

FACTORS AFFECTING THE DECISION MAKING PROCESS IN HEALTHCARE INSTITUTIONS

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ABSTRACT

In health care organizations, decision making is very complicated and could be of both clinical and nonclinical nature. Decision towards patients is usually associated with multiple factors including economic ones, in addition to several treatment options. Leaders and managers in healthcare organizations have to adapt significant pressure to make difficult operational and budgetary decisions by maximizing operational efficiency and reducing unnecessary costs while improving and maintaining high quality. Several factors influence decision making in healthcare organizations. Because of that it is imperative to identify and understand factors that positively or negatively influence the decision making process in such critical and sensitive forms.

The purpose of this study is to determine and examine factors that affect decision making process in Healthcare Organizations. A meta-analytic study was done to identify the most cited factors affecting the decision making process in the last five year throughout searching and screening the literature using Ankara University Electronic Library, The Pub Med, SAGEM Library, Google Scholar. Time period for scanning was between October 2014 and February 2015. First, all of the articles were tabulated according to the year of publication, the Author and the resulted factors influencing the decision making process in health care organizations. A lot of studies were found related to our key words of interests but many of them were talking about the factors affecting the decision making process from a clinical perspective and only articles talking about the process from a managerial point of view were included in our study. As a result 48 articles were included as they met our research criteria. Articles of interest were collected, gathered and tabulated according to the resulted factors affecting the decision making process in health care organizations. The following keywords were helpful in articles pickup process (Healthcare organizations, Decision Making, Process, Impact and Factors).

During the last five years Knowledge based decision making, Informative decision making and training effect on decision making were the most cited factors 14/48 studies. Followed by 11 studies mentioned the organizational and institutional factor, 7 studies considered the using of specific models for decision making and decision supporting tool a great and a helpful factor in the decision making process. The characteristic of the decision maker as an influencing factor took a part in three studies and was equal to the financial resources which were also taken in consideration in 3 studies also. The timelines of decisions, the delegation of decisions, and shared decision making factors came to play in one to two studies.

Decision making in health care organizations is a complicated process because it is of both clinical and non-clinical nature. According to findings, knowledge and evidence

informed decision making (EBDM) was the most cited factor to influence the decision making process in health care organizations. However, “the most cited” doesn’t mean “the most important”. Beside this the use of information and communication technologies and decision support tools, the environmental and institutional factors, the financial factors and the delegation of decisions were also important factors to discuss in this context.

INTRODUCTION

Making and implementing decisions are central functions of management (Ozcan, 2005). Decision making is the process of analyzing alternatives to reduce uncertainty about achieving a desired outcome, with the best effect on the organization. Timelines, methodological considerations, interpretations of value for money, explication of social values, stakeholder engagement and accountability for reasonableness are main issues surrounding the decision making process (Stafinski et al., 2011). Consideration of social and organizational dimensions of context is critical in optimizing the quality decision making (Smith, Higgs & Ellis, 2015). The decision makers' thinking processes included: vision, political astuteness, being tactical, being strategic, due diligence, and risk management; and the ethical processes included: respect for diverse opinions, integrity and trust, democracy, impact of policies, passion for public service, and intuition about doing the right thing. Strong face validity and trust worthiness of the data was achieved to inform future research (Jiwani, 2011).

Healthcare managers, administrators, physicians and other health care professionals have a great pressure to make the best use of available resources to get excellent results from limited resources. In addition to ensure providing high quality of care at a lower and competitive cost, because of today’s highly complicate, technologic and competitive healthcare arena (Hanson et al., 2011). Decisions towards patients are usually associated with multiple factors including economic ones, in addition to several treatment options. In health care organizations, managers have to make decisions frequently based on collected information, they must decide how to direct and organize others, how to control processes within the system plus helping others to reach their own decisions. As a result, decision making can be quite stressful in today’s dynamic and complex health care industry (Ozcan, 2005). Healthcare decision making is complex and requires access to a wide array of high- quality information and success depends on whether or not enough right decisions are both made and implemented (Bansal, 2005). Decisions can be described in terms of decision characteristics and attributes (e.g. complexity, urgency etc), nature of the task, the characteristics of the decision maker (e.g. demographics, diversity, tenure), and in which context the decision will take place, in addition to the availability of information required for making decisions, the economic and financial factors and to what extent the government is involved in decision making regarding to politics and regulations. Many factors may lead to more evidence based decision making such as the developed personal skills, the use of data and analytic tools, plus the suitable and favorable organizational climate. Knowledge and leadership are factors that influence the managers’ decision. Although most people understand this concept, a relatively small number had substantial expertise and experience with its practice. Factors associated with use of EBDM included strong leadership; workforce capacity (number and skills); resources; funding and program mandates; political support; and access to data and program models suitable to community conditions (Sosnowy et al., 2013).

