Diffusion of innovation theory for clinical change

Robert W Sanson-Fisher

ABSTRACT

- Maximising the adoption of evidence-based practice has been argued to be a major factor in determining healthcare outcomes. However, there are gaps between evidence-based recommendations and current care.
- Bridging the evidence gap will not be achieved simply by informing clinicians about the evidence.
- One theoretical approach to understanding how change may be achieved is Rogers' diffusion model. He argues that certain characteristics of the innovation itself may facilitate its adoption. Other factors infuencing acceptance include promotion by influential role models, the degree of complexity of the change, compatibility with existing values and needs, and the ability to test and modify the new procedure before adopting it.
- The diffusion model may provide valuable insights into why some practices change and others do not, as well as guiding those who try to effect adoption of best-evidence practice.

MJA 2004; 180: S55–S56

THE ADOPTION of a new clinical behaviour by a clinician and healthcare system is a consequence of multiple factors, with research evidence being only one. Research on the diffusion or adoption of innovations suggests that a number of themes come into play. For example, the willingness to use new drugs is influenced by the physician's sex, specialty, medical school, years since graduation, practice location and practice volume, and the relative proportion of elderly patients in the physician's practice.[1]

Diffusion theory

Rogers[2] has developed one of the better-known theoretical approaches to diffusion of innovation. This theoretical framework is helpful when determining the adoption of specific clinical behaviours and when deciding which components will require additional effort if diffusion is to occur. It includes a consideration of aspects of the innovation (or new technology), style of communication, steps in decision making, and the social context.

The innovation

According to Rogers[2] there are five elements of a new or substitute clinical behaviour that will each partly determine whether adoption or diffusion of a new activity will occur: relative advantage, compatibility, complexity, trialability and observability.

Relative advantage: Rogers defines "relative advantage" as the degree to which an innovation is perceived as better than the idea it supersedes.

Research provides information on the cost-effectiveness and potential benefit to patients of implementing a new clinical activity. However, the objective data may be less important than the clinician's perception of whether the innovation will be advantageous. Decisions about implementing best-evidence practice are driven not only by patient welfare but also by the interplay between the interests of the patient, the clinician and the healthcare system. For example, if a proposed change alters the balance of power between or within professional groups in a "negative" way, the innovation may not be implemented. Conversely, if the recommended behaviour increases the status of adopting clinicians and brings in more revenue for individuals or the organisation, the innovation may be readily adopted.

Compatibility: "Compatibility" is a measure of the degree to which an innovation is perceived as being compatible with existing values, past experiences, and the needs of potential adopters.

To increase the probability of adoption, the innovation must address an issue that clinicians or others perceive to be a problem. For example, a new procedure that enables early detection of a life-threatening illness is likely to be adopted. Early screening tests are compatible with medical beliefs that early detection of disease is beneficial. Consequently, tests and procedures that appear to offer this capacity are more likely to be adopted. Real-life examples include the rapid adoption of mammography screening[3,4] and testing for prostate cancer,[5] despite some debate about their effectiveness.

Complexity: "Complexity" is a measure of the degree to which an innovation is perceived as difficult to understand and use. A clinical procedure is more likely to be adopted if it is simple and well defined. For example, altering a patient's drug regimen is relatively simple, and thus changes in drug therapy can occur rapidly. In contrast, preventive activities such as detecting and treating patients with hazardous alcohol consumption[6] and smoking[7] have not been adopted quickly, in spite of the potential health gain. This may, at least in part, be a result of the complexity of these activities. Attempts to intervene at the level of primary prevention may be hampered by patients' resistance and their lack of accuracy in self-reporting risk behaviours. Moreover, some clinicians may have insufficient expertise in the consulting skills necessary to achieve change.

Trialability: Rogers defines "trialability" as the degree to which the innovation may be trialled and modified. The

Faculty of Health, University of Newcastle, Newcastle, NSW.
Robert W Sanson-Fisher, PhD, Professor of Health Behaviour.
Reprints will not be available from the author. Correspondence: Professor Robert W Sanson-Fisher, Faculty of Health, University of Newcastle, David Maddison Building, King Street, Newcastle, NSW 2300. Rob.sanson-Fisher@newcastle.edu.au

ability to test a potential medical intervention on a limited basis allows clinicians to explore the implementation of the procedure, its acceptability to patients, and the potential outcomes. Rogers argues that the facility to undertake a limited cost–benefit trial of an intervention promotes faith that the evidence is correct and that its implementation is logistically possible.

