Self-directed learning using clinical decision support: costs and outcomes

ABSTRACT

It is an axiom of research into cost and value in education that the way to deliver low cost education is to save on faculty cost, as this makes up the majority of the costs in most educational programmes. Thus, any savings that can be made to faculty costs will make a significant contribution to reducing overall cost. But this may not be the case with all programmes, or with all methods of learning. In particular, it may not be the case with self-directed learning. The cost of self-directed learning can be divided up into cost categories just like any other form of learning. As such, it will be made up of faculty cost, learner costs, infrastructure and facility costs, content costs and technology costs. However, in postgraduate education, these costs are largely the same as those that account for clinical care, as postgraduate learners learn as they work. To get maximum value from self-directed learning that will support clinical decisions, learners will need to have access to excellent clinical decision support resources that will facilitate self-directed learning.

Medical education is expensive (Frenk et al, 2010). There is the cost of undergraduate, postgraduate and continuing professional development. At all levels, there is the cost of curriculum design, curriculum delivery, assessment and evaluation (Goulston et al, 2012; Golub, 2015; Maloney et al, 2015).

Curriculum in continuing professional development is an especially interesting and important idea. The curricula for both medical students and doctors in training are largely defined by the training requirements. But the curriculum in continuing professional development must in essence be a curriculum for practice: it must be based, at least in part, on the identified needs relevant to a specific practice context. Thus a fully qualified doctor should do continuing professional development which is a mixture of learning based on his/her own personal learning needs, his/her patients' needs and mandatory requirements that relate to his/her practice.

The cost of medical education at all levels must be borne by someone – be it governments, institutions, employers, sponsors or individuals – or sometimes a combination of these stakeholders. The cost of undergraduate medical education in the UK is currently approximately £230 000 per student. This is borne partly by students and partly (the majority) by the government. At the same time, the importance of high quality outcomes from medical education cannot be over-emphasized. We need to have doctors and other health-care professionals who can provide safe and effective care that will meet the needs of patients and populations.

Dr Kieran Walsh, Clinical Director, BMJ, BMA House, London WC1H 9JR

Dr Stephen Maloney, Associate Professor, School of Primary and Allied Health Care, Monash University, Australia

Correspondence to: Dr K Walsh (kmwalsh@bmj.com)

Costs and outcomes

The expense of medical education and the importance of its outcomes has led to a growing interest in methods of medical education that will deliver the twin benefits of low costs and excellent outcomes (Brown et al, 2015; Maloney et al, 2017). There are a number of ways of doing this – broadly we can save costs or improve outcomes or do both. This article will now look further at the issue of saving costs. It is an axiom of research into cost and value in education that the way to deliver low cost education is to save on faculty cost (Maloney et al, 2017). The reason is that the cost of faculty makes up the majority of the costs in most educational programmes (Chambers and Parrish, 1994; Levin and McEwan, 2001; Walsh, 2010). Faculty cost is largely related to faculty pay but also to other associated costs such as travel, accommodation and subsistence (if faculty have to travel to attend a face to face event). Thus, any savings that can be made to faculty costs will significantly contribute to reducing overall cost. But this may not be the case with all programmes, or with all methods of learning. One example is in running a continuing professional development conference where significant funding might be necessary to secure space, catering, information technology costs and accreditation.

Self-directed learning

Another example is in the case of self-directed learning. According to Knowles (1975), self-directed learning 'describes a process by which individuals take the initiative, with or without the assistance of others, in diagnosing their learning needs, formulating learning goals, identify human and material resources for learning, choosing and implement appropriate learning strategies, and evaluating learning outcomes'. The cost of self-directed learning can be divided up into cost categories just like any other form of learning. As such, it will be made up of faculty cost, learner costs, infrastructure and facility costs, content costs and technology costs (Maloney et al, 2017). And in classic accounting fashion, there is the category of 'other'. Self-directed learning may focus on clinical or non-clinical topics (e.g. communication, interprofessional team collaboration or professionalism), but this article focuses on self-directed learning within the clinical domain.

As such, costs in self-directed learning are most likely to be made up of the cost of the time of faculty (in teaching the skills of self-directed learning), the cost of the time of learners (this is important in postgraduate medical education as learners are being paid as they learn), the cost of the clinical decision support resources needed to support self-directed learning, and the cost of technology needed to support self-directed learning. In this context, clinical decision support resources mean electronic knowledge content that is evidence based and updated and that can support decision making.

But this in turn begs the question as to whether these costs are separate to the costs of clinical care. Clinical decision support resources support clinical care and self-directed learning – so there is no real separation. The technology needed to support self-directed learning is often the same as that needed to support clinical care: doctors and other health-care professionals need the same resources to help them learn and also to help them make better decisions. The cost of the time of faculty and the cost of the time of learners is the same as the costs of the time of senior health-care professionals and their juniors. And all stakeholders want doctors and other health-care professionals who are continually learning and who are continually checking and ensuring that they are delivering safe and high-quality care. So there is only really an artificial separation between excellence in self-directed learning using clinical decision support and excellence in clinical care. A common theme in both is that of time. To get maximum value from clinical decision support and self-directed learning, then learners will need to be able to get to the answers that they need quickly (Bates et al, 2003).

Clinical decision support resources in self-directed learning

Clinical decision support resources on their own will not deliver self-directed learning. Self-directed learning is a set of skills which include:

- Raising and answering questions stimulated by practice
- Searching the literature for evidence to address the issue or question
- The appraisal of what was found
- The ability to appropriately apply the evidence within a specific practice context.