METHODOLOGY

The aim of this study was to identify the most cited factors affecting the decision making process in the last five years throughout searching and screening the literature using Ankara University Electronic library, The Pubmed, SAGEM library, Google scholar. Scanning process was carried in the time period between October 2014 and February 2015. First, all of the articles were tabulated according to the year of publication, the Author and the resulted factors influencing the decision making process in health care organizations. A lot of studies were found related to our key words of interests but many of them were talking about the factors affecting the decision making process from a clinical perspective and only articles talking about the process from a managerial point of view were included in our study. As a result 48 articles were included as they met our research criteria. Articles of interest were collected, gathered and tabulated according to the resulted factors affecting the decision making process in health care organizations. The following keywords were helpful in articles pick up process (Healthcare organizations, Decision Making, Process, Impact and Factors).

Table 1 MAJOR FINDINGS OF THE SELECTED ARTICLES	
Publication	Findings
Purwanto, Eswaran & Logeaswaran, 2012	Dual hybrid model is useful for generating appropriate decisions which will be helpful for the healthcare managers. Special generated models for taking decisions
Adeyemi, Demir & Chaussalet, 2013	The transferable skills; the health outcomes, understanding of how the accesses, uses health service and information in making strategic decisions; and Practical involvement in how information informs commissioning decisions. Knowledge and information effect
Yuen, 2014	This study identified the need for having a receptive climate that supports the use of research in decision making. institutional and organizational factor
Solans-Domènech et al., 2013	The relationships between managers. Shared decision making
Nutley, Powell & Davies, 2013	Decision support tool play a vital role in health decision making. Using decision support tools and models
Zeng, Li & Yang, 2013	Considering VIKOR for use as a decision support tool for future study. Using decision support tools and models
Tromp & Baltussen, 2012	Recommended the use of conceptual mapping criteria by decision makers. Using decision support tools and models (mapping criteria)
Stipp & Kapp, 2012	Directors inform their decision making with streams of information. Organizational knowledge and value for local practice effectiveness.
Simonen et al., 2009	Manager's professional background and activity sector are associated with the kind of knowledge that affects their decision making.
Tourigny & Pulich, 2006	The role of delegation in improving the decision making process.
Kotalik et al., 2014	Ethical decision-making as well as advance the ethical atmosphere of the institution.
Bai et al., 2014	Task based and employee based sequential-decision approach, extensive computational analysis of a clinical workflow process

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Publication	Findings
Williams et al., 2013	Decision-maker characteristics and processes that may influence the decision, including
Yousefi – Nooraie, Dobbins	Implying a positive atmosphere towards implementation of evidence-informed decision making in this public health organization.
Legare et al., 2014	Health professionals and managers attitude are barriers that influence decision making.
Sosnowy et al., 2013	Strong leadership; knowledge, workforce capacity (number and skills); resources; funding and program mandates; political support.
Villa et al., 2013	One's workforce and board of health were also influential in making decisions regarding resource allocations
Hoflund, 2013	Health care decision makers identified timeliness as a key factor.
Koon et al., 2013	The principles that are representative of the larger environment.
Poulin et al., 2013	Our findings suggest that four qualities influence decision: reputation, capacity, quality of connections to decision-makers, and quantity of connections to decision-makers and others. In addition to this, the policy strongly influences up take.
Hamrock et al., 2013	The effect of introducing new technologies on the decision making process.
De Graaf - Ruziendaa & De	Shared Decision making effect
Mendez et al., 2013	Conceptually, the hospital self-management policy is based on financial autonomy, and implementation is affected by persistent capacity gaps in policy design.
Fache, 2013	The mission, vision, and values statements of these organizations have been successfully translated into a set of shared values--a moral compass that guides behavior and decision making.
Mc Cormack et al., 2011	Levels of knowledge and actual levels of involvement in decision making
Lee et al., 2013	The effect of implementation qualitative analysis for past decision making results on developing appraisal guidelines and enhance the objectivity of decision-making processes.
Mc Caughey & Bruning, 2010	Cognitive information processing as a key factor in the decision-making process.
Shoemaker, Kazley & White, 2010	Financial considerations were a factor in decision making.

