KAZUISTICKÝ MODEL KLINICKÉHO ROZHODOVÁNÍ ZALOŽENÉHO NA DŮKAZU A METODA BLENDED LEARNING : LITERÁRNÍ PŘEHLED

A CASUISTIC MODEL OF EVIDENCE-BASED CLINICAL DECISION MAKING VIA BLENDED LEARNING : LITERATURE OVERVIEW

Vladimír Mihál, Jarmila Potomková

Palacky University Olomouc

Abstrakt

Tento literární přehled slouží jako názorová základna konfenčního sdělení. Zabývá se teoretickými východisky i praktickými zkušenostmi s využitím kazuistického modelu vzdělávání v kontextu praxe založené na důkazu. Shrnuje definice o výukové metodice blended learning a jejím uplatnění při studiu medicíny.

Klíčová slova: kazuistický model vzdělávání, medicína, blended learning

Abstract

Learning through experience is an important approach employed by humans to comprehend new problems. Medical practice management is facing a challenge of knowledge discovery from the growing volume of information. Recently, there has been a hot debate about the role of casuistry in the context of evidence-based decision-making. Case-based reasoning (CBR) matches the natural reasoning model similar to that used by physicians: „I have seen a patient like this“, and provides recollection of past cases revlevant to the present case. A general CBR life cycle consists of 4 processes: (1) retrieve the most similar case or cases; (2) reuse the infromation and knowledge in that case; revise the proposed solution; and (4) retain the experience for future problem solving.

Current medical students have grown up with computers and expect learning materials to be available electronically. It is a rapidly expanding field with systems evolving from simple computer storage of learning materials to sophisticated web-based multimedia interactive modules. In medical education, a portion of face-to-face approach seems indispensable which led to introduction of a blended learning design, i.e. development of online modules combined with didactic lectures. These learning opportunities encourage dynamic interplay between learners and teachers with e-learning and may help to obviate some of the potential pitfalls of purely online instruction.

Case stories of real patients supplemented with evidence-based literature reviews may serve a valuable resource to develop hypermedial learning objects. Educational principles must be given priority and include: relevance, reliability, validity of content, clarity of delivery, effective use of time and appropriate assessment.

Keywords: case-based medical education, evidence-based medicine, blended learning

Fundamentals of Case-Based Reasoning (CBR)

In 1996, R Schank, one of the influential contributors to artificial intelligence and cognitive psychology, wrote:

„Learning from experiences is the fundamental process of case-based reasoning. Taking case-based reasoning seriously as a cognitive model implies that experieces play a fundamental role in human learning as well. This has important effects on what and how to teach….Learning by doing works because it teaches implicitly rather than explicitly. Things that are learned implicitly need only be experienced in the proper way at the proper time. In order to make classrooms into learning-by-doing experiences we need to allow students to be in situations that are germane to their interests."

Ten years later, deMantaras Lopez (2005) confirmed that CBR was a procedure encompassing the significance of prior experience during future problem solving. New problems can be tackled by reusing and if possible *modifying* the solutions to similar problems that were solved in the past. It became applicable in a wide range of disciplines and domains, including medicine. Case-based reasoning gave rise to case-based teaching that is generally considered a superior instructional methodology compared to lectures because it motivates learners' critical thinking skills. Even though much is known about the role played by facilitators in case-based teaching, there are still numerous controversies on the impact of the format and structure of cases on teaching and learning (Kim et al. 2006).

Case-Based Teaching and Evidence-Based Medicine (EBM)

In the context of EBM**,** Tonelli (2006) provoked a hot debate about integrating "real" evidence into practice as a substitute for evidence-based approaches.

He introduced EBM struggling with other kinds of medical knowledge, such as (1) empirical evidence, (2) experiential evidence, (3) pathophysiologic rationale, (4) patient goals and values, and (5) system features. He emphasized that none of the topics had a priority over others, and the relative importance of a topic would depend upon the circumstances of the particular case. The skilled clinician must weigh these potentially conflicting evidentiary and non-evidentiary aspects for action to employ both practical and theoretical reasoning and to make the best choice for a respective patient.

His paper was followed by numeours thought-provoking comments (Buetow 2006; Djulbegovic 2006; Gupta 2006; Lipman 2006; Loughlin 2006; Miettinen 2006; Porta 2006; Sá Couto 2006; Tanenbaum 2003; Upshur 2006) that are worth reading.

