

FACTORS AFFECTING THE UTILIZATION OF SYSTEMATIC REVIEWS

A Study of Public Health Decision Makers

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Abstract

Objective: To determine the extent to which public health decision makers used five systematic reviews to make policy decisions, and to determine which characteristics predict their use.

Methods: This cross-sectional follow-up study of public health decision makers in Ontario collected primary data using a telephone survey and a short, self-administered organizational demographics questionnaire completed by the administrative assistant for each Medical Officer of Health. Independent variables included characteristics of the innovation, organization, environment, and individual. Data were entered into a computerized database developed specifically for this study, and multiple logistic regression analysis was conducted.

Results: The participation rate was very high, with 85% of public health units and 96% of available decision makers completing the survey. In addition, 63% of respondents stated they had used at least one of the systematic reviews in the previous 2 years to make a decision. The most important predictors of use were one's position, expecting to use a review in the future, and perceptions that the reviews were easy to use and that they overcame the barrier of limited critical appraisal skills.

Conclusions: Utilization of the systematic reviews in Ontario was very high. The utilization rates found in this study were significantly higher than those reported in previous utilization studies. One's position was found to be the strongest predictor of use, identifying program managers and directors as the most appropriate audience for systematic reviews.

Keywords: Evidence-based practice, Diffusion of innovations, Evidence-based decision making, Public health

Research utilization is defined as the process of transferring research-based knowledge into clinical practice (23;38). It represents a process whereby research information is not only received but translated into a useable form (9;20;21;37). However, the limited success observed in the research dissemination literature suggests that transforming scientific research

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into practice is a demanding task requiring intellectual rigor, discipline, creativity, clinical judgment and skill, organizational savvy, and endurance (28).

The purpose of this study was to examine the association between the utilization of systematic reviews on the effectiveness of public health interventions by public health decision makers in Ontario, and characteristics of the innovation, organization, environment, and the individual. The 41 public health units in Ontario are responsible for promoting the health of the population, preventing disease, and providing medical care to treat communicable diseases. They provide diverse services such as newborn and parent home visiting, prenatal classes, health promotion within public and secondary schools and worksites, nutritional counseling, development of community strengths to promote or improve health, and restaurant inspections (35).

BACKGROUND

Dissemination research has been defined as the study of the processes and variables that determine and/or influence the adoption of knowledge, interventions, or practice by various stakeholders (24). In the past decade there has been an increased emphasis on research examining the relationship between the dissemination of research evidence and its use in healthcare policy decision making and clinical practice (7;8). Several forces, such as the growth of science and technology, increased media attention on scientific discoveries, the Internet, and the demand for political accountability for the use of public resources, have intensified the need for better dissemination and utilization of research evidence in healthcare settings (24). Currently, policy decisions and clinical practice are determined by a number of distinct pieces of evidence, including past experiences, beliefs, values, skills, resources, legislation, protocols, patient preferences, and scientific research (16;29;44). Despite considerable pressure to practice evidence-based health care, some researchers remain convinced that policy making and clinical practice continue to be predominantly based on experience rather than research-based knowledge (1;5;32;33;45).

The process that occurs from the dissemination of research evidence to its utilization in healthcare policy and clinical decision making is ambiguous. It has been suggested that there is a continuum that proceeds from knowledge generation to knowledge acquisition and knowledge utilization (36), and that there are several factors that can intercede along the pathway that may facilitate or hinder research utilization. Among these factors are beliefs, values, education, social status, and networks (22).

Diffusion scholars have long recognized that adoption of an innovation is not an instantaneous act. Rather it is a process that occurs over time and consists of a series of actions (39). The diffusion of innovations refers to the spread of new ideas, techniques, behaviors, or products throughout a population (39) and/or the adoption of a change that is new to an individual/organization or the relevant environment (13;43). Innovations in health care may be preventive, curative, rehabilitative, or palliative, and encompass all of the instruments, equipment, drugs, procedures, and decision processes used in the delivery of healthcare services (2). These definitions indicate that research evidence is an innovation and that the knowledge gained from diffusion research is applicable in understanding the process of research utilization.