Tso et al., 2011	Decision aid is intended to help public sector health policy decision makers.
Jack et al., 2011	Experiential knowledge. Individual and organizational facilitators and
Khoumbati et al., 2008	MAESTRO identifies a set of factors that influence decision
Champagne et al., 2014	The impact of training. Individual, organizational and program design factors that facilitated and/or impeded the dissemination of the attitudes and skills gained by trainees to other organizational members
Hubbeling, 2014	The underlying psychological processes of normal decision-making are not well known and one cannot differentiate between unwise decisions caused by an illness or other factors.
François, Louise & Duranceau, 2014	Knowledge

FINDINGS

During the last five years Knowledge based decision making, Informative decision making and training effect on decision making was the most cited factor 14/48 studies. Followed by 11 studies mentioned the organizational and institutional factor, 7 studies considered the using of specific models for decision making and decision supporting tool a great and a helpful factor in the decision making process. The characteristic of the decision maker as an influencing factor took a part in three studies and was equal to the financial resources which were also taken in consideration in 3 studies also. The timelines of decisions, the delegation of decisions, and shared decision making factors came to play in one to two studies. These findings are showed in Tables 2 and 3 respectively from the most cited factor to the least cited factor. The most cited factor doesn't mean the most important factor.

Table 2

Knowledge based decision making	Organizational and institutional environment	The use of technology and analytic tools
Adeyemi, Demir & Chaussalet, 2013	Yuen, 2014	Wills et al., 2014
Sosnowy et al., 2013	Stipp & Kapp, 2012	Poulin et al., 2013
Simonen et al., 2009	Kotalik et al., 2014	Hamrock et al., 2013
Hamrock et al., 2013	Bai et al., 2014	De Graaf – Ruziendal & De Bakker, 2013
Wilby & Al-Siyabi, 2013	Yousefi – Nooraie, Dobbins & Marin 2014	Stafinski et al., 2011
Mc Cormack et al., 2011	Hoflund, 2013	Yang et al., 2013
Lee et al., 2013	Fache, 2013	Lugtenberg et al., 2014
McCaughey & Bruning, 2010	Jack et al., 2011	Glover, Webb & Evison, 2010
Jack et al., 2011	Gildiner, 2007	Qureshi et al., 2014
Champagne et al., 2014	Ellen et al., 2014	
Ellen et al., 2014	Noriega Bravo & Pría Barros, 2011	
Simonen et al., 2012		

Table 3

Decision supporting tools and models	Shared decision making	Financial resources	Time and delegation
Zeng, Li & Yang, 2013	Williams et al., 2013	Bekemeier et al., 2013	Villa et al., 2013
Tromp & Baltussen, 2012	Legare et al., 2014	Mendez et al., 2013	Tourigny & Pulich, 2006
Tso et al., 2011	Koon et al., 2013	Shoemaker, Kazley & White, 2010	
Kudyba et al., 2005			

