especially in rural areas, as well as the retirement of baby-boomers, now is the time when effective integration of NPs can help improve our healthcare system.[21] By addressing the major barriers to NP expansion, healthcare systems can maximize the potential of NPs as experienced and flexible healthcare providers.

REFERENCES

1. Hass J. Nurse practitioners now able to work across Canada. CMAJ. 2006 Mar 26;174(7):911.
2. Scope of Practice for Nurse Practitioners. College and Association of Registered Nurses of Alberta. 2011 [updated 2011 September, cited 2012 Feb 25]. Available at: http://www.nurses.ab.ca/Carna-Admin/Uploads/2011_NP_Scope_of_Practice.pdf
3. Lenz ER, Mundinger MO, Hopkins SC, Lin SX, Smolowitz JL. Diabetes care processes and outcomes in patients treated by nurse practitioners or physicians. Diabetes Educ. 2002 Jul-Aug;28(4):5908.
4. Lenz ER, Mundinger MO, Kane RL, Hopkins SC, Lin SX. Primary care outcomes in patients treated by nurse practitioners or physicians: two-year follow-up. Med Care Res Rev. 2004 Sep;61(3):332-351.
5. Horrocks S, Anderson E, Salisbury C. Systematic review of whether nurse practitioners working in primary care can provide equivalent care to doctors. BMJ. 2002 Apr 6;324(7341):819-823.
6. Kinnersley P, Anderson E, Parry K, Clement J, Archard L, Turton P, et al. Randomised controlled trial of nurse practitioner versus general practitioner care for patients requesting "same day" consultations in primary care. BMJ. 2000 Apr 16;320(7241):1043-1048.
7. Regulated Nurses: Canadian Trends, 2006 to 2010. Canadian Institute for Health Information;2011 [2012 Feb 26]. Available from: https://secure.cihi.ca/estore/productFamily.htm?pf=PFC1691&locale=en&lang=EN&mediatype=0
8. Grumbach K and Bodenheimer T. Can Health Care Teams Improve Primary Care Practice? Innovations In Primary Care. 2004 Mar 10;291(10)1246-1251.
9. Wagner EH. The role of patient care teams in chronic disease management. BMJ. 2000 Feb 26;320:569-572.
10. Considine J, Kropman M, Stergiou HE. Effect of clinician designation on emergency department fast track performance. Emerg Med J. 2010 Jun 26;27:838-842.
11. Venning P, Durie A, Roland M, Roberts C, Leese B. Randomised controlled trial comparing cost effectiveness of general practitioners and nurse practitioners in primary care. BMJ. 2000 Apr 15;320(7241):1048-1053.
12. Grumbach K, Hart G, Mertz E, Coffman J, Palazzo L. Who is Caring for the Underserved? A Comparison of Primary Care Physicians and Nonphysician Clinicians in California and Washington. Ann Fam Med. 2003 Jul;1(2):97-104.
13. Lamarche K, Tullai-McGuinness S. Canadian nurse practitioner job satisfaction. Nurs Leadersh (Tor Ont). 2009;22(2):41-57.
14. Watts R. Part nurse, part doctor, no job. Victoria Times. 2010 March 11.
15. Wilson A, Pearson D, Hassey A. Barriers to developing the nurse practitioner role in primary care — the GP perspective. Family Practice. 2002 Dec;19:641-646.
16. Sangster–Gormley E, Martin–Misener R, Downe–Wamboldt B, Dicenso A. Factors affecting nurse practitioner role implementation in Canadian practice settings: an integrative review. Journal of Advanced Nursing. 2011 Jun;67(6):1178-1190.
17. Lague G. Do nurse practitioners pose a threat to family physicians? Can Fam Physician. 2008 Dec;54(12):1668-1670.
18. Laurant MG, Hermens RP, Braspenning JC, Akkermans RP, Sibbald B, Grol RP. An overview of patients' preference for, and satisfaction with, care provided by general practitioners and nurse practitioners. J Clin Nurs. 2008 Oct;17(20):2690-2698.
19. Dicenso A and Bryant-Lukosius D. Clinical nurse specialists and nurse practitioners in Canada. Canadian Health Services Research Foundation. Published June 2010. Retrieved June 27, 2012 from http://www.chsrf.ca/Libraries/Commissioned_Research_Reports/Dicenso_EN_Final.sflb.ashx
20. Sawchenko L, Fulton T, Gamroth L, Budgen C. Awareness and acceptance of the nurse practitioner role in one BC health authority. Nurs Leadersh (Tor Ont). 2011 Jan;24(4):101-111.
21. Bailey T. Waiting for a family doctor. Can Fam Physician. 2007 Mar;53(3):579-580.

