Evaluating complex interventions in real context: Logic analysis of a case management program for frequent users of healthcare services

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ABSTRACT

Case management programs for frequent users of healthcare services are complex interventions which implementation and application are challenging to evaluate. The aim of this article was to conduct a logic analysis to evaluate a case management program for frequent users of healthcare services. The study proceeded in three phases: 1) establishing causal links between the program's components by the construction of a logic model, 2) developing an integrated framework from a realistic synthesis, and 3) making a new reading of the case management program in regard of the integrated framework. The study demonstrated, on one hand, strengths and weaknesses of the actual case management program, and, on the other hand, how logic analysis can create a constructive dialogue between theory and practice. The evaluative process with decision-makers, clinicians and patients has helped to make connexions between theory, practice, experience and services organization.

1. Introduction

In Canada, as in many other industrialised countries, 80 % of healthcare system costs are due to 10 % of patients who frequently use emergency or hospital services (Bodenheimer & Berry-Millett, 2009). For example, 5 % of emergency department (ED) patients account for 30 %–50 % of all visits (Althaus et al., 2011). The reasons for the consultations varied, but the majority of these frequent users suffer from multimorbidity, psychiatric comorbidities and/or psychosocial issues (Byrne et al., 2003), resulting in poorer health indicators, high mortality rates and considerable costs to the health and social services system (Lee & Davenport, 2006; Ruger, Richter, Spitznagel, & Lewis, 2004; Schoen et al., 2011).

Case management (CM) is recognized around the world as an intervention that can improve the quality of life of frequent users of healthcare services and the satisfaction of healthcare providers while reducing costs to the healthcare system (Althaus et al., 2011; Hudon, Chouinard, Lambert, Dufour, & Krieg, 2016; Bodenheimer & Berry-Millett, 2009; Grover, Close, Villarreal, & Goldman, 2010; Hansagi,

Olsson, Sjoberg, Tomson, & Goransson, 2001; Kumar & Klein, 2013; Singh, 2005; Sutherland & Hayter, 2009; Sweeney, Halpert, & Waranoff, 2007). CM interventions have the potential to positively affect patient empowerment (Aliotta, 2002; Chouinard et al., 2013; Grun & Maier, 2008), patient self-management (Hudon et al., 2016; Chouinard et al., 2013; Bourbeau, Lavoie, & Sedeno, 2015) and the integration of care services (e.g. access, communication, coordination, involvement in decision-making and better health care transitions) (Hudon et al., 2014). As a complex intervention (Smith, Soubhi, Fortin, Hudon, & O'Dowd, 2012), CM focuses on interdisciplinary work in which a case manager (e.g. nurse, social worker or other) evaluates, plans, implements, coordinates and prioritizes services according to patient needs, in close collaboration with the partners concerned (American Nurses Association, 2010).

In Quebec, a health and social services centres (HSSCs), which include a hospital and community and long-term services, ensure access, continuity, coordination and the quality of services intended for the population of their local territories (Ministère de la santé et des services sociaux du Québec, 2018). In 2008, the Saguenay-Lac-Saint-Jean (SLSJ)

health and social services agency mandated the six HSSCs of its territory to deploy CM programs for frequent users of hospital services. Four programs were implemented in the following year, in which case managers were engaged to identify frequent users from the previous year, to assess their experiences and life projects, and to plan care with them and with primary care teams, including nurses, social workers, family physicians and representatives of community organisations.

A partnership between researchers and decision-makers of the IUHSSC of the SLSJ aimed to describe and evaluate the CM program implemented in this region, in order to generate knowledge on CM that can be useful in other contexts, and to inform improvement of the intervention (Hudon et al., 2014). However, the evaluation of complex programs such as CM presents many methodological and practical challenges. The application of standards uniformly and the results expected from the intervention may depend on many contextual factors, which require an appropriate approach to evaluation. Intervention program theories do not always reflect the mechanisms that produce the expected outcomes, but rather the perceptions and beliefs of their developers (Brousselle & Champagne, 2011). In addition, the evolution of the characteristics of a program over time may render the analysis results obsolete or make predictions impossible (Callaghan, 2008). Another challenge is making the evaluation understandable and useful to stakeholders (Rey, Brousselle, & Dedobbeleer, 2011). Theory-based evaluation methods such as logic analysis allow integrating the characteristics of complex interventions while explaining, in a comprehensible way for knowledge users, how to obtain the desired effects (Brousselle & Champagne, 2011, Rey et al., 2011; Brousselle & Buregeya, 2018).