DISCUSSION

Several factors influence decision making in healthcare organization. Because of that it is imperative to identify and understand factors that positively or negatively influence decision making process in health care organizations. Decisions based on scientific evidence are useful for both long and short term demands of health care organizations and helps improve the acceptability of decisions (Ross, 1999; Stafinski et al., 2015). Evidence informed decision making process is a complex, multi-disciplinary process that occurs within dynamic and ever changing community. It is not easy to translate research evidence into practice ,as a result, staff and managers succeed to implement evidence informed/based practice are considered experts and information sources (Yousefi – Nooraie, Dobbins & Marin, 2014). Many factors are needed to implement evidence based decision making and these factors include the strong leadership characteristics of the decision maker, the workforce capacity (number and skills); resources; funding and program mandates; political support; and access to data and program models suitable to community conditions (Sosnowy et al., 2013). The future decision-makers have to be capable of making comprehensive decisions affecting the entire organization in addition to that they should be able to identify versatile knowledge areas taking the cultural barriers in their consideration (Simonen et al., 2009). Sources of evidence range from online medical literature databases such as PubMed, to international organizations offering evidence summaries and appraisals of published studies (Wilby & Al-Siyabi, 2013). The level of knowledge is important at actual levels of involvement in decision making (Mc Cormack et al., 2011). Developing guidelines help decision makers to enhance objectivity of decision making process especially in terms of safety and effectiveness (Lee et al., 2013) increasing the adoption of evidence-based healthcare models, the rational choice, utility maximizing assumptions in EBDM and EBPM, must be critically evaluated to ensure effective and high-quality health policy decisions (McCaughey & Bruning, 2010). Decision makers need to inform practice-related decisions at different levels using research evidence and all factors that may influence the evidence informed decision making process. Information for decision-making is accessed from a range of sources, including web-based resources and experts in the field (Jack et al., 2011). Support must be given at different administrative levels to integrating EIDM, transfer and exchange strategies should be focused towards program managers and administrators and include capacity building for locating, appraising and using research evidence, knowledge brokering, and for partnering with universities. Resources are required to maintain web-based databases of searchable evidence to facilitate access to research evidence (Jack et al., 2011). Training can influence the extent of skills and knowledge transfer by the dissemination of the attitudes and skills gained by trainees to other organizational members (Champagne et al., 2014). Barriers to implementing EIDM include limited resources, time constraints, and negative attitudes toward change, on the other hand knowledge translating culture over time in health care organizations is considered a facilitator in implementing evidence based decision making (Ellen et al., 2014). Implementing accessible and efficient systems to support the use of research in decision-making (e.g., documentation and reporting tools, communication tools, and decision support tools) and developing and implementing an infrastructure or position where the accountability for encouraging knowledge use lies (Ellen et al., 2014). Changes in health services are highly correlated with the results of research and the channels used to transfer new knowledge (Solans- Domenech et al., 2013). It is not easy to translate and to transfer new knew knowledge into practice

have access to comprehensive and timely information (Villa et al., 2013).

Delegation is the process of granting authority to make decisions to employees, thus increasing their decision-making autonomy. It involves giving subordinates the requisite authority to take action without obtaining prior approval. In essence, it refers to the locus of authority in decision making (Tourigny & Pulich, 2006). The globalized knowledge economy, the challenge of translating knowledge into policy and practice is universal. At the dawn of the 21st century, the clinicians, leaders, and managers of health care organizations are increasingly required to bridge the research-practice gap. Many clinicians still resist to the implementation of evidence-based clinical practice, asking themselves why their current practice should be changed or expanded. On the other hand, many leaders and managers of health care organizations are searching how to keep pace with the demand of actionable knowledge (Lapaige, 2009).

CONCLUSION

Decision making in health care organizations is a complicated process because it is of both clinical and non-clinical nature. Leaders and managers in health care organizations are continuously asked to make critical operational and budgetary decisions, with an objective to achieve efficient operations, competitive costs, with high quality of services. Many factors influence the coverage and commissioning of decisions in health care system around the world. According to our findings, knowledge and Evidence informed decision making was the most cited factor to influence the decision making process in health care organization. However, the most cited doesn't mean the most important.

Having the knowledge means having the power in making decisions for both short and long term demands of the health reforms. Nowadays, many sources of information are available and accessible whether as online medical literature or from the international health organizations publications. Health care organizations are being asked to implement accessible and effective web-based database of searchable evidence to facilitate the access to research evidence. Translating the research evidence into practice is not an easy job. On the other hand health care organizations could improve their employees in translating information in their decision making practice throughout continuous education and training. Having the information and all required data for making decision on a timely base facilitate the decision making process, because that the timeliness of decision is a sensitive factor to make the right decision on the right time. In our study the timeliness of decision was from the least cited factors. The institutional and the Environmental factors were a key factors and were from the most cited factors that influence the decision making process in our study. The mission, vision and values statements guide the behavior and the decision making process.

The amount of data in health care reforms are increasing in an astonishing rate, make it impossible to evaluate the status and making a decision in according to. But the introduction of information and communication technologies helped in extracting actionable information that leaders and managers could take advantage of in their decisions. Many constructed decision tools are now available on the internet that the organizations could benefit from. The use of a decision aid tool can facilitate the mission to make appropriate decisions as some of these methods could imitate the operations in the real world system over time and could be a suitable predictor before implementing any decision.

The Financial side must not be absent in any decision making process in any organization and is considered to be a vital factor in the financing of health services delivery

and in hospitals self-management policies. Because of the specific nature of health reforms, the shared decision making is a critical factor especially in investigation, screening and treatments decision making. Granting and delegating the authority for employees to make decisions, increase the decision making autonomy in the organization, although in our study these factors were from the least cited factors.