Observability: "Observability" is the degree to which the results of the innovation are visible to others. "Visibility" of an innovation stimulates peer discussion, as colleagues of a clinician adopting a new procedure often request information about it. If respected and influential clinicians argue for and demonstrate the application of a new procedure or treatment approach, it is likely to have a positive impact upon adoption rates.[8] The more charismatic the person providing the role model, the greater the chance that a greater number of other professionals will adopt the advocated change in clinical behaviour. In surgery, new techniques are often adopted very quickly, as there is a common perception that there are disadvantages in being "left behind" by not adopting new technology.[9]

Communication style

Channels of communication used to convey information about clinical practice include research publications, databases (eg, the Cochrane database), the mass media, attendance at lectures and workshops, visits from interest groups, and videos or audiotapes.

Current research suggests that the most effective communication strategy is face-to-face exchange.[8] It provides an opportunity to tailor information to recipients and allows the advocate of the change to explore and, if necessary, modify the reasons why a shift in clinical behaviour should occur. Interpersonal communication is usually more effective when there is a high degree of professional resemblance between the individual attempting to introduce the innovation and the recipient. This may partly explain why clinical audits undertaken by medical practitioners are more likely to lead to adoption of a new practice than those performed by allied health staff.[8]

The decision process

The diffusion model[2] postulates five steps in the decision-making process:

- researchers acquire knowledge about the proposed clinical change;
- the individual clinician is persuaded about the advantages of the innovation;
- the clinician engages in activities that will lead to a choice about adopting or rejecting the innovation (eg, reading, attending workshops, communicating with individuals who have experience in the field);
- the innovation is incorporated into the daily activity of the clinician; and
- the clinician seeks reinforcement about the innovation decision (eg, discussion and comparison with peers).

Individuals and organisations will move through the decision process at different rates, depending upon whether they are innovators, or early or late adopters. Innovators are characterised by their tolerance of high levels of uncertainty.

The social context

The systems most likely to respond easily and quickly to innovation are ones that have a culture of creativity and innovation, a relatively flat hierarchical system, and strong leadership that is committed to effecting change. In contrast, the healthcare system has a hierarchical model, with separate organisational structures for each professional group. The system is often bureaucratic, with social norms that hinder rapid change. However, within this system, it is possible for clinicians to change some aspects of their clinical activities relatively rapidly, as there are few restraints on determining the choice of care. Changing to evidence-based clinical behaviour may mean modifying the system so that it adequately monitors the frequency of the activity, the outcomes, feedback to the clinician and contingencies for desired clinical behaviour.

Summary

Diffusion theory offers a plausible explanation for why some clinical activities are adopted rapidly and others only with difficulty, despite strong evidence of their potential benefits. Some clinical behaviours may be adopted relatively easily because of the nature of the behaviour itself, while others may involve a complex interplay between social systems, communication style and the decision-making process. There is a need to prospectively test the assumptions of the model in the healthcare environment using rigorous experimental design.

Competing interests

The author is a Senior Advisor to the National Institute of Clinical Studies.

References

1. Tamblyn R, McLeod P, Hanley JA, et al. Physician and practice characteristics associated with the early utilization of new prescription drugs. *Med Care* 2003; 41: 895-908.
2. Rogers E. Diffusion of innovations. New York: Free Press, 1983.
3. Goodman SN. The mammography dilemma: a crisis for evidence-based medicine? *Ann Intern Med* 2002; 13: 363-365.
4. Stanley DE. The mammography dilemma. *Ann Intern Med* 2003; 138: 771.
5. McDougall GJ Jr, Weber BA, Dziuk TW, Heneghan R. The controversy of prostate screening. *Geriatr Nurs* 2000; 21: 245-248.
6. Schorling JB, Klas PT, Willems JP, Everett AS. Addressing alcohol use among primary care patients: differences between family medicine and internal medicine residents. *J Gen Intern Med* 1994; 9: 248-254.
7. Franzgrote M, Ellen JM, Millstein SG, Irwin CE Jr. Screening for adolescent smoking among primary care physicians in California. *Am J Public Health* 1997; 87: 1341-1345.
8. Bero LA, Grilli R, Grimshaw JM, et al. Closing the gap between research and practice: an overview of systematic reviews of interventions to promote the implementation of research findings. *BMJ* 1998; 317: 465-468.
9. Denis J-L, Hebert Y, Langley A, et al. Explaining diffusion patterns for complex health care innovations. *Health Care Manage Rev* 2002; 27: 60-73. ❑