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Trapped in technology adoption?

Breaking the dependency of health economics on coverage decisions

[The paper previously known as 'An Addiction to Adoption…']

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Abstract

Our premise in this paper is that health economists devote a disproportionate amount of their time and energy to technology adoption questions. We use the term 'adoption' to refer to decisions that others may describe as coverage or reimbursement (e.g., should a new high cost drug be recommended for use in the health care system?). We consider this adoption emphasis as a trap that is reinforced through training programs and funded research programs that ironically have not considered where the greatest benefit for the limited resources available can be achieved.

The crux of our premise is the word 'disproportionate', a judgement informed by knowing (1) how much adoption-focussed activity is happening, and (2) what activity is being neglected. The paper provides an estimate of the scale of adoption-type activity from bibliometric analyses of the health economics literature (with an initial focus on published work in the *BMJ*).

So why is an adoption focus problematic? It is well understood that the vast majority of health care spend is unrelated to adoption decision-making – it involves the ongoing use of 'accepted' technologies, without analytic attention or monitoring of costs and benefits. We argue for a re-focussing of analytic effort, the potential pay-off being a more significant contribution by our 'discipline' to the goals of efficiency and equity.

Both diagnostic issues (i.e., possible causes of the adoption addiction) and treatment options (i.e., where we should be going) are discussed in the paper.

Introduction

The focus of this paper is health care technology, more specifically its adoption and use in the health care system. We are using a typically broad definition of technology to include 'methods used to promote health, prevent and treat disease and improve rehabilitation and long term care' (NIHR HTA Programme website). This captures drugs, devices, procedures and screening.

Total spending on health care in Canada has now passed $200 billion, with annual increases over the last decade in the range of 7.4% (Canadian Institute for Health Information, 2011). The rate of growth has slowed over the last couple of years but the need to 'bend back the cost curve' is the dominant conversation amongst provincial and federal health care leaders. Likewise in the UK, expenditure is now well in excess of £100 billion but year on year growth is slowing to about 1% in real terms going forward. The pattern in Canada and the UK mirrors trends in other similar developed nations, including other European countries (Callan *et al*., 2010).

The impact of technological change as a cost driver has been difficult to quantify but is widely considered to be one of the largest contributors to such growth. Thus, effective efforts to address cost growth cannot ignore technology. With the accelerating pace at which new technologies appear, there is always pressure on decision-makers – from patients, providers and manufacturers – to expand public coverage and use of these technologies. At the same time, citizens expect stewardship in the management of public funds and so look for health policy-makers to exert influence over how new technologies are introduced and used in the system.

Both Canada and the UK have long (and some would argue, glorious) traditions in health technology assessment (HTA), with well established and active HTA processes. Canada has had a national HTA agency since 1990, now called the Canadian Agency for Drugs and Technologies in Health (CADTH). The UK has funded HTA research for several decades, now predominantly through the NIHR HTA Programme, with technology coverage recommendations in England made by the National Institute for Health & Clinical Excellence (NICE).

We support ongoing efforts by health system managers in scrutinizing the expected costs and benefits associated with the introduction of new drugs and other technologies. They have a clear responsibility to assess the trade-off between a new technology's expected clinical benefits and value relative to other potential health system investments. However, our premise in this paper is that health economists and

their colleagues in the HTA 'industry' have become rather obsessed by questions of technology adoption (i.e. should a new technology be available for routine use in the health care system?) and have largely ignored the technology management issues (i.e. once in the system, how do we ensure cost-effective utilization of the technology?). Figure 1 provides a representation of this, and includes the consideration of technology withdrawal or disinvestment too.

Part of the evidence of the need for a rebalancing of effort is the realization that rapid increases in the utilization of existing technology (and not simply the adoption of new technology) represent a major driver of cost growth. For example, Keenan *et al*. (2007) report that the annual admission rates for cataract surgery in England increased 10-fold between 1968 and 2003; from 62 per 100,000 population to 637 per 100,000 in 2004. This increase was not driven primarily by demographic changes; the increase in cataract surgery rates was seen in every eligible age group and for both men and women (Keenan *et al*., 2007). Similarly, medical imaging examinations have seen large utilization increases: in 2010 in Canada, 1.4 million magnetic resonance imaging (MRI) examinations and 4.2 million computed tomography (CT) examinations were performed, representing annual increases over recent years of 6.9% and 6.2% for MRI and CT, respectively (Canadian Institute for Health Information, 2011).