However, there is little understanding concerning the substantial variation that exists among healthcare professionals, decision makers, and organizations with respect to the adoption of research evidence (3;4;26). Research suggests that the process of innovation adoption in the healthcare field is complex and associated with multiple factors related to individuals, organizations, environments, and the innovations themselves. Decisions regarding whether to adopt an innovation are essentially information-seeking and processing activities in which the decision-making unit is motivated to reduce uncertainty about the

innovation (39). A framework of research dissemination and utilization, which has been described elsewhere by M. Dobbins (unpublished data, 2000), was used to guide this study.

METHODS

The research objectives of this study were: a) to determine the extent to which public health decision makers used five systematic reviews of the effectiveness of public health interventions; and b) to determine which characteristics of the innovation, organization, environment, and/or individual predicted the use of these reviews.

The innovation examined in this study consisted of five systematic reviews of the effectiveness of public health interventions that had been disseminated to public health decision makers in Ontario in 1996. A systematic review is a rigorous approach to retrieving and appraising all of the available literature on a research topic to determine the overall effectiveness of a given intervention on specified outcomes, without calculating an overall effect size (12;30). Systematic reviews, as opposed to meta-analyses, were conducted because in most cases there was wide variation in the interventions and outcomes measured in the studies. The methods used to conduct the systematic reviews were adopted from those developed by the Cochrane Collaboration (42), to suit the state of the public health literature. The process included the development of a comprehensive search strategy to retrieve both published and unpublished literature, critically appraising each study for relevance and validity using validated tools, extracting relevant data from each study using a standardized tool, and finally, developing recommendations for public health practice based on the findings. The written reports, published by the Quality of Nursing Worklife Research Unit, were lengthy, detailed documents of approximately 40 pages in length that outlined the procedures used and made clear recommendations to decision makers with respect to specific interventions. The topics of the reviews were chosen in collaboration with provincial advisory groups to ensure their relevance to current policy and program decisions. Topics included the effectiveness of home-visiting as a public health strategy, adolescent suicide prevention, community-based heart health, community development, and a review of reviews of parent-child health.

This study was a follow-up to an earlier study funded by the Ontario Health Care Evaluation Network (OHCEN) conducted in 1996. The OHCEN study identified barriers to using research evidence in public health decision making as well as perceptions of the usefulness of systematic reviews in policy decision making (10). The five systematic reviews were disseminated to all decision makers that participated in this study.

Sample and Setting

This cross-sectional follow-up survey was administered by telephone to decision makers from all public health units in Ontario, along with a self-administered organizational demographic questionnaire completed by one administrative assistant in each health unit. The study sample included all medical and associate medical officers of health, program directors, and program managers who were responsible for making decisions about public health practice, who were employed in public health units in Ontario in 1998 and who had completed the OHCEN study in 1996. The unit of analysis was individual public health decision makers.

Independent and Dependent Variables

All of the independent and dependent variables were measured as individual items using Likert scales or continuous and dichotomous variables. The independent variables of interest included characteristics of the innovation, organization, environment, and individual. A full list of the variables is summarized in Table 1. The data collected on the characteristics of the