This research aims to use logic analysis to evaluate the CM program for frequent users of healthcare services implemented in the SLSJ. This article has three objectives: (1) to develop a logic model of the SLSJ CM program that describes relationships between resources, activities and outcomes, (2) to elaborate an integrated framework of CM from the scientific literature and (3) to analyze the logic model based on the integrative framework to highlight strengths and limitations of the SLSJ CM program.

2. Methods

Logic analysis is a theory-based evaluation approach (Hudon et al., 2018) which uses scientific knowledge 'to evaluate the validity of the intervention's theory and identify promising alternatives to achieve the desired effects' (Rey et al., 2011: 2). Its methodological principles aim to reveal the causal mechanisms by which the program produces the desired outcomes (Brousselle & Champagne, 2011; Weiss, 1997). Logic analysis avoids the biases related to stakeholder beliefs and perceptions by testing the validity and plausibility of the program's intervention theory based on a multidisciplinary integrative theoretical framework using scientific knowledge (Brousselle, Contandriopoulos, & Lemire, 2009; Brousselle & Champagne, 2011, Rey et al., 2011). Logic analysis helps to evaluate the adequacy of the intervention theory and its potential impacts – not the impacts themselves – and to identify the strengths and weaknesses of an intervention (Brousselle et al., 2009). Based and developed both on the experiential knowledge of the CM program designers (i.e. decision-makers and health professionals), and scientific literature, logic analysis contributes to broadening professional competencies, developing a reflexive practice and initiating organizational changes (Tremblay, Brousselle, Richard, & BeaudetDefining, 2013).

Logic analysis can take two forms: direct or reverse (Brousselle & Champagne, 2011, Rey et al., 2011). Direct logic analysis identifies crucial characteristics and critical contextual conditions for the program to produce its intended outcomes (Rey et al., 2011). Reverse logic analysis identifies alternative means of action and better ways to produce the effects (Brousselle & Champagne, 2011). This study uses direct logic analysis to validate the design of the CM program by identifying

characteristics required as well as the conditions needed to achieve the CM program results (Tremblay et al., 2013). This type of evaluation proceeds in the three phases described below (Brousselle & Champagne, 2011, Rey et al., 2011).

2.1. Design of the logic model

The first phase aims to represent the intervention theory through a logic model that specifies the links between the context, resources, activities and results. This step leads to the identification of more specific issues that can be explored in detail, according to the interests and objectives of stakeholders and health professionals, or the difficulties they encounter (Brousselle, Lamothe, Mercier, & Perreault, 2007). The construction of the logic model helps to organize and systematize program processes and thereby promotes a common conceptualization, planning, implementation and communication of program objectives and expected outcomes (Émond & Charlebois, 2004). This facilitates a shared understanding of the program and stakeholder roles, actively involving key actors to accomplish program goals (Émond & Charlebois, 2004).

The five steps for constructing a logic model proposed by Rossi, Lipsey, and Freeman (2004) were followed: (1) analysis of unpublished documents (administrative documents and others documents about the program's goals and objectives); (2) review of the literature in connection with CM program for frequent users; (3) in-depth interviews (n = 58); (4) focus groups with stakeholders (n = 13); and (5) participant observations (n = 39). One hundred and twenty-nine (129) people were involved in the data collection.

Interviews, focus groups and participant observations notes were processed by thematic analysis according to an iterative process (Miles, Huberman, & Saldana, 2014). All content was coded and categorized by themes and compared to the information obtained with the unpublished documents and the literature review.