Further, some technology use should probably not be happening at all, according to Don Berwick, former President of the Institute for Healthcare Improvement (IHI) and former Administrator of the US Centers for Medicare and Medicaid Services. He argues that in the US somewhere between 20% and 30% of health spending is 'waste' (i.e. results in no benefit to patients) resulting in part from 'overtreatment' (Pear, 2011). This statistic, even if accurate, may say more about US health care than it does about health technology use in Canada and the UK but it would be a brave person who claimed those of us outside of the US do not experience some of the same challenges.

When we consider the goals of health economics technology evaluation, or 'micro-economic evaluation at the treatment level' (Williams, 1987), we probably have universal agreement: efficiency (i.e. maximising health and other benefits with available resources) and equity (i.e. fairness in the allocation of benefits and/or resources). We argue in this paper that consideration of technology adoption questions (i.e. ensuring that the introduction of new treatments and therapies enhances system efficiency and equity) and technology management questions (i.e. ensuring that treatments and therapies used within the system enhance efficiency and equity) is necessary if we are to achieve our twin goals, but that to date there has been an over-emphasis on adoption.

[In order to illustrate our point (and for fun), we have created a Wordle from a highly cited paper by leading health economists on technology decision making – see Figure 2. The cloud gives greater prominence to words that appear more frequently in source text. We see that 'adoption' is one of the more prominent words in the cloud.]

In this paper we will:

- Expand on our hypothesis that health economists are trapped in a technology adoption focus;
- consider why such a focus is troubling;
- speculate on the pathology of the condition (i.e. why do we see it and what is its course?); and
- outline some possible 'treatment' options.

Evidence to support the 'trapped in adoption' hypothesis

We have undertaken a rapid literature review (as a first stage – the plan is for a fuller review in time), searching for papers reporting economic evaluation of health technologies published in the *British Medical Journal* between 2005 and 2012. Our search considered only economics papers relating to technology (broadly defined) and excluded work being undertaken in developing countries. All relevant papers were then categorised primarily as either dealing with a technology adoption or a technology management question. The classification was not always clear and so a cautious approach was adopted and where an argument could be made for classifying a paper in the 'management' group that was done.

A total of 54 papers were identified, 47 (87%) of which focussed on questions of technology adoption and only 7 (13%) dealt with technology management in some respect. The lists of papers are given as Tables 1 and 2. Of note, of the 47 technology adoption papers, 29 (62%) report results supportive of adoption of the technology in question, 16 (34%) indicate non-adoption is the preferred policy and two are more neutral.

The health technology management papers can be thought of in terms of two distinct categories. First, there are papers (n=5) where the technology of interest is a broad service (e.g. screening for cervical cancer), and is already in widespread use (and so has already been adopted either formally or

informally). Therefore, the economic analysis is exploring opportunities for improvements in the technology's effectiveness and efficiency.

For example, Turner *et al*. (2011) take as their starting point the English National Chlamydia Screening Programme and explored, using mathematical modelling, alternative approaches to improving the cost-effectiveness of the existing Programme. They conclude that the focus for efficiency improvement should be on partner notification strategies rather than increasing male screening coverage. Another screening example is concerned with cervical screening, a program that has been in place in the UK for some considerable time (TOMBOLA Group, 2009). The focus of this economic analysis was how best to manage the low grade cervical cytological abnormalities detected at routine screening: surveillance, immediate treatment or biopsy and recall. They conclude that there is no compelling case for favouring any one of the alternative approaches. A non-screening example is the paper by Richardson *et al*. (2009) concerned with gastrointestinal endoscopy and flexible sigmoidoscopy. However, their analysis was not questioning the use of these technologies, which represent established and standard of care practices, but rather sought efficiency gains in the delivery of the technology. Specifically, the question was asked whether physician or nurse delivered procedures are more cost-effective? Given the cost pressure frame to our paper, this 'scope of practice' type of question is of great importance. Interestingly, their findings support the higher cost physician-delivered care as being both more effective and cost-effective.

The second set of papers (n=2) have as a starting point clinical practice variation (and so again the concern is with technologies in widespread use) and the concern is the lack of standardization of practice. The economic analysis in these cases sought to improve efficiency through establishing appropriateness and clinical practice guidance recommendations. For example, an interesting study by Griffin *et al*. (2007) looked at clinical management strategies for patients judged to be 'clinically appropriate' for coronary revascularisation. Their analyses highlighted that amongst the clinical populations of focus, a commonly used procedure, percutaneous coronary intervention (i.e. coronary angioplasty) was never a cost-effective technology of choice. For patients judged clinically to be appropriate for angioplasty, the most cost-effective intervention was medical management. Such analytic work can then be used to inform clinical practice guidelines and target commonly used (already adopted) technologies such that benefits are maximised.

Areas of concern regarding technology use in the health care system

Here we want to highlight three sets of issues that might be addressed in technology management work, the first of which came through clearly from the brief literature review.