Table 1. Variable Definition and Measurement

Variable label	Operational definition	Data source
<i>Organizational characteristics</i>		
Size	Number of full-time equivalent employees (35 hrs/week) in health unit	Administrative data
Population served	Urban/rural/mixed (municipal designation)	Administrative data
Functional differentiation	Number of divisions	Administrative data
Complexity	Number of programs	Administrative data
Vertical differentiation	Number of levels of workers in organization (Front-line staff to Medical Officer of Health)	Administrative data
Research activity	Health unit involvement in research activities Yes/No	Administrative data
Research activity	Number of research projects health unit is involved in	Administrative data
Teaching health unit	Designated as a teaching health unit (now PHRED)	Health unit administrative data
Formalization	Degree to which organization follows policies and procedures ^a 5 point Likert scale 1 = strongly agree 5 = strongly disagree	Decision-maker perceptions
Financial (slack) resources	Perceived barrier to using research evidence based on limited organizational resources ^a	Decision-maker perceptions
Organizational culture research value	The organization values the use of research ^a	Decision-maker perceptions
Staff training	Ongoing training for staff in research methods and critical appraisal ^a	Decision-maker perceptions
External communication	Existence of mechanisms that promote transfer of new information into organization ^a	Decision-maker perceptions
Centralization: Information searched for before making decision	Extent to which information is routinely searched before making decisions 5 point Likert scale 1 = not at all 2 = extensively	Decision-maker perceptions
Centralization: Importance of research evidence to decisions	Importance routinely placed on research evidence in decision making 1 = not at all 2 = very	Decision-maker perceptions
<i>Environmental characteristics</i>		
Regulations and legislation	Degree to which provincial and local regulations and legislation impact on program decisions ^a	Decision-maker perceptions
Network embeddedness	Degree to which decisions are made in collaboration with other institutions and agencies ^a	Decision-maker perceptions
MOH relationship with board	Amount of influence the MOH has over decisions that the local board of health makes ^a	Decision-maker perceptions
MOH relationship with politicians	Amount of influence the MOH has over decisions that local politicians make ^a	Decision-maker perceptions
Board influenced by research	Degree to which local board of health is influenced by research evidence ^a	Decision-maker perceptions
Politicians influenced by research	Degree to which local politicians are influenced by research evidence ^a	Decision-maker perceptions

(Continued)

Table 1. (Continued)

Variable label	Operational definition	Data source
<i>Characteristics of innovation</i>		
Relative advantage	Priority that should be given to conducting systematic overviews	OHCEN data
Compatibility	4-point Likert Scale: 1 = low; 4 = top Weight given to research when making decisions 5-point Likert Scale: 1 = 0–20%; 5 = 81–100%	OHCEN data
Compatibility	Weight that should be given to research when making decisions 5-point Likert Scale: 1 = 0–20%; 5 = 81–100%	OHCEN data
Compatibility: Appropriateness of timing for receiving overviews	How appropriate was the timing for receiving the systematic overview? ^b	Decision-maker perceptions
Compatibility: Relevance of OHCEN data	How relevant was the systematic overview to current program decisions? ^b	Decision-maker perceptions
Relative advantage	Do you think systematic overviews could overcome barrier of limited access to literature? ^c	OHCEN data
Relative advantage	Do you think systematic overviews could overcome barrier of not having enough time to review the literature? ^c	OHCEN data
Relative advantage	Do you think systematic overviews could overcome barrier of limited critical appraisal skills? ^c	OHCEN data
Relative advantage	Do you think systematic overviews could overcome barrier of limited resources? ^c	OHCEN data
Relative advantage	Do you think systematic overviews could overcome barrier of research evidence not being relevant to decision being made? ^c	OHCEN data
Relative advantage	Do you think systematic overviews could overcome barrier of unsupportive work environments for using research evidence in decision making? ^c	OHCEN data
Relative advantage	Do you think systematic overviews could overcome barrier of lack of decision-making authority? ^c	OHCEN data
Complexity: Ease of use	How easy was the systematic overview to use? ^b	Decision-maker perceptions
Bandwagon effect	Perception of the percentage of other health units using the systematic overviews	Decision-maker perceptions
Bandwagon effect	Percentage of other colleagues in the same position using the systematic overviews	Decision-maker perceptions
<i>Individual characteristics</i>		
Baseline position in 1996	Respondent's current position	OHCEN data
Tenure	Years in current position	OHCEN data
Tenure	Years in public health	OHCEN data
Education	Years since graduation	OHCEN data
Age	10-year age categories	OHCEN data
Consultant contact	Access to research consultant (Yes/No)	OHCEN data
Access to online searching	Direct access in organization to online database searching (Yes/No)	OHCEN data

(Continued)

Table 1. (Continued)