REFERENCES

- Adeyemi, S, Demir, E & T. Chaussalet (2013). Towards an evidence-based decision making healthcare system management: Modelling patient pathways to improve clinical outcomes, 10.1016/j.dss.12.039.
- Bai, X., Gopal, R., Nunez, M. & D. Zhdanov (2014). A decision methodology for managing operational efficiency and information disclosure risk in healthcare processes. *Decision Support Systems*, 57, 406-416.
- Bansal, P. (2005). Responsible Strategic Decision Making. *Proceedings of the International Association for Business and Society*, 57-62.
- Bekemeier, B., Chen, A.L.T., Kawakyu, N. & Y. Yang (2013). Local Public Health Resource Allocation: Limited Choices and Strategic Decisions. *American Journal of Preventive Medicine*, 45(6), 769-775.
- Champagne, F., Lemieux-Charles, L., Duranceau, M., MacKean, G., & T. Reay (2014). Organizational impact of evidence-informed decision making training initiatives: a case study comparison of two approaches. *Implementation Science*, 9(1):53. doi:10.1186/1748- 5908-9-53
- De Graaf-Ruizendaal, W. & D.H. De Bakker (2013). The construction of a decision tool to analyse local demand and local supply for GP care using a synthetic estimation model. *Human Resources for Health*, 11(1), 55. doi:10.1186/1478-4491-11-55.
- Ellen, M.E., Leon, G., Bouchard, G., Lavis, J.N., Ouimet, M. & J.M. Grimshaw (2013). What supports do health system organizations have in place to facilitate evidence – informed decision making? A qualitative study. *Implementation Science*, 8(1), 84.
- Fache, Donnellan JJ. (2013). A moral compass for management decision making: a healthcare CEO's reflections. *Frontiers of Health Services Management*, 30(1), 14-26.
- Foshay, N. & C. Kuziemy (2014). Towards an implementation framework for business intelligence in healthcare. *International Journal of Information Management*, 34(1), 20- 27.
- François, C., Louise, L.C. & M.F. Duranceau (2014). Organizational impact of evidence- informed decision making training initiatives: a case study comparison of two approaches. *Implementation Science*, 9 (1), 25-51.
- Gildiner, A. (2007). The Organization of Decision-making and the Dynamics of Policy Drift: A Canadian Health Sector Example. *Social Policy & Administration*, 41(5):505-524.
- Glover, G., Webb, M. & F. Evison (2010). Improving Access to Psychological Therapies: A review of the progress made by sites in the first rollout year. *North East Public Health Observatory*, July. Hamrock, E., Paige, K., Parks, J., Scheulen, J. & S. Levin (2013). Discrete Event Simulation for Healthcare Organizations: A Tool for Decision Making. *Journal of Healthcare Management*, 58(2):110-124.
- Hanson, L., Carey, T., Caprio, A., Lee, T., Ersek, M., & J. Garrett et al. (2011). Improving Decision-Making for Feeding Options in Advanced Dementia: A Randomized, Controlled Trial. *Journal of The American Geriatrics Society*, 59(11): 2009-2016.
- Hoflund, A. (2013). Designing a Decision-Making Process for a Network Administrative Organization: A Case Study of the National Quality Forum's Consensus Development Process. *Public Organization Review*, 13(1): 89-105.
- Hubbeling, D. (2014). Decision-making capacity should not be decisive in emergencies, *Medicine, Healthcare & Philosophy*, 17 (2):229-239.
- Jack, M.S., Dobbins, M., Sword, W., Novotna, G., Brooks, S., Lipman, E.L. & A. Niccols (2011). Evidence – informed decision – making by professionals working in addiction agencies serving women: a descriptive qualitative study. *Substance Abuse Treatment, Prevention and Policy*, 6:29.
- Jiwani, G. (2011). Uncovering the Unknown of Government Policy Decision-making Process at Senior Levels. *The International Journal of Science in Society*, 2(3). Retrieved from <http://science->

society.com/journal/.