(1) Guarding against sub-optimal performance of health technologies

We see technology management having an emphasis on improvement. This would translate to a role whereby health sector staff and analysts strive for improvement in the quality and cost-effectiveness of the service being delivered. Taking the example of cervical screening, from the time of its widespread introduction in the UK there have been several major changes in the approach to delivery (e.g. the use of liquid-based cytology in 2008) which have enhanced the efficiency of the national screening programme. Similarly, the paper by the TOMBOLA Group (2009) highlighted some of the challenges in terms of effective service delivery (i.e. how best to manage low grade cervical cytological abnormalities) and the analysts had the goal of uncovering cost-effective solutions.

Also, the research that starts with observed variation and then overlays analysis to provide guidance to clinical practice (e.g. Griffin *et al*., 2007; Turner *et al*., 2010) falls under a banner of promoting higher levels of technology performance. The key question then being addressed is one of appropriateness. For example, the paper by Turner et al. (2010) starts with variation in clinical practice in relation to management of urinary tract infections (UTIs) and reports analysis work to guide more appropriate use of various investigation and treatment strategies.

(2) Indication creep

A technology management area related to appropriateness but one not explicitly highlighted in the literature review above is the concern relating to 'indication creep'. That is, once a new technology has been accepted and adopted for use in one clinical area, the door is open for its use to spread to other clinical areas or patient groups, without formal consideration of cost-effectiveness.

Let us consider the example of cataract surgery (Davis et al., 2012). The development of age-related cataracts is an inevitable part of ageing for many people and without effective treatment it is one of the leading causes of blindness worldwide. The widely acknowledged standard of care is cataract extraction. Compelling research evidence supports the efficacy and cost-effectiveness of cataract

extraction when performed in patients with poor baseline visual acuity (Baltussen et al., 2004; Castells et al., 2000). Hence, it is not surprising that cataract removal is one of the most frequently performed surgical procedures in the developed world. Over recent years there has been a dramatic change in cataract technology, evolving from an inpatient surgical procedure to a 19-minute ambulatory operation. This increase in technical efficiency has also been associated with dramatic increases in the volumes of surgery undertaken (as discussed earlier) and associated reductions in surgery thresholds. Figure 1 reports data on pre-operative visual functioning (using the VF-14 scale) before cataract surgery. The two data sets shown are both from British Columbia. Low thresholds for cataract surgery in a Canadian setting were demonstrated by Wright *et al.* (2002) in their Regional Evaluation of Surgical Indications and Outcomes (RESIO) study. Thirty-two percent of RESIO patients scheduled for first cataract surgery had a pre-operative visual function score of 90 or higher on the visual functioning VF-14 scale (where 100 is full visual functioning). The second set of data in Figure 1 were collected for an evaluation of cataract surgery outcomes conducted at Fraser Health Authority ophthalmology practices in 2009/10 (Davis et al., 2012). The distribution of pre-surgery VF-14 scores for the new cohort is further right-skewed compared to RESIO, indicating even higher levels of visual functioning pre-surgery. With such high levels of visual function, the scope for improvements in functioning is very limited. These data alone do not indicate system inefficiencies in the provision of cataract surgery but do offer an example of how indication creep (here to patients with higher levels of visual functioning) might potentially offer an important area for investigation relating to ongoing service efficiency.

(3) Technologies failing to deliver promised benefits

Another area of concern (but this time with the analysis-side of the equation) is whether, when a technology is implemented into clinical practice, we see the scale of benefits and costs that had been predicted at the time of the adoption assessment. That is, how good are our analysis-based predictions of the cost and benefit profiles for a technology once implemented? For example, have we seen the predicted improvements in health, and cost impacts and savings, from the widespread use of new high cost cancer drugs or Alzheimer's drugs? It seems remarkable that we cannot answer such questions with any degree of certainty – we should be testing the predictive validity of our analysis work in a more systematic and rigorous manner. Weather forecasters are rightly castigated when they fail to predict major storms – do we in the health economics technology assessment world have our equivalent of Michael Fish? (http://en.wikipedia.org/wiki/Michael_Fish)

> Regrettably we just don't know because we spend all of our time building new models rather than exploring the validity of existing models. As analysts, we too should be seeking improvement, and the necessary components of such a learning experience would be to establish the predictive validity of our analyses and, where the results are not good, understanding why there is a discrepancy between predicted and observed.

Pathology

If the premise is accepted (and, of course, for the sake of discussion and debate at HESG we're hoping that is not universally the case), then before we start considering responses to the 'problem' we need to consider why this adoption focus is so prevalent. Let us consider in turn the demand (the paymasters) and supply (the analysts) sides of technology evaluation work.