Online Videos: A New Tool for Medical Education

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ABSTRACT

Currently, most Canadian medical schools educate students on core biomedical knowledge through lecture-based courses. However, recent studies indicate that passive lecture-based university courses fail to educate students in an efficient manner. In response, Dr. Sebastian Thrun and Sal Khan separately developed successful online educational models that engage students with interactive online videos focusing on fundamental concepts. This use of online interactive videos represents a new educational tool medical schools can use to engage students in active learning and also as a way to provide standardized teaching to students dispersed across several hospitals or at different campuses.

KEYWORDS: *vodcasting, online education, lectures, video, medical education*

A NEW EDUCATIONAL TOOL

In autumn of 2011, computer science professor Dr. Sebastian Thrun created an online version of "Introduction to Artificial Intelligence" that ran parallel to his course at Stanford University. However, he made this online course available to anyone outside the university.[1] Two unexpected outcomes occurred. First, within weeks of offering the course 58,000 students enrolled, and in the end, over 160,000 non-Stanford students from across the globe completed the course.[1,2] The second, and most unsettling outcome for Stanford, was that of the 200 students in Dr. Thrun's class on campus, 170 stopped attending class, preferring to learn through the online lectures.[3]

Dr. Thurn's online artificial intelligence course was a success in part because it was interactive. All of the videos involved him explaining concepts on a piece of paper with frequent pauses for multiple choice questions or requests for the student to correctly label part of a diagram.[4] This teaching

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method forces students to think actively and the questions allow students to identify their level of understanding of a lesson through immediate feedback. In contrast, university lectures provide a passive lecture style where the only feedback many students receive is from a mid-term or final exam. Dr. Thrun's modality of teaching is an attractive benchmark for future teaching because it de-emphasizes the "weeder" method, where students are given substantial amounts of difficult material and either sink or swim, for a method placing emphasis on solidifying one concept before moving onto the next.

Another leader in online education is Sal Khan, a Massachusetts Institute of Technology trained electrical and computer engineer, who began in 2004 to teach his cousins simple math by creating short online videos.[5] Khan's teaching method revolves around simplicity; just him talking with an electronic blackboard onscreen to illustrate concepts visually. In 2009, his videos garnered millions of views on YouTube, so Khan quit his job as a hedge fund analyst and formed a non-profit online educational website.[5] By the summer of 2012 Khan's website had over 3,200 videos with more than 155 million views. In part, Khan's videos are an educational success because they allow students to learn at their own pace. However, the most important attribute of Khan's videos is their simplicity. As pointed out by Harden, a problem with current university lectures, and therefore recording of these lectures, is that PowerPoint has become a crux for ineffective teaching—with professors overfilling slides with detailed information that obscure the fundamental concepts.[6] In contrast, Khan discards PowerPoint in favour of a simpler modality, an electronic blackboard. With this blackboard he breaks complex topics, such as linear algebra, into brief videos that focus on explaining core concepts.