- Khoubati, K., Themistocleous, M., Irani, Z. & V. Mantzana (2008), Information Systems and Healthcare: Factors Affecting The Early Adoption in the Healthcare Sector. *Communications of the Association for Information Systems*, 22:87-102.
- Koon, A., Rao, K., Tran, N., & A. Ghaffar (2013). Embedding health policy and systems research into decision-making processes in low- and middle-income countries. *Health Research Policy Systems*, 11(1): 30. doi:10.1186/1478-4505-11-30
- Kotalik, J., Covino, C., Doucette, N., Henderson, S., Langlois, M., McDaid, K. & L. Pedri (2014). Framework for Ethical Decision-Making Based on Mission, Vision and Values of the Institution. *HEC Forum*, 26(2): 125-133.
- Koumaditis, K., Themistocleus, M. & P.R. Da Cunha (2013). SOA Implementation critical success factors in healthcare. *Journal of Enterprise Information Management*, 26(4), 343- 362.
- Kudyba S., Hamar, G.B. & W.M. Gandy (2005). Enhancing Efficiency in the Health Care Industry. *Communications of the ACM*, 48 (12), 107-110.
- Lapiage, V. (2009). Evidence – based decision – making within the context of globalization: A “Why – What – How” for leaders and managers of healthcare organizations. *Risk Management and Health Care Policy*, 2, 35-46.
- Lee, S., Kim, G., Ahn, J., Suh, H. & D. Heo (2013). Factors Influencing Decision Making on Therapeutic Interventions. *International Journal of Technology Assessment in Health Care*, 29(03): 331-335.
- Legare, F., Ratte, S., Gravel, K. & I.D. Graham (2008). Barriers and facilitators to implementing shared decision – making in clinical practice: Update of a systematic review of health professionals’ perceptions. *Patient Education & Education*, 73(3):526-535.
- Lugtenberg, M., Westert, G.P., Pasveer, D., Van Der Weijden, T. & R. B. Kool (2014). Evaluating the uptake and effects of the computerized decision support system NHGDoc on quality of primary care: protocol for a large – scale cluster randomized controlled trial. *Implementation Science*, 9: 145.
- McCaughy, D. & N. Bruning (2010). Rationality versus reality: the challenges of evidence- based decision making for health policy makers. *Implementation Science*, 5(1), 39. doi:10.1186/1748-5908-5-39.
- Méndez, C., Miranda, C., Torres, M., & M. Márquez (2013). Hospital self-management policy in Chile: perceptions of decision-makers. *Rev Panam Salud Publica*, 33(1), 47-53.
- Mc Cormack, L., Treiman, K., Bann, C., Williams-Piehot, P., Driscoll, D. & J. Poehlman et al. (2011). Translating Medical Evidence to Promote Informed Health Care Decisions. *Health Services Research*, 46(4), 1200-1223.
- Noriega Bravo, V.M. & M.C. Pria Barros (2012). Instrument for evaluation of the organizational environment in the vector control groups. *Revista Cubana de Salud Publica*, 37(2).
- Nutley, S., Powell, A. & H. Davies (2013). What counts as good evidence? *Provocation paper for alliance for useful evidence*. The Alliance for Useful Evidence, London, England.
- Ozcan, Y. (2005). *Quantitative methods in health care management*. San Francisco, CA: Jossey- Bass.
- Peirson, L., Ciliska, D., Dobbins, M. & D. Mowat (2012). Building capacity for evidence informed decision making in public health: a case study of organizational change, *BMC Public Health*, 12:137.
- Picone, D. (2014). Shared decision making: What do clinicians need to know and why should they bother?. *The Medical Journal of Australia*, 201 (9):513.
- Poulin, P., Austin, L., Poulin, M., Gall, N., Seidel, J., Lafreniere, R. & C. Scott (2013). Introduction of new technologies and decision making processes: a framework to adapt a Local Health Technology Decision Support Program for other local settings. *MDER*, 185. doi:10.2147/nder.s51384.
- Purwanto, Eswaran, C. & R. Logeswaran (2012). An enhanced hybrid method for time series prediction using linear and neural network models. *Applied Intelligence*, 37(4):511-519.
- Qureshi, N.A.; Qureshi, Q.A., Khan, M.Z., Shah, B. & I. Marwart (2014). Factors affecting the introduction of ICTs for “healthcare decision – making” in hospitals of developing countries. *Mediterranean Journal of Medical Sciences*, 1 (1):13-20.
- Ross, L.F. (1999). *Children, Families and Health Care Decision – Making*. Oxford University Press, Inc.
- Shoemaker, L., Kazley, A. & A. White (2010). Making the Case for Evidence-Based Design in Healthcare: A Descriptive Case Study of Organizational Decision Making. *Health Environments Research & Design Journal*, 4(1), 56-88.