On the demand side, for us it would largely be summed up as 'he who pays the piper calls the tune'. Funding is more readily available for analysis work focussed on adoption decisions and so it is no surprise that we see more activity on that side. The funding comes from both private and public sector sources, and much of it flows in the context of reimbursement decision making. Those organisations with a stake in the technology adoption decision (e.g. manufacturers of pharmaceutical and device products) naturally wish to strengthen their product's claim for reimbursement. In some jurisdictions, coverage decision making agencies mandate that an economic analysis be undertaken before a new technology will be appraised. The consequence then is that public bodies such as the National Institute for Health & Clinical Excellence (NICE) require analytic support to allow technology appraisal decisions to be made.

This is all well and good, and we are not critical of this development in itself, it is the lack of balance (between adoption and management analytic activity) that worries us. In the field of technology appraisal, agencies such as NICE and CADTH have been largely been mandated (by their own paymasters) to focus on adoption. More naturally one would look to health care delivery organisations, charged with delivering safe and effective care to their populations whilst remaining within budget, (e.g. PCTs, health authorities, etc.) to give emphasis to the management piece. It is, therefore, disappointing, but not surprising, to read Robinson et al (2012): 'in reality PCT boards focussed more on developing robust priority-setting processes around *new* service developments than other areas.'

On the supply side, as a sub-discipline we have seen benefits and revenues flow in our direction and so the response has generally been one of either active or passive encouragement of the adoption focus. A number of university-based and independent health economics and health technology assessment groups have therefore developed in the UK to service the needs of both industry and NICE, and many have been rewarded handsomely for this work. Why would we want to be playing a different tune? Our answer: if we do not address this issue then we will continue to see poor alignment between the goals and activity of health economists in technology evaluation work. The self-evident danger is that the work of health economists might serve to diminish rather than enhance efficiency and equity.

Treatment options

Our perhaps obvious recommendation in moving forward is thus for there to be a greater analytic emphasis on technology management as opposed to technology adoption. This is not at all meant to suggest that adoption work should cease but rather a call for a re-balancing of effort to come more in line with the reality of the real-world decision making context where many more resources are spent on management than adoption decisions. In our view, this re-balancing might take at least four inter-connected forms.

First, working in close partnership with decision makers, health economists should adopt of model of evaluation and assessment throughout the life cycle of health technologies. On the surface some commentators might balk, as this task in and of itself could not possibly be achieved for all technologies currently in play. However, value of information analyses could predicate and inform decisions on where the greatest return for analytic effort could be achieved. This would alleviate the need to include management-focused analysis work on all technologies and as such vastly improve the efficiency of our efforts.

Second, building on this idea of life cycle analyses speaks to much more work on development of administrative data systems that would allow for more effective monitoring of technology that is in use. Of course there are substantial resource implications in going this route that would have to be weighed carefully but the potential benefit – measured in terms of achieving much greater efficiency and equity in the management of resources – surely would suggest that such *consideration* is at least justified. The development of in-service data collection of patient-reported outcomes, as we see in both England and

Canada (Devlin & Appleby, 2010; McGrail *et al*, 2012; Bryan *et al*., 2012), is a move in this direction. If we can encourage development of a health service that feels obliged routinely to ask patients (in a systematic manner) how they are recovering post surgery or whilst taking a new drug, then such administrative data resources may not seen such a fanciful idea.

Third, and in part related to the first recommendation, is for tracking and evaluation of the cost-effectiveness analysis predictions for the technology at the time of coverage assessment. We have already made this point in the paper but feel the importance of fostering a more self-critical and learning culture amongst those involved in technology evaluation analysis and model building is critical. This requires us, once the given technology is in routine use, to see the value in re-visiting the initial analyses to allow for refinement of the application of research methodologies but also ongoing (i.e. 'real-time') assessment of true effectiveness in relation to actual costs.

Finally, as part of routine assessment of existing technologies, there needs to be a much greater focus on decommissioning (i.e., disinvestment) of services. As many health care decision makers will admit, the track record on decommissioning, either in terms of stopping ineffective services or scaling back of effective but lower value services is woefully inadequate. Efforts in the UK and Australia suggest relatively low yield on targeting purely ineffective services (perhaps because clinical practice naturally evolves away from services that are not clinically effective), but opportunities abound on releasing resources from effective – but lower value – services (Elshaug et al., 2007). It is here that health economists could be making a major contribution to real world decision making, noting, as highlighted above, the serious fiscal constraints faced by most major economies at present.