Variable label	Operational definition	Data source
Number of articles retrieved in past month	<ul style="list-style-type: none"> • None • <10 • 10–19 • 20–29 • >30 	OHCEN data
Percentage of retrieved articles read in past month	<ul style="list-style-type: none"> • None • <25 • 25–50 • 51–75 • >75% 	OHCEN data
Cosmopolitanism	Days at external meetings/conferences in past year	OHCEN data
Authority	Perceived barrier to using research evidence based on level of authority to make program decisions ^d	OHCEN data
Critical appraisal	Perceived barrier to using research evidence based on critical appraisal skills ^d	OHCEN data
Financial resources	Perceived barrier to using research evidence based on limited financial resources ^d	OHCEN data
Prior use of systematic overviews	Have used systematic overviews in the past to make program decisions	OHCEN data
Future use	Expectation of using the systematic overview in future	OHCEN data
<i>Research utilization dependent variables</i>		
Use of systematic overview	Has the systematic overview been used in the past 2 years to make a program decision?	Decision-maker perceptions

^aFive-point Likert Scale: 1 = strongly agree; 5 = strongly disagree.

^bFour-point Likert Scale: 1 = excellent; 4 = poor.

^cFive-point Likert Scale: 1 = definitely won't; 5 = definitely will.

^dFive-point Likert Scale: 1 = not a barrier; 5 = very serious barrier.

innovation represented decision makers' perceptions of the innovation's relative advantage, complexity, and compatibility. Relative advantage refers to the degree to which an innovation is perceived as better than the idea it supersedes (14;40). Complexity represents the degree to which an innovation is perceived as difficult to understand and use (40), and compatibility refers to the degree to which an innovation is perceived as being consistent with existing values, past experiences, and needs of potential adopters (40). Decision makers' perceptions of the innovation characteristics were measured both before and after the systematic reviews were disseminated to the study participants.

Data were collected on organizational characteristics related to the size, perceived complexity, and culture of the organization. Data on environmental characteristics related to municipal and provincial regulations, relationships between the medical officer of health and the board of health and local politicians, and collaboration among community organizations were also collected. The individual characteristics included demographic measures such as age, education, position, and perceptions of the barriers to using research evidence in public health decision making.

Use of the five systematic reviews was measured using a self-reported dichotomous variable of use versus no use. The term *use* indicated that a systematic review was used on its own or in combination with other evidence to make a decision. Other measures of use (extent the systematic reviews influenced public health decisions) were also examined and have been discussed elsewhere by M. Dobbins (unpublished data, 2000).

Instruments

The data were collected using four instruments, two of which were developed for this study: the Research Utilization Survey and the Organizational Demographics Survey. These two surveys were modified from previous diffusion of innovation and research utilization studies (6;9;11;15;17;18;26;27;34;37;39;48). Both instruments were pretested for test-retest reliability and face validity at one public health unit. The Chronbach alpha score for reliability for the surveys was 0.65. The two remaining instruments, Baseline Survey of Barriers to Using Research Evidence in Public Health Decision Making, and Follow-up Survey of Perceptions of the Usefulness of Systematic Reviews, were previously validated and used in the OHCEN study (10).

Statistical Analysis

The analysis included simple descriptive summaries as well as multiple logistic regression modeling using a three-step procedure. This included analysis of variance, bivariate correlation analysis, and multiple logistic regression analysis.

RESULTS

Thirty-five of the 41 (85.4%) public health units and 141 of 147 decision makers (95.9%) agreed to participate in the study. On characteristics such as age, position, years in current position, and years in public health, there were no statistically significant differences between participants in this study and the 43 decision makers who participated in the 1996 study but subsequently left public health.

In total 63.1% of respondents reported they had used at least one of the systematic reviews in the past 2 years to make a decision. The multiple logistic regression analysis was conducted using 88 of the 141 cases for which complete data existed. The results are presented in Table 2. The results of the Hosmer and Lemeshow Goodness-of-fit Test indicated a strong fit between the final model and the data. The classification table demonstrated a high overall correct prediction rate of 81.2%, with the model accurately predicting use of the reviews 92.4% of the time. None of the interaction terms tested in the model were significant.