2.2. Development of the integrative framework

The second phase of logic analysis is the development of an integrative framework based on a scientific literature review, which identifies the essential characteristics and contextual conditions for the success of the program (Brousselle et al., 2007). The present study used a realist synthesis (RS), a particularly useful method for reviewing complex social interventions involving a chain of processes (Pawson, Greenhalgh, Harvey, & Walshe, 2004). RS can help to synthesize qualitative, quantitative and/or mixed methods evidence from complex interventions (Pawson, 2002; Pawson et al., 2004; Pope, Mays, & Popay, 2007).

The review process followed five non-linear and interrelated stages described by Pawson (2006): (1) focusing the scope of the RS; (2) searching for the evidence; (3) appraising the quality of evidence; (4) extracting the data; and (5) synthesising the evidence. The RS was conducted by a multi-province team of researchers, patients, clinicians and decision-makers based on the results of a systematic review of CM interventions reporting positive outcomes in a primary care setting for frequent users with chronic diseases (Hudon et al., 2019). For each of the reviewed publications, data was extracted pertaining to the context, causal mechanism and outcomes of each intervention. This was an iterative process which allowed for the definition of the various resources offered by each intervention, and the characteristics of individuals and of the environment that in combination, resulted in the reported outcomes. These context-mechanism-outcome (CMO) configurations led to the development of a programme theory anchored in empirical evidence and highlighting how CM works, and under what circumstances (Hudon et al., 2019). The complete method and results of the systematic review and the realist synthesis are described elsewhere (Hudon et al., 2017, Hudon et al., 2019).

2.3. Evaluation of the intervention

The third phase of the logic analysis is the evaluation of the program theory, by comparing the logic model to the integrative framework. As mentioned by Tremblay et al. (2013), the purpose of this stage is to 'examine the scientific validity of the links between the resources mobilized, the activities, and the desired outcomes of the program'. It also allows to identify critical contextual conditions influencing the production of effects. Every dimension of the logic model and the RS has been analysed and compared in a way to highlight the strengths and limitations of the intervention program to establish the strength of the causal chain toward the effects as well as to understand contextual factors' influences (Brousselle & Champagne, 2011). In other words, this phase helped to understand which characteristics of the program produce the expected effects (Brousselle et al., 2007).

3. Results

3.1. Construction of the logic model

The logic model illustrates how contextual factors justify the resources mobilized to achieve the activities, and how these activities produce the expected benefits for the patients and for the organization. While material, organizational and human resources bring the necessary support for providers of healthcare services in their activities and make the implementation of CM program possible, each of these resources depends on adequate public funding. Resource allocation within the CM program also have an impact on the effectiveness of thefive main intervention activities: case finding; assessment; care planning; care coordination and self-management support.

Case finding refers to the identification of patients who will benefit the most from the intervention by the case manager via administrative data from IUHSSC information system and via HSSC or PC providers.

Assessment refers to the pre-analysis and withdrawal of users who do not correspond to the CM criteria. Reviewing the frequent users' healthcare/medical records includes services used and reasons for services use. The case manager communicates with key healthcare providers to obtain information about the patient's situation, and with the patients to assess and identify their needs and goals.

Care planning involves establishing a strategy of organizing services adapted to the situation, the healthcare team and the patients. With the help of healthcare providers, CBOs and community pharmacists, the case manager identifies available resources in the IUHSSC and in the community, establishes an individualized services plan (ISP) and, if necessary, organizes an interdisciplinary meeting.

Coordination refers to the way that services and professionals are mobilized in the care planning, e.g. in the organization, animation and coordination of the ISP. The patient must know who the main point of contact is (case managers or other primary care providers), and obtain support to navigate between services. The role of the case manager is to evaluate and adjust the ISP and ensure follow-up.

Finally, self-management support is a component included from the assessment step to the coordination step. It refers to the provision of support and tools to enhance patient empowerment and capabilities based on needs and level of complexity. To obtain optimal outcomes, the intensity of the activities has to be adapted to the complexity of patient needs.