Newble and Clarke 1986; Hmelo-Silver et al. 2000; Marcus 2004 have demonstrated that case-based activities can be enhanced by evidence- based redesigning online learning resources for undergraduate medical education in favour of blended learning to improve their understanding of the theories and to develop their skills in clinical problem solving. It has beem also confirmed that case based learning can be used to promote deeper approaches to learning and reduced reliance on surface approaches in medical students..

Blended Learning : Definitions and Implications for Evidence-Based Practice

Blended learning has been defined as the combination of face-to-face andelectronic learning opportunities while reducing classroom contact hours.

(Dziuban et al. 2004).

Inherent in blended learning is a fundamental redesign of the instructional model, shifting from lecture to student-centred instruction, increasing all forms of interaction and incorporating formative and summative assessment.

(Twigg, 2003; Dziuban et al. 2004).

Blended learning = combined and integrated use of e-Learning and face-to-face (F2F) learning activities to develop a community of learning.

(Schaffer et al. 2004)

Blended learning complements face-to-face classes with eLearning modules.

(Voos 2003)

It is possible to bring the advantages of face-to-face classes and online courses together. Further advantages are the higher flexibility and reduced costs in comparison to to traditional classes.

(Graham 2004; Harding et al. 2005).

It supports a wide range of learning models, such as situated, associative, systemic, simulative and constructivist learning which help to improve the quality of medical education.

(Sharpe et al. 2006).

Combining face-to-face learning opportunities, especially those that encourage a dynamic interplay between learner and teacher, with e-learning may help to obviate some of the potential pitfalls of purely online instruction. (Academy of Royal Medical Colleges, 2007).

The revised results of a meta-analysis performed by U.S, Department of Education (Means 2010), focused on evaluation of evidence-based practices in online learning, can be summarized as follows:

- Instruction combining online and face-to-face elements have a larger advantage relative to purely face-to-face instruction than did purely online instruction.
- The mean effect size in studies comparing blended with face-to-face instruction was +0.35, $p < .001$;
    - This effect size is larger than that for studies comparing purely online and purely face-to-face conditions.
- The observed advantage for blended learning conditions may not be rooted in the media used per se, thus reflectingdifferences in content, pedagogy and learning time.
- Contrasting blends of online and face-toface instruction with conventional face-to-face classes, blended instruction has been more effective, providing a rationale for the effort required to design and implement blended approaches.
- Despite strong research designs used by the studies in the meta-analysis (i.e., experimental or controlled quasi-experimental), many of the studies suffered from weaknesses:
    - small sample sizes;
    - failure to report retention rates for students in the conditions being contrasted;
    - bias stemming from the authors' dual roles as experimenters and instructors.

This meta-analysis is a challenge for performing future experimental studies to increase validity of the results.

A Proposal of a Triad for the Development of Case-Based Learning Environment in Medicine

[1] Selection of attractive, authentic clinical problems to place sudents *in medias res* and motivate them to take responsibility for learning through decision making.

[2] Encourage learners to tackle the clinical problem in a way consistent with professional practices and methodologies (eg. Searching for current literature).

[3] Offer students as much support and guidance as possible, but promote creative approaches (eg. critical thinking), far from fragmented, surface solutions (eg. Memorizing mere facts).

Conclusion

This literature overview will provide a background for detailed comprehension of the conference lecture and resources for further reading.

References

[1] Academy of Medical Royal Colleges (2007). The development of e-learning for doctors. [Online]. Available: http://www.aomrc.org.uk/news.aspx

[2] Buetow S. (2006) Opportunities to elaborate on casuistry in clinical decision making. Commentary on Tonelli (2006). Integrating evidence into clinical practice: an alternative to evidence-based approaches. J Eval Clin Pract 12(4):427-432.

[3] De Mantaras Lopez R. et al. (2005) Retrieval, reuse, revision and retention in case-based reasoning. Knowledge Engin Rev 20:215-240.

[4] Djulbegovic B. (2006) Evidence and decision making. Commentary on M.R. Tonelli (2006), Integrating evidence into clinical practice: an alternative approach to evidence-based approaches. Journal of Evaluation in Clinical Practice 12, 248-256. J Eval Clin Pract 12(3):257-259.

[5] Dziuban C.D., Hartman J.L., Moskal P.D. (2004) Blended learning. Educause Learn Bull 7: 2-12.

[6] Graham C. R. (2004) Blended learning systems: Definition, current trends, and future directions. In C. J. Bonk & C. R. Graham (Eds.), The handbook of blended learning: Global perspectives, local designs, pp. 3–21. Zurich: Pfeiffer Publ.

[7] Gupta M. (2006) Beyond 'evidence'. Commentary on Tonelli (2006), Integrating evidence into clinical practice: an alternative to evidence-based approaches. Journal of Evaluation in Clinical Practice 12, 248-256. J Eval Clin Pract 12(3):296-298.