Although extreme cases, Dr. Thrun's and Mr. Khan's online videos mirror an emerging trend in Canadian medical education—the use of vodcasting. Vodcasting is a method where a recording captures the PowerPoint slides along with the lecturer's voice and combines them into a video posted online for student viewing. Educational institutions are embracing vodcasting as a method to enable students to review conceptually difficult material after class and for absent students to learn the missed material.[7] However, as noted earlier, the leaders of web-based education are supplanting passive lecture recordings by creating dedicated online videos with built in interactive features.

Online video lectures represent a paradigm shift in the way of presenting educational material. The current university model, one in which a professor lectures to a substantial group of students, represented the best way of disseminating information in the past because it brought one expert and numerous students from different parts of the city, country, or globe together for a one-way exchange of information. However, as a class size increases, the knowledge acquired by students decreases in part because students are intimidated by large audiences and are less likely to ask a professor for clarification when a topic is troublesome.[8] Thus, questions remain unasked and concepts go unlearned. However, as Ruiz et al. indicate, students prefer online videos because they can select a learning pace agreeable to their learning style.[9] For instance, if a demanding concept arises, the student can rewind to review or pause to clarify with online resources

or textbooks. Students also prefer the advantage of being able to review the material by re-watching the video at a later date.[10] Most importantly, though, the use of online educational tools by students correlates with higher examination scores as well as better long-term retention of knowledge.[9,11,12]

ONLINE EDUCATIONAL TOOLS AND MEDICAL EDUCATION

With regards to medical education, online videos represent a unique opportunity to overcome challenges many medical schools face. For instance, with the increasing demands of clinic work it is difficult to recruit and retain clinicians for lectures. A web-based method for lectures would allow these clinicians to record lectures at a convenient time and post them online for students. Another problem medical schools face is the need to provide standardized learning for medical students dispersed over several hospital sites or even different campuses. Online teaching modules allow dissemination of one lecture to many students in differing geographical locations. However, despite the benefits of online interactive videos, two important hurdles exist when trying to utilize them in a medical education program. First, implementing a web-based learning environment is an expensive endeavour requiring a skilled information technology staff. The final obstacle is that the educational institution must realize the content provided by the interactive video is paramount to the sophistication of the technology behind the video. Thus every effort must be made when creating the video to ensure that medical learning objectives are being taught and that a competent teacher provides the information.

In the end, learning to become a physician involves a combination of small group learning, problem-based learning, clinical experience, patient interaction experience, and lecture-based courses. Online educational videos should not displace any of these components, but instead could represent an effective learning tool for use in the blended medical education curriculum offered by most medical schools.

REFERENCES

1. Craig R. Adventures in wonderland[Online]. 2012 [cited 2012 February 15]; Available from: http://www.insidehighered.com/views/2012/02/03/essay-massive-online-courses-not-game-changing-innovation.
2. Markoff J. Free course in artificial intelligence is offered online, and 58,000 sign up. New York Times. 2011 Aug 16: A11.
3. Salmon F. Udacity's model [Online]. 2012 [cited 2012 June 27]; Available from: http://blogs.reuters.com/felix-salmon/2012/01/31/udacitys-model/
4. Murray P. Sebastian Thrun aims to revolutionize university education with udacity [Online]. 2012 [Cited 2012 June 27]; Available from: http://singularityhub.com/2012/01/28/sebastian-thrun-aims-to-revolutionize-university-education-with-udacity/
5. Thompson C. How Khan academy is changing rules of education [Online]. 2011 [Cited 2012 June 27]; Available from: http://www.wired.com/magazine/2011/07/ff_khan/all/
6. Harden RM. Death by powerpoint - the need for a 'fidget index'. Med teach. 2008;30(9-10):833-835.
7. Vajoczki S, Watt S, Marquis N. Vodcasts: are they an effective tool to enhance student learning? A case study from McMaster university, Hamilton Canada. Paper presented at: The Association for the Advancement of Computing in Education Annual Meeting; 2008 June 30; Vienna, Austria.
8. Kokkelenberg E, Dillion M, Christy S. The effects of class size on student grades at a public university. Econ of educ review. 2008; 27(2):221-233.