The results demonstrated that the respondent's position was highly predictive of use of the systematic reviews. Program managers were 14 times more likely and program

Table 2. Final Logistic Regression Analysis: Overall Use (n = 88)

Variable	B	SE	Wald	df	Sig	R	Odds ratio B	Lower 95% CI	Upper 95% CI
MOH			8.31	2	.016	.22			
Directors	2.28	.97	5.59	1	.018	.19	9.82	1.48	65.32
Managers	2.64	.94	7.87	1	.005	.25	14.04	2.22	88.96
Expect to use	2.96	1.05	7.87	1	.005	.25	19.25	2.44	151.99
Critical appraisal	1.21	.46	6.88	1	.009	.23	3.36	1.36	8.31
Easy to use	1.10	.57	3.68	1	.05	.14	3.01	.98	9.29
Constant	-15.75	4.32	13.29	1	.0003				
-2 log likelihood (constant)	-2 log likelihood (full Model)	Model chi square	Model p value	Hosmer & Lemeshow goodness of fit	Classification table (overall)				
90.33	58.61	31.71	.000	$p = .81$	81.2%				

directors 9.8 times more likely to have used a systematic review as compared with medical and associate medical officers of health. The difference in use between program managers and directors was not statistically significant. Expecting to use the systematic reviews in the future, which was measured 3 months after the reviews were disseminated, was also highly predictive of use. Respondents who expected to use the reviews in the future were 19.2 times more likely to have used a review than those who did not expect to use the reviews. The results also indicated a strong association between use of the reviews and the perception that systematic reviews could overcome the barrier of limited critical appraisal skills. Respondents who perceived systematic reviews could overcome this barrier were 3.4 times more likely to have used a systematic review than those who did not perceive reviews could overcome this barrier. Finally, respondents who perceived the reviews as being easy to use were three times more likely to use the reviews than those who did not perceive them as easy to use.

DISCUSSION

The results of this study demonstrate that the majority of public health decision makers in Ontario used at least one of the five reviews during the 2 years since their dissemination. The attainment of a 63.1% utilization rate was almost double that observed 3 months after the systematic reviews were disseminated in 1996. Similar findings have been reported among staff nurses in Canada, where 77.0% of a random sample indicated they had used research findings at least sometimes in their practice (47).

The results not only identify one's position as a significant predictor of use but also demonstrate that public health program managers and directors are the appropriate target audience for systematic reviews. These findings are corroborated by Lomas (31), who suggested that the type of information provided to decision makers must vary with the functions of the various levels of decision makers. These results demonstrate that the research evidence provided in systematic reviews is more appropriate for the information needs and decisions of program managers and directors as opposed to medical and associate medical officers of health. Program managers and directors in Ontario are currently involved in making decisions related to the provision of specific interventions (35), thereby making systematic reviews highly relevant for these decision makers. Medical and associate medical officers of health may not find these reviews as useful, since the decisions in which they are involved are at the level of the provision of programs as well as resource allocation as opposed to specific interventions.

There were only four characteristics that significantly predicted use of the systematic reviews, with one's position and expecting to use the reviews in the future being the strongest predictors of use. These findings are somewhat surprising given that previous studies have reported individual factors as not being significantly associated with research utilization (10;25;26). It may be that public health decision-makers, particularly program managers and directors, have more decision-making authority as compared to other health care professionals, or that certain decisions are more conducive to individual input as opposed to other factors such as organizational and environmental factors.

It was suspected that characteristics of the innovation would be important predictors of research utilization, and this was the case for two of the innovation characteristics. Similar results have been reported by Meyer and Goes (34), who reported that characteristics of the innovation explained most of the observed variation in innovation adoption, even when other characteristics such as organizational and environmental variables were included in the regression model. Utterback (46) reported similar findings, suggesting that the perceived relative advantage of an innovation were the primary determinants of its adoption.

