatment for substance use disorders in clinical practice
2	Selecting the appropriate pharmacological and psychosocial treatment interventions based on the best evidence as well as individual patient needs, circumstances, and preferences
3	Providing safe and effective treatment to patients and their families throughout the induction, maintenance, and/or discontinuation process across the continuum of care for substance use disorders
4	Setting treatment goal monitoring and evaluating progress, and providing patient-centered support across the continuum of care for substance use disorders
5	Appreciating the complexity of substance use disorders, diversity of care, and providing informed referrals to evidence- based support services
6	Promoting recovery, safety, wellness, and harm reduction to improve patient care and support for those with substance use disorders
7	Implementing strategies for safer prescribing practices for medications with abuse/diversion potent (i.e. opioids for analgesia, benzodiazepines)

#	Topics / Modules[a] (time in module)
1	Introduction to addiction medicine (20 mins)
2	Screening, diagnosis, and brief intervention for SUD (45 mins)
3	Opioid use disorder (50 mins)
4	Tobacco use disorder (45 mins)
5	Alcohol use disorder (35 mins)
6	Withdrawal syndromes (60 mins)
7	Stimulant use disorder (20 mins)
8	Poly substance use (65 mins)
9	Comorbid mental illness and substance use disorder(s) (35 mins)
10	Pain and substance use disorder(s) (65 mins)
11	Common medical complications (45 mins)
12	Safe prescribing (75 mins)
13	Overdose prevention and harm reduction (45 mins)
14	Psychosocial interventions (50 mins)
15	Addiction in the workplace (75 mins)
16	Recovery oriented systems of care (30 mins)

| 17 | Cases consolidating knowledge (35 mins) |

Note. Lecture times do not include the time to complete pre- and post-tests.
ᵃEach topic corresponds to a single module in the online course; post-tests were only provided for chapters 2-16.

Box 2. Sample Question and Format

Question: Evidence-based first line anti-craving and relapse prevention therapies for the treatment of alcohol use disorder include:

a) Naltrexone 50 mg once daily
b) Acamprosate 666 mg once daily
c) Gabapentin 300 mg once daily
d) Celexa 40 mg once daily

Correct answer: A

Explanation: Naltrexone is typically provided 50 mg once daily and has a number needed to treat to prevent a return to any drinking of 20. Acamprosate has a number needed to treat to prevent a return to any drinking of 12 and is an alternative first line agent but it is dosed 666 mg three times per day rather than once daily. Though less studied, Gabapentin appears to be an effective anti-craving agent but the optimal studied dose was 600 mg three times per day. Celexa is not a pharmacotherapy for alcohol use disorder.

Citations:

1. Jonas DE, et al. Pharmacotherapy for adults with alcohol use disorders in outpatient settings: a systematic review and meta-analysis. *JAMA*. 2014 May 14;311(18):1889-900.

2. Mason BJ et al. Gabapentin treatment for alcohol dependence: a randomized clinical trial. *JAMA Intern Med*. 2014 Jan;174(1):70-7.

FIGURE 1. Total number of registrations in the online addiction medicine certificate from May 2017 to February 2018, stratified by professional discipline (N=6,985)
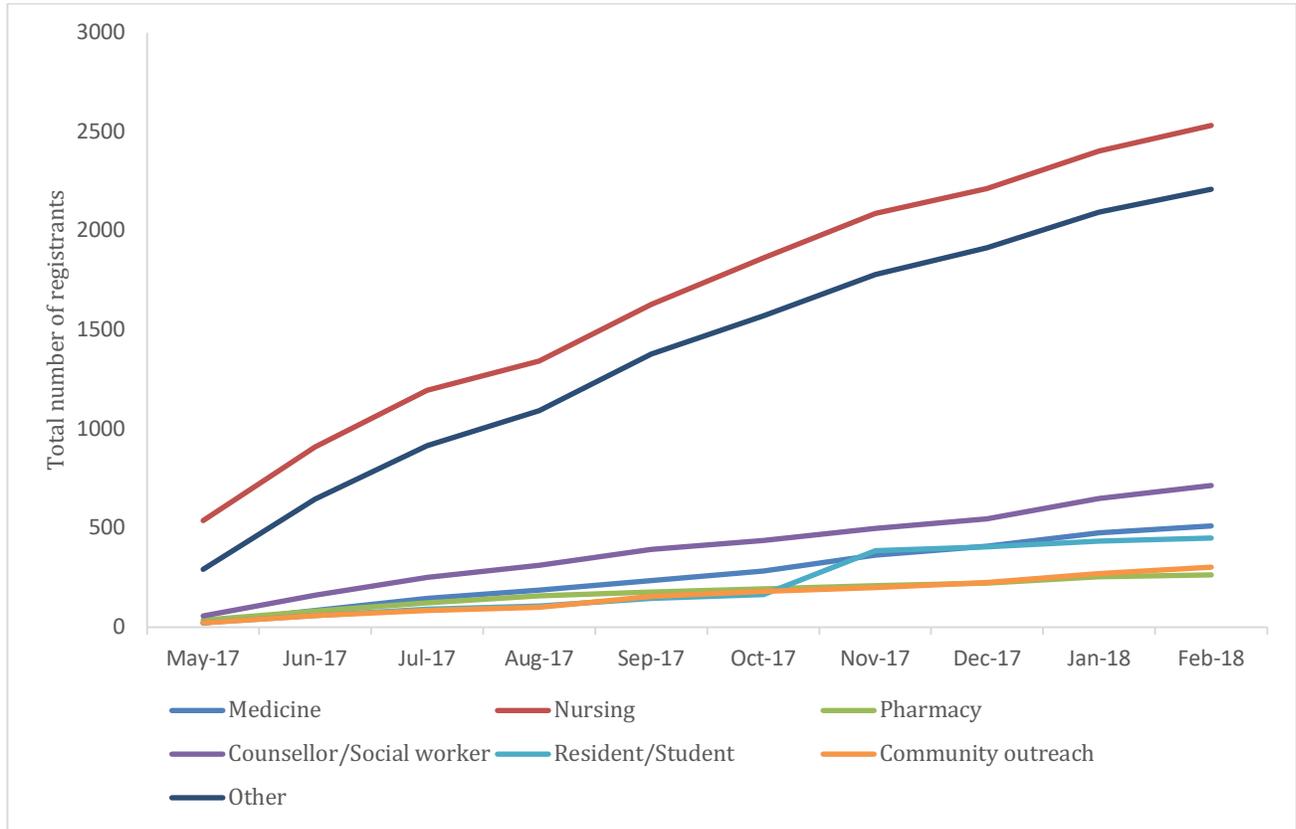
FIGURE 2. Percentages of chosen responses on Likert-type scales to questions assessing satisfaction with the online certificate in addiction medicine (N=475)

This course was effective in meeting my learning needs

Relevance to my practice

Incorporation of evidence-based research