One example of good practice with respect to resource management is the implementation of explicit resource allocation methods like programme budgeting and marginal analysis (PBMA). Taking a multi-criteria approach to benefit assessment, use of PBMA in Canada has resulted in the re-allocation of tens of millions of dollars within the regional health authority context (Mitton et al., 2003; Dionne et al. 2009) and, in cases where disinvestment is the objective, fitting with a 'rational disinvestment' approach advocated in a recent article in the *QJM* (Donaldson et al., 2010), millions of dollars have been released from specific budgets with limited negative consequences (Mitton et al., 2011). While it would be incorrect to consider PBMA solely as a 'cost-cutting' tool, it can provide a rigorous and transparent approach to release resources from services and technologies that are providing lower relative value.

In terms of moving to a more reasonable balance between the adoption and management agendas, several things need to be addressed. First, there needs to be a realignment of emphasis on adoption and coverage analysis in training programs. Second, we need much greater engagement of health economists with decision makers in health care delivery organisations. While this might seem daunting to get out of the ivory tower, our experience is that most within the health service actually have very good intentions and are keen to discuss projects of mutual interest. Third, the health service should be encouraged to invest in studentships and fellowships that will enable health economists to gain training on methods to support analysis of ongoing management of technologies within the system.

Conclusions

The primary symptom we are concerned by is the poor alignment between goals and activity of health economists in the field of technology evaluation. Almost all of our analytic effort in the micro-economic evaluation at the treatment level is focused on the adoption decision rather than the system use of technologies. This paper is a call for economists to become more engaged with health technology management and break out of the adoption trap. The obvious question for researchers and policy makers alike is that for the vast resources being spent in health care at present – $200 billion in Canada and just over £100 billion in England – how could greater emphasis on management be denied?

Suggested topics for discussion:

- Is there agreement on the problem?
- If so, why does this problem exist?
- Thoughts on how we might move forward to address the concern?

References

Baltussen R, Sylla M, Mariotti SP. Cost-effectiveness analysis of cataract surgery: a global and regional analysis. *Bull World Health Organ.* May 2004;82(5):338-345.

Bryan S, McGrail KM, Davis J. "In God We Trust; All Others Must Bring Data". Healthcare Papers 2012;11(4):55-58

Callan T, Nolan B, Walsh J. The Economic Crisis, Public Sector Pay and the Income Distribution. Germany (Bonn): Institute for the Study of Labor, 2010

Canadian Institute for Health Information. Health Care Cost Drivers: The Facts. CIHI, Ottawa, 2011

Castells X, Alonso J, Castilla M, Comas M. Efficacy and cost of ambulatory cataract surgery: a systemic review. Med Clin (Barc). 2000;114 Suppl 2:40-47

Cooper, C. Disinvestment in health care. BMJ 2010;340:c1413

Davis J, McNeil H, Wasdell M, Chunick S, Bryan S. Focussing both eyes on health outcomes: Revisiting cataract surgery [under review]

Devlin N, Appleby J. Getting the most out of PROMs: Putting health outcomes at the heart of NHS decision-making. King's Fund, London, 2010

Dionne F, Mitton C, Smith N, Donaldson C. Evaluation of the impact of Program Budgeting and Marginal Analysis in Vancouver Island Health Authority. Journal of Health Services Research and Policy 2009;14(4):234-242

Donaldson C, Bate A, Mitton C, Dionne F, Ruta D. Rational Disinvestment. QJM 2010; 103(10):801-807

Elshaug AG, Hiller JE, Tunis SR, Moss JR. Challenges in Australian policy processes for disinvestment from existing, ineffective health care practices. Aust N Z Health Policy 2007;4:23

Griffin SC, Barber JA, Manca A, Sculpher MJ, Thompson SG, Buxton MJ, Hemingway H. Cost effectiveness of clinically appropriate decisions on alternative treatments for angina pectoris: prospective observational study. BMJ, doi:10.1136/bmj.39129.442164.55 (published 5 March 2007)

Keenan T, Rosen P, Yeates D, Goldacre M. Time trends and geographical variation in cataract surgery rates in England: study of surgical workload. Br J Ophthalmol 2007;91:901–904. doi: 10.1136/bjo.2006.108977

McGrail KM, Bryan S, Davis J. Let's All Go to the PROM: The Case for Routine Patient-Reported Outcome Measurement in Canadian Healthcare. Healthcare Papers, 2012;11(4):8-18

Mitton C, Dionne F, Damji R, Campbell D, Bryan S. Difficult decisions in times of constraint: Criteria based Resource Allocation in the Vancouver Coastal Health Authority. BMC Health Services Research 2011;11:169

Pear R. Health Official Takes Parting Shot at 'Waste'. *New York Times*. (Dec. 3, 2011) http://www.nytimes.com/2011/12/04/health/policy/parting-shot-at-waste-by-key-obama-health-official.html?_r=1&emc=eta1.