- Simonen, O., Viitanen, E., Lehto, J. & A. Koivisto (2009). Knowledge sources affecting decision making among social and health care managers. *Journal of Health Organization and Management*, 23(2), 183-199. doi:10.1108/14777260910960920.
- Smith, M., Higgs, J. & E. Ellis (2015). Retrieved 14 May 2015, from <http://www.elsevierhealth.com/media/us/samplechapters/9780750688857/9780750688857.pdf>
- Solans-Domènech, M., Adam, P., Guillamón, I., Permanyer-Miralda, G., Pons, J. & J. Escarabill (2013). Impact of clinical and health services research projects on decision-making: a qualitative study. *Health Research Policy Systems*, 11(1), 15. doi:10.1186/1478-4505-11-15.
- Sosnowy, C., Weiss, L., Maylahn, C., Pirani, S. & N. Katagiri (2013). Factors Affecting Evidence-Based Decision Making in Local Health Departments. *American Journal of Preventive Medicine*, 45(6), 763-768.
- Stafinski, T., Menon, D., McCabe, C. & D. Philippon (2011). To Fund or Not to Fund. *Pharmacoeconomics*, 29(9), 771-780.
- Stipp, K. & S. Kapp (2012). Building Organizational Knowledge and Value: Informed Decision Making in Kansas Children's Community-Based Mental Health Services. *Community Mental Health Journal*, 48(1): 1-11.
- Tourigny, L. & M. Pulich (2006). Delegating Decision Making in Health Care Organizations. *The Health Care Manager*, 25(2), 101-113.
- Tromp, N. & R. Baltussen (2012). Mapping of multiple criteria for priority setting of health interventions: an aid for decision makers. *BMC Health Services Research*, 12(1), 454. doi:10.1186/1472-6963-12-454.
- Tso, P., Culyer, A., Brouwers, M., & M. Dobrow (2011). Developing a decision aid to guide public sector health policy decisions: A study protocol. *Implementation Science*, 6(1), 46. doi:10.1186/1748-5908-6-46.
- Villa, L., Warholak, T.L., Hines, L.E., Taylor, A.M., Brown, M., Hurwitz, J., Brixner, D. & D.C. Malone (2013). Health care decision makers' use of comparative effectiveness resea...- PubMed - NCBI. Retrieved 9 March 2015, from <http://www.ncbi.nlm.nih.gov/pubmed/24156643>
- Wilby, K. & K. Al – Siyabi (2013). Evidence – based healthcare practice in Qatar: A need to more forward. *Avicenna*, 7.
- Williams, I., & H. Brown (2014). Factors influencing decisions of value in health care: a review of the literature. Health Services Management Centre University of Birmingham. Retrieved 14 May 2015, from http://www.nhsconfed.org/~media/Confederation/Files/Publications/Documents/DOV_HSMC_Final_report_July_281.pdf.
- Williams, J., Blais, M., Banks, D., Dusablon, T., Williams, W. & K. Hennessy (2013). Predictors of the Decision to Adopt Motivational Interviewing in Community Health Settings. *The Journal of Behavioral Health Services & Research*, 41(3), 294-307.
- Wills, M. (2014). Decisions through data: analytics in healthcare. *Journal of Healthcare Management*, 59(4), 254-62.
- Yang, H., Duvall, S., Ratcliffe, A., Jeffries, D. & W. Stevens (2013). Modeling health impact of global health programs implemented by Population Services International. *BMC Public Health*, 13(2), S3.
- Yousefi-Nooraie, R., Dobbins, M. & A. Marin (2014). Social and organizational factors affecting implementation of evidence-informed practice in a public health department in Ontario: a network modelling approach. *Implementation Science*, 9(1), 29. doi:10.1186/1748-5908-9-29
- Yuen, K. (2014). The Primitive Cognitive Network Process in healthcare and medical decision making: Comparisons with the Analytic Hierarchy Process. *Applied Soft Computing*, 14, 109-119. doi:10.1016/j.asoc.2013.06.028
- Zeng, Q., Li, D. & Y. Yang (2013). VIKOR Method with Enhanced Accuracy for Multiple Criteria Decision Making in Healthcare Management. *J Med Syst*, 37(2). doi:10.1007/s10916-012-9908-1.