3.2. Developing an integrative framework with a realist synthesis

An iterative process rooted in empirical evidence, the RS led to a programme theory that explains how and why particular contexts and particular types of frequent users influenced the results of the CM program (Hudon et al., 2019). The context of successful interventions includes easy access to an experienced and trusted case manager who provides comprehensive care and maintains positive interactions with the patients. To produce the expected outcomes, the mechanism of CM is to ensure that the patients feel supported, respected and accepted, engaged and committed to understand the care plan and how to access to relevant healthcare services. To feel understood makes patients less anxious, more secure and empowered to self-manage. Providers must also feel supported, respected, accepted and engaged in the care plan. Positive outcomes for the patient are related to the improvement of self-management skills, adherence to treatment and recommendations, satisfaction, health status and quality of life. For the healthcare system, positive outcomes are the reduction of healthcare use and costs.

The development of a trusting patient-provider relationship plays a key-role in the effectiveness of CM programs for frequent users (Hudon et al., 2019). While the patients' past experience of care can have an impact on the relationship between patients and providers, this relationship can influence patients' behaviour regarding the motivation to engage in self-care. A trusting relationship empowers patients to self-manage their care. Patients require the case managers and other providers to take the time to listen to them and to plan regular follow-up meetings.

To promote a trusting relationship, providers need health care aptitudes and skills. A calm, confident, sensitive, friendly, empathic, and supportive case manager is more likely to inspire patients' confidence and increase their likelihood of being engaged in self-care.

Providers have to involve patients in the development of their care plan, for example by considering their needs, prioritizing what they want to address, explaining their role in their own care, and encouraging them to make their own health-related decisions. Educating patients about their health condition, facilitating access to services, and offering assistance with the navigation of healthcare services, improves the patients' ability to seek and reach appropriate care when needed. Considering both patients' medical and social issues and the utilization of a comprehensive approach may also influence patients' engagement in their care and lead to a reduction of their inappropriate healthcare services use and help them to sustain their engagement in their care. For the case managers and other providers, to be engaged means to take an active role in caring for patients, which has a positive influence on patients' motivation to engage in their care (Hudon et al., 2019).

Finally, providers must ensure that patients with a substance use disorder follow their care plan, otherwise these patients are not inclined to adherence and will continue to use services in an inappropriate and repeated way in order to obtain narcotics (Hudon et al., 2019).

3.3. Analysis of the intervention theory

Analysis shows that the program as designed in Quebec includes many factors identified in the integrative framework that are determinants for the production of the expected results, for patients as well as for providers and for the healthcare system. These factors are linked to the personal, relational and organisational contexts as well as to the intensity of certain activities, processes and underlying mechanisms. We noticed that some factors should be added, clarified or explained in the logic model in order to strengthen achievement of the objectives of the program.

3.3.1. Context

Regarding the characteristics of frequent users of services, the RS shed additional light on the specific situation of patients with a substance use disorder. Indeed, results indicate that it is essential that health professionals rigorously follow the care plan for this type of patient in particular: 'Regarding frequent users with substance abuse issues, healthcare providers' compliance with their care plan is crucial (Grover et al., 2010; Pope, Fernandes, Bouthillette, & Etherington, 2000)'.

The quality of interpersonal relationships, particularly positive interaction between patients and health providers has a strong impact on achieving program objectives and should be emphasized. Access to an

experienced and trustworthy case manager, as identified in the integrative framework, is not explicitly named in the logic model. Instead, the latter highlights some of the problems linked to a lack of coordination and access to care in the current model. The integrative framework emphasizes the importance of a comprehensive approach that provides a holistic portrait of patients and promotes their increased engagement in their care plan (Hudon et al., 2019), which the logic model does not explicitly mention. This intervention approach should therefore play an even more important part along the care continuum.