Richardson G, Bloor K, Williams J, Russell I, Durai D, Cheung WY, Farrin A, Coulton S. Cost effectiveness of nurse delivered endoscopy: findings from randomised multi-institution nurse endoscopy trial (MINuET). BMJ 2009;338:b270

Robinson S, Dickinson H, Freeman T, Rumbold B, Williams I. Structures and processes for priority-setting by health-care funders: a national survey of primary care trusts in England. Health Services Management Research (in press) 2012

TOMBOLA Group. Options for managing low grade cervical abnormalities detected at screening: cost effectiveness study. BMJ 2009;339:b2549

Turner K, Adams E, Grant A, Macleod J, Bell G, Clarke G, Horner P. Costs and cost effectiveness of different strategies for chlamydia screening and partner notification: an economic and mathematical modelling study. BMJ 2011;342:c7250

Turner D, Little P, Turner S, Rumsby K. Cost effectiveness of management strategies for urinary tract infections: results from randomised controlled trial. BMJ 2010;340:c346

Williams A. Health Economics: The Cheerful Face of the Dismal Science? In: Health and Economics, Macmillan Press, London, 1987

Wright CJ, Chambers GK, Robens-Paradis Y. Evaluation of indications for and outcomes of elective surgery. CMAJ 2002;167(5):461-6

Figure 1: Technology management components

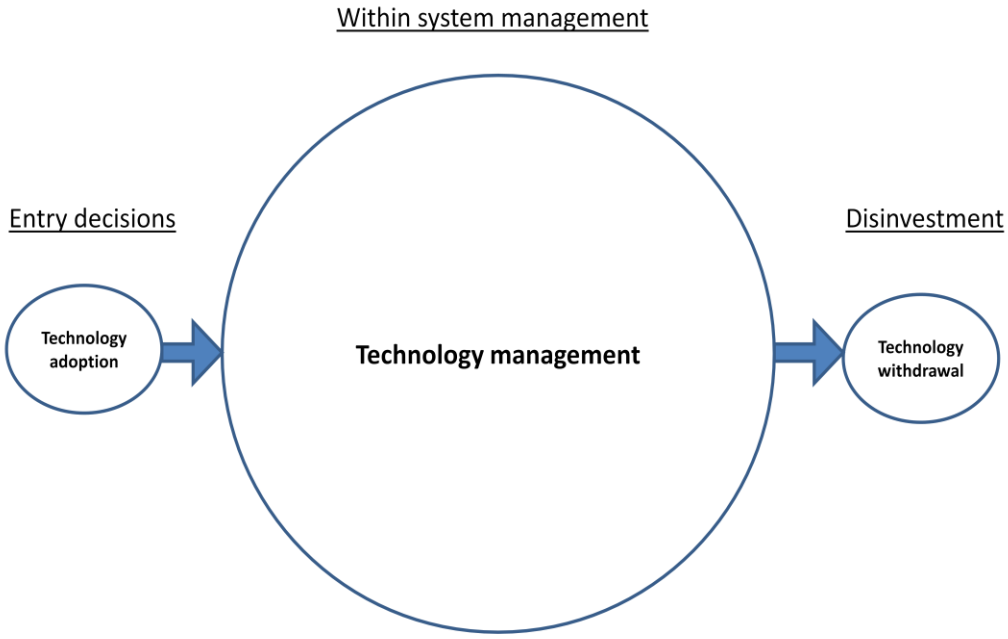

Figure 2: Wordle for one highly cited paper by leading health economists dealing with technology decision making

Fun Quiz: Which paper?