[8] Harding A., Kaczynski D., Wood L. (2005). Evaluation of blended learning: Analysis of qualitative data. In Proceedings of UniServe Science Blended Learning Symposium, pp. 56–61.

[9] Hmelo\Silver C.E. et al. (2000) It´s harder than we thourght it would be: a comparative case study of expert-novice experimentation strategies. Sci Educ 86:219-243.

[10] Kim S. et al. (2006) A conceptual framework for developing teaching cases: a review and synthesis of the literature across disciplines. Med Educ 40(9): 867-876

[11] Lipman T. (2006) Evidence and casuistry. Commentary on Tonelli (2006), Integrating evidence into clinical practice: an alternative to evidence-based approaches. J Eval Clin Pract 12(3):269-272.

[12] Loughlin M. (2006) The future for medical epistemology? Commentary on Tonelli (2006), Integrating evidence into clinical practice: an alternative to evidence-based approaches. Journal of Evaluation in Clinical Practice 12, 248-256. J Eval Clin Pract 12(3):289-291.

[13] Marcus G. (2004) Implications for the design of online case based learning activities based on the student blended learning experience. In R. Atkinson et al. (Eds), Beyond the comfort zone: Proc 21st ASCILITE Conf. Perth, 5-8 December. pp. 577-586. [Online]. Available: http://www.ascilite.org.au/conferences/perth04/procs/marcus.html

[14] Means B. et al. (2010) Evaluation of evidence-based practices in online learning: a meta-analysis and review of online learning studies. U.S. Department of Education Office of Planning, Evaluation, and Policy Development Policy and Program Studies Service. Revised September 2010 [Online]. Available: www.ed.gov/about/offices/list/opepd/ppss/reports.html.

[15] Miettinen O.S.(2006) Evidence-based medicine, case-based medicine; scientific medicine, quasi-scientific medicine. Commentary on Tonelli (2006), Integrating evidence into clinical practice: an alternative to evidence-based approaches. J Eval Clin Pract 12(3):260-264.

[16] Newble D., Clarke R.M. (1986) The approaches to learning in a traditional and in an innovative medical school. Med Educ 20: 267-273.

[17] Porta M. (2006) Five warrants for medical decision making: some considerations and a proposal to better integrated evidence-based medicine into everyday practice. Commentary on Tonelli (2006), Integrating evidence into clinical practice: an alternative to evidence-based approcahes. J Eval Clin Pract 12(3): 265-268.

[18] Sá Couto J. (2006) Can we forget how to treat patients? Commentary on Tonelli (2006),Integrating evidence into clinical practice: an alternative to evidence-based approaches. Journal of Evaluation in Clinical Practice 12, 248-256. J Eval Clin Pract 12(3):277-280.

[19] Schank R.C. et al.(1993) The Design of goal-based scenarios. J Learn Sci 3(4):305-345.

[20] Schank R.C. (1996) Goal-based scenarios: case-based reasoning meets learning by doing. In D. Leake (ed.) Case-based reasoning: experiences, lessons & future directions. AAAI Press/The MIT Press. pp. 295-347.

[21] Shaffer K. et al. (2004) Blended learning in medical education: use of an integrated approach with web-based small group modules and didactic instruction for teaching radiologic anatomy. Acad Radiol 11**:**1059-1070.

[22] Sharpe R. et al. (2006). The undergraduate experience of blended learning: A review of UK literature and research. The Higher Education Academy (October 2006). [Online]. Available: http://www.heacademy.ac.uk/4884.htm.

[23] Tanenbaum S.J. (2006) Evidence by any other name. Commentary on Tonelli (2006), Integrating evidence into clinical practice: an alternative to evidence-based approaches. J Eval Clin Pract 12(3):273-276.

[24] Tonelli M.R. (2006) Integrating evidence into clinical practice: an alternative to evidence-based approaches. J Eval Clin Pract 12(3): 248-256.

[25] Twigg C. A. (2003) Improving learning and reducing costs: new models for online learning. Educause Rev 38(5), 28.

[26] Upshur RE. (2006) The complex, the exhausted and the personal: reflections on the relationship between evidence-based medicine and casuistry. Commentary on Tonelli 2006), Integrating evidence into clinical practice: an alternative to evidence-based approaches. Journal of Evaluation in Clinical Practice (2006), 12, 248-256. J Eval Clin Pract 12(3):281-288.

[27] Voos R. (2003) Blended learning—what is it and where might it take us? Sloan-C View 2(1): 2–5.