Training will be needed to develop these skills and they must be part of the rest of the curriculum or a practice improvement plan. But at the same time this means clinical decision support resources will be needed where learners are able to find answers immediately – when and where they want it. This in turn will mean excellent browse and search functionality in the clinical decision support tool. The clinical decision support must work on all devices – online and offline, at institutions and remotely. The content must fit with the clinical workflow so that the user will hardly notice that he/she is using it. The actual content in the clinical decision support must be actionable so users can put it into practice quickly for the benefit of patients.

Users must be able to track and record their learning so that they will have a record of what they have done. The tracking functionality must also enable users to reflect on their learning and on the impact that it has had on their clinical practice – so that their self-directed learning is more than just clicks on a webpage.

Last this form of learning must count – it must be accredited – just like any other form of continuing professional development. Once again, this emphasizes the importance of tracking at an individual level. However, tracking can also add value beyond the individual level – for example through heads of department identifying themes and trends in learning activities and so learning needs (heads of departments will need to have the consent of learners to track their activities). This sets the bar quite high for clinical decision support tools. But it is necessary because of the importance of having motivated self-directed learners who are delivering evidence-based care.

Commonly available clinical decision support resources vary widely in their cost. However, the cost varies depending on whether the purchase is for an individual or an institution. A large institution can effectively bulk-buy clinical decision support resources at a lower cost per head. This results in improved cost effectiveness (dos Santos et al, 2014).

Conclusions

Over the past 20 years, much thought has been given to the development of self-directed learning skills (Brydges et al, 2010; Murad et al, 2010), but less attention has been paid to the resources that self-directed learners will use and how we can build the architecture around the resources so that they will be used. If learners can use clinical decision support tools to support their self-directed learning in an efficient way, then they will achieve value for investment of their own time and also value for the health service. **BJHM**

Conflict of interest: Dr K Walsh works for BMJ which produces a clinical decision support tool – BMJ Best Practice; Dr S Moloney: none.

KEY POINTS

- If learners can use clinical decision support tools to support their self-directed learning in an efficient way, then they will achieve value for their investment of their own time and also value for the health service.
- To get maximum value from self-directed learning that will support clinical decisions, learners need to be able to get to the answers that they need quickly.
- Self-directed learning using clinical decision support tools should count as continuing professional development.

Bates DW, Kuperman GJ, Wang S et al. Ten commandments for effective clinical decision support: making the practice of evidence-based medicine a reality. J Am Med Inform Assoc. 2003 Nov;10(6):523–530. https://doi.org/10.1197/jamia.M1370

Brown C, Ross S, Cleland J, Walsh K. Money makes the (medical assessment) world go round: the cost of components of a summative final year Objective Structured Clinical Examination (OSCE). Med Teach. 2015 Apr 29;37(7):1–7. https://doi.org/10.3109/0142159X.2015.1033389

Brydges R, Dubrowski A, Regehr G. A new concept of unsupervised learning: directed self-guided learning in the health professions. Acad Med. 2010 Oct;85(10) Suppl:S49–S55. https://doi.org/10.1097/ACM.0b013e3181ed4c96

Chambers J, Parrish T. 1994. Developing a resource cost database. In: Barnett WS, ed. Cost analysis for education decisions: Methods and examples. (Vol 4, pp 23–44). Greenwich, CT: JAI Press

dos Santos MA, Tygesen H, Eriksson H, Herlitz J. Clinical decision support system (CDSS) – effects on care quality. Int J Health Care Qual Assur. 2014 Oct 07;27(8):707–718. https://doi.org/10.1108/IJHCQA-01-2014-0010

Frenk J, Chen L, Bhutta ZA et al. Health professionals for a new century: transforming education to strengthen health systems in an interdependent world. Lancet. 2010 Dec;376(9756):1923–1958. https://doi.org/10.1016/S0140-6736(10)61854-5

Golub RM. At What Cost? JAMA. 2015 Dec 08;314(22):2361–2363. https://doi.org/10.1001/jama.2015.16546

Goulston K, Oates K, Shinfield S, Robinson B. Medical student education: what it costs and how it is funded. Intern Med J. 2012 Oct;42(10):1149–1152. https://doi.org/10.1111/j.1445-5994.2012.02912.x

Knowles MS. Self-directed learning: A guide for learners and teachers. 1975. Englewood Cliffs: Prentice Hall/Cambridge: 18

Levin HM, McEwan PJ. 2001. Cost-effectiveness analysis: Methods and applications. Vol 4. Thousand Oaks, CA: Sage

Maloney S, Nicklen P, Rivers G et al. A cost-effectiveness analysis of blended versus face-to-face delivery of evidence-based medicine to medical students. J Med Internet Res. 2015 Jul 21;17(7):e182. https://doi.org/10.2196/jmir.4346

Maloney S, Reeves S, Rivers G, Ilic D, Foo J, Walsh K. The Prato Statement on cost and value in professional and interprofessional education. J Interprof Care. 2017 Jan 02;31(1):1–4. https://doi.org/10.1080/13561820.2016.1257255

Murad MH, Coto-Yglesias F, Varkey P, Prokop LJ, Murad AL. The effectiveness of self-directed learning in health professions education: a systematic review. Med Educ. 2010 Nov;44(11):1057–1068. https://doi.org/10.1111/j.1365-2923.2010.03750.x

Walsh K. 2010. Cost effectiveness in medical education. Abingdon: Radcliffe Publishing