Figure 3: Cataract surgery thresholds

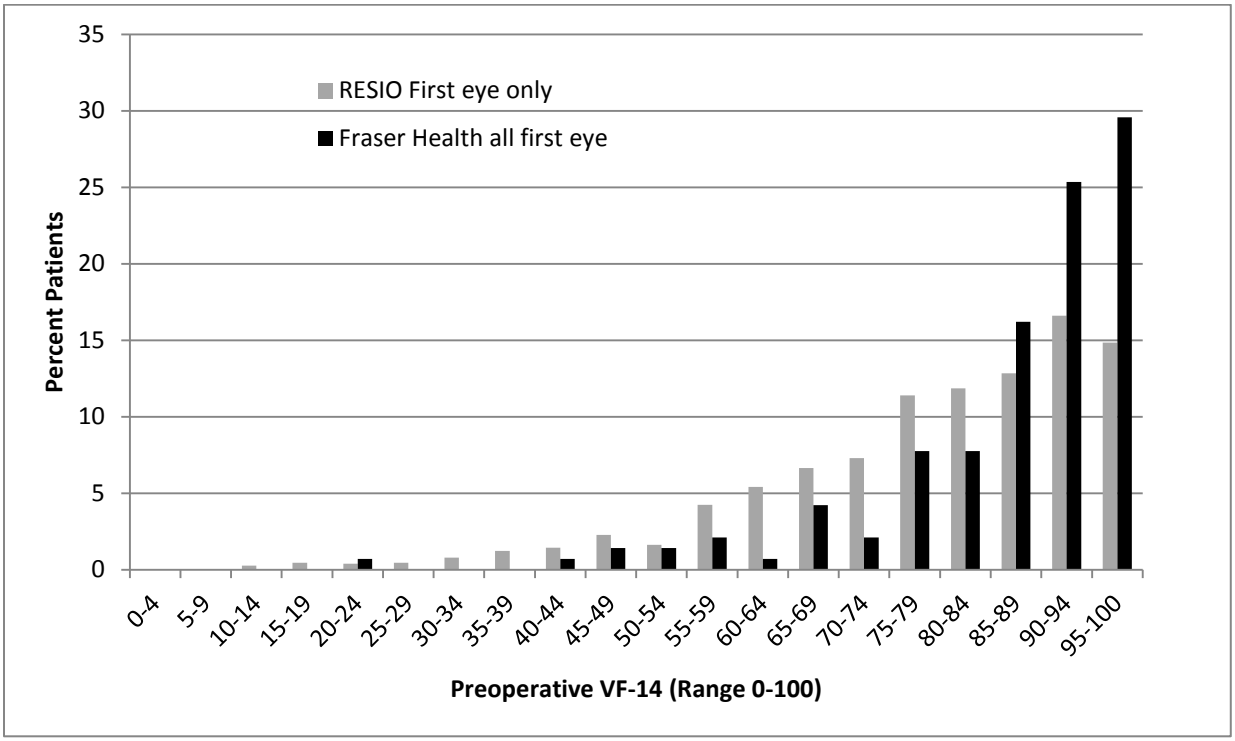

Table 1: BMJ papers focussed on technology adoption decisions

Year	Lead Author	Title
2012	Ryan	Clinical and cost effectiveness of mobile phone supported self monitoring of asthma: multicentre randomised controlled trial
2012	De Kok	Primary screening for human papillomavirus compared with cytology screening for cervical cancer in European settings: cost effectiveness analysis based on a Dutch microsimulation model
2011	Pink	Dabigatran etexilate versus warfarin in management of non-valvular atrial fibrillation in UK context: quantitative benefit-harm and economic analyses
2011	Robotham	Screening, isolation, and decolonisation strategies in the control of meticillin resistant *Staphylococcus aureus* in intensive care units: cost effectiveness evaluation
2011	Jit	Dedicated outreach service for hard to reach patients with tuberculosis in London: observational study and economic evaluation
2011	Barton	Effectiveness and cost effectiveness of cardiovascular disease prevention in whole populations: modelling study
2011	Roberts	Hysterectomy, endometrial ablation, and levonorgestrel releasing intrauterine system (Mirena) for treatment of heavy menstrual bleeding: cost effectiveness analysis
2011	Green	Group therapy for adolescents with repeated self harm: randomised controlled trial with economic evaluation
2010	Manns	Population based screening for chronic kidney disease: cost effectiveness study
2010	Gillett	Delivering the diabetes education and self management for ongoing and newly diagnosed (DESMOND) programme for people with newly diagnosed type 2 diabetes: cost effectiveness analysis
2010	Koek	Cost effectiveness of home ultraviolet B phototherapy for psoriasis: economic evaluation of a randomised controlled trial (PLUTO study)
2010	Lambeek	Effect of integrated care for sick listed patients with chronic low back pain: economic evaluation alongside a randomised controlled trial
2010	Rozenbaum	Cost effectiveness of pneumococcal vaccination among Dutch infants: economic analysis of the seven valent pneumococcal conjugated vaccine and forecast for the 10 valent and 13 valent vaccines
2010	Henriksson	Assessing the cost effectiveness of using prognostic biomarkers with decision models: case study in prioritising patients waiting for coronary artery surgery
2009	Paulden	Screening for postnatal depression in primary care: cost effectiveness analysis
2009	Kim	Cost effectiveness analysis of including boys in a human papillomavirus vaccination programme in the United States
2009	Patel	Economic evaluation of arthritis self management in primary care
2009	Epstein	Laparoscopic fundoplication compared with medical management for gastro-oesophageal reflux disease: cost effectiveness study
2009	Latimer	Cost effectiveness of COX 2 selective inhibitors and traditional NSAIDs alone or in combination with a proton pump inhibitor for people with osteoarthritis
2009	Thompson	Screening men for abdominal aortic aneurysm: 10 year mortality and cost effectiveness results from the randomised Multicentre Aneurysm Screening Study
2009	Ehlers	Analysis of cost effectiveness of screening Danish men aged 65 for abdominal aortic aneurysm
2009	Armstrong	Surgical treatments for men with benign prostatic enlargement: cost effectiveness study
2009	Soares	Cost effectiveness analysis of larval therapy for leg ulcers
2008	Hollinghurst	Randomised controlled trial of Alexander technique lessons, exercise, and massage (ATEAM) for chronic and recurrent back pain: economic evaluation
2008	Hollinghurst	Paracetamol plus ibuprofen for the treatment of fever in children (PITCH): economic