The final two variables in the model, perceptions that the reviews would overcome the barrier of limited critical appraisal skills and that the reviews were easy to use, have been reported previously as being associated with research utilization (19). In addition, Royle et al. (41) reported that 62.0% of directors of nursing believed that courses on critical appraisal would be necessary to facilitate research utilization, while Ciliska et al. (10) found that public health decision makers perceived limited critical appraisal skills to be one of the most significant barriers to using research evidence in decision making. Therefore, the challenge inherent in this finding is concerned with influencing decision makers to believe that systematic reviews will overcome the barrier of limited critical appraisal skills. With respect to ease of use, these findings pointed out the importance of presenting research evidence in easily understood ways to decision makers. This suggests that the presentation of research evidence is likely as important as the results themselves. This finding is supported by MacPhail (33), who suggested that researchers should find ways of presenting their findings in a clear, accessible, and easily understood form.

Limitations of the Study

The results of this study are only directly generalizable to public health professionals who make decisions for public health practice in Ontario. The results may not necessarily be applicable for public health decision makers outside of Ontario, who may have different roles or decision making responsibilities. However, it is likely that these results would provide a starting place for examining research dissemination and utilization among public health decision makers in other provinces and countries, while providing some useful recommendations for dissemination strategies for health services researchers.

There was a relatively small sample in this study, which was problematic given the complex multivariate analysis and large number of independent variables. However, the alternative of increasing the sample size meant expanding the sample to include public health units from outside Ontario. Including public health units from other provinces, with different roles and responsibilities, would have resulted in significantly more methodologic concerns than currently exists.

There were also some concerns that decision makers within health units would have more similar responses (clustering effect) than those between health units and that adjustments for clustering effects should be included in the statistical analysis. Since the within health unit variation was as great or greater than the between health unit variation, a clustering effect may not have been a concern in this study.

It was surprising that none of the organizational characteristics remained in the final logistic regression model. This was likely explained by the limited variability in the range of observations across participants for some of these characteristics. For example, approximately 95% of respondents indicated that their health unit strictly adhered to policies and procedures. Since this left little room for variability among responses, it was not likely that a significant association with the dependent variable would be found. This suggested that organizational characteristics with little variation might not be appropriate measures for predicting research utilization or that an alternative way of measuring them is needed.

The use of a large number of independent variables combined with a fairly small sample size was the most disturbing limitation of this study. The large number of independent variables may have resulted in some variables being significant due to chance alone. The use of scaled items, as opposed to individual variables, would have decreased this effect, thereby reducing the chance for type II errors. The large confidence intervals associated with the odds ratios were also of concern and a product of the small sample size. Therefore, these odds ratios should be interpreted with caution with the understanding that an overestimation of the true odds may have occurred. Since this was the first time these characteristics were examined, it was important to begin to understand the individual relationships between the

independent and dependent variables. Future studies should, however, examine the development of scales, particularly for characteristics of the innovation, organization, and the environment. Finally, recall bias may have been an important limitation of this study, although efforts were made to assist respondents in recalling behaviors over the 2-year period.

POLICY IMPLICATIONS

There were a number of potential policy implications for future research and dissemination strategies related to these findings. Recommendations to health services researchers include the following: a) disseminate systematic reviews to the appropriate target audience (i.e., link the key messages of the evidence with the level of decision making); b) present the reviews in ways that are perceived as easily understood and easy to use; and c) develop a marketing approach demonstrating that systematic reviews will overcome the barrier of limited critical appraisal skills. The results of this study will inform decision makers in public health across Ontario about the process of evidence-based decision making and where evidence currently fits into the decision-making process. The knowledge gained from this study, in conjunction with the dissemination literature, will assist in the development of more effective dissemination strategies targeted at public health decision makers as well as other healthcare professionals working within a multidisciplinary health organization.

CONCLUSIONS

This was the first study of its kind in Ontario and Canada to assess the influence of a variety of variables on the adoption of systematic reviews among public health decision makers. This study focused on identifying characteristics of the innovation, organization, environment, and the individual that were believed to be associated with research utilization. It also considered these variables in explaining variation in the use of the systematic reviews. The findings of this study were used to develop recommendations to assist health services researchers in disseminating research evidence in the future.

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