		evaluation of a randomised controlled trial
2008	Jit	Economic evaluation of human papillomavirus vaccination in the United Kingdom
2008	Gilles	Different strategies for screening and prevention of type 2 diabetes in adults: cost effectiveness analysis
2008	Gray	Cost effectiveness of self monitoring of blood glucose in patients with non-insulin treated type 2 diabetes: economic evaluation of data from the DiGEM trial
2008	Graff	Community occupational therapy for older patients with dementia and their care givers: cost effectiveness study
2007	Colbourn	Preventive strategies for group B streptococcal and other bacterial infections in early infancy: cost effectiveness and value of information analyses
2007	Roberts	Cost effectiveness of home based population screening for Chlamydia trachomatis in the UK: economic evaluation of chlamydia screening studies (ClaSS) project
2007	Edwards	Parenting programme for parents of children at risk of developing conduct disorder: cost effectiveness analysis
2007	Rao	Cost effectiveness analysis of minimally invasive internal thoracic artery bypass versus percutaneous revascularisation for isolated lesions of the left anterior descending artery
2006	Heart Protection Study Collaborative	Lifetime cost effectiveness of simvastatin in a range of risk groups and age groups derived from a randomised trial of 20,536 people
2006	Flood	Joint crisis plans for people with psychosis: economic evaluation of a randomised controlled trial
2006	Ratcliffe	A randomised controlled trial of acupuncture care for persistent low back pain: cost effectiveness analysis
2006	Norlund	Immediate computed tomography or admission for observation after mild head injury: cost comparison in randomised controlled trial
2006	O'Reilly	A cost effectiveness analysis within a randomised controlled trial of post-acute care of older people in a community hospital
2006	Iglesiais	Pressure relieving support surfaces (PRESSURE) trial: cost effectiveness analysis
2006	Legood	Lifetime effects, costs, and cost effectiveness of testing for human papillomavirus to manage low grade cytological abnormalities: results of the NHS pilot studies
2005	Coast	Economic evaluation of a general practitioner with special interests led dermatology service in primary care
2005	UKATT Research Team	Cost effectiveness of treatment for alcohol problems: findings of the randomised UK alcohol treatment trial (UKATT)
2005	McManus	Targets and self monitoring in hypertension: randomised controlled trial and cost effectiveness analysis
2005	Dijkgraaf	Cost utility analysis of co-prescribed heroin compared with methadone maintenance treatment in heroin addicts in two randomised trials
2005	Rivero	Surgical stabilisation of the spine compared with a programme of intensive rehabilitation for the management of patients with chronic low back pain: cost utility analysis based on a randomised controlled trial
2005	Walsh	Economic evaluation of nurse led intermediate care versus standard care for post-acute medical patients: cost minimisation analysis of data from a randomised controlled trial
2005	Rafferty	Cost effectiveness of nurse led secondary prevention clinics for coronary heart disease in primary care: follow up of a randomised controlled trial

Table 2: BMJ papers focused on technology management

Year	Lead Author	Title	Technology management focus
2012	Schroeder	Cost effectiveness of alternative planned places of birth in woman at low risk of complications: evidence from the Birthplace in England national prospective cohort study	Improvement of existing technology
2011	Turner	Costs and cost effectiveness of different strategies for chlamydia screening and partner notification: an economic and mathematical modelling study	Improvement of existing technology
2010	Turner	Cost effectiveness of management strategies for urinary tract infections: results from randomised controlled trial	Clinical practice variation
2009	TOMBOLA Group	Options for managing low grade cervical abnormalities detected at screening: cost effectiveness study	Improvement of existing technology
2009	Gekas	Comparison of different strategies in prenatal screening for Down's syndrome: cost effectiveness analysis of computer simulation	Improvement of existing technology
2009	Richardson	Cost effectiveness of nurse delivered endoscopy: findings from randomised multi-institution nurse endoscopy trial (MINuET)	Improvement of existing technology
2007	Griffin	Cost effectiveness of clinically appropriate decisions on alternative treatments for angina pectoris: prospective observational study	Clinical practice variation

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