3.3.2. Activities

Care planning, coordination and self-management support are found in the logic model as well as in the integrative framework as factors leading to the expected results, which constitute strengths of the program allowing to maximize results. The current program could specify the inherent conditions to optimal coordination and planning of care and services. As demonstrated in the integrative framework, engaging the CM team and mobilizing their support towards patients for their participation in the care plan and through services, as well as ensuring collaboration among care providers and the different sectors constitute mechanisms that promote optimal coordination. These should be specified in the logic model. In addition, support for the providers involved in CM is a mechanism that was not presented in the logic model. This mechanism was not excluded from intervention activities, but was implicitly accepted by stakeholders and care teams. Yet, as it is far from insignificant in obtaining results, support for providers should be clearly identified in the logic model.

3.3.3. Processes and mechanisms

Some authors consider the logic model as reductionist and biased because of its linear character, operating step by step successively and from cause to effect (Greene, 2013, Émond & Charlebois, 2004; Potvin, Bilodeau, & Gendron, 2008). One solution could be found in the modelization of the relationships between actors who are engaged in the program, in collaboration with the actors themselves (Potvin & McQueen, 2008). Our integrative framework accomplishes this by emphasizing interpersonal dimensions, engagement and support (for self-management or in navigating through services), thereby proposing the underlying mechanisms through which context, activities and results are integrated and interrelated. This captures the depth and complexity of interactions between each actor and component of the program and highlights that the quality of relationships between the involved stakeholders has an impact on the underlying mechanism, and by extension, on results. For example, the support of healthcare providers by managers, coordinators and other stakeholders translates into the providers feeling of being supported, respected and accepted. This can lead to an improved patient-care provider relationship, as well as increased engagement in CM for patients. In turn, patients also feel supported, respected and accepted. They are more likely to be involved in understanding and elaborating their care plan, leading to more adequate use of healthcare services. Feeling that their concerns are understood makes patients less anxious and more secure, which leads them to develop self-management skills. In this context, it is important to put the patient at the centre of attention and to promote a system centred on the individual. This 'virtuous circle' underlying the CM program should be highlighted in the logic model.

This analysis allows us to better identify the strengths and weaknesses of the initial logic model of the CM program. These results do not indicate failure or limitations of the program but rather emphasizes the importance of some elements, identified in the RS, that appear as major determinant of the program's effectiveness. These elements should be highlighted and explicitly communicated by decision-makers, team leaders, program coordinators and case managers to all healthcare teams to improve the program.

4. Discussion

This study highlights the complementarity of each phase of the logic analysis throughout the evaluation process of the CM program for frequent users. The logic model and the development of an integrative framework make important contributions that deserve to be underlined.

This logic analysis was built along the entire evaluation process from the knowledge, experiences, opinions and intentions gathered during interviews and focus groups conducted with a variety of stakeholders (n = 129). According to Knowlton and Phillips (2013), "Because models enhance learning thought the iterative exchange of information and experience, they offer important features to organizations that value evidence, diversity, dialogue, feedback, inquiry, great planning, and teams". The engagement of key actors in the evaluation process is an undeniable strength of the logic analysis. The development of both the logic model and the integrative framework allowed stakeholders (decision-makers, managers, case managers, clinicians and other providers working within the CM program) to become familiar with concepts relative to the intervention. Decision-makers, managers and case managers received the results of this logic analysis with openness and used them to reinforce or adjust the program's resources and activities. By doing this, key actors have been able to take ownership and commit to the program. This participative exercise proved to be enriching in terms of consensus and appropriation of the evaluation's results, and to initiate the necessary changes to the program (Donaldson, 2003). Furthermore, the mobilization of political, disciplinary and organizational domains was an essential step to the development of the integrative framework (Hudon et al., 2017) and generated an enriching dialogue between decision-makers, managers, clinicians and academics. Stakeholder participation in reflective activities may have resulted in greater validity of the results and a common understanding of the CM program. The transfer and uptake of the evaluation results by the knowledge users makes it possible to enrich and improve the program (Brousselle et al., 2009).

The logic model represents a simplified version of the intervention that aims to provide an easier way to understand how context, resources, and activities interact together to reach the expected outcomes. It can help decision-makers to make better decisions about specific issues or components of the program. However, to analyze an intervention, a more conceptual level of analysis is required. Actually, a programme theory is necessary to conceptualize causal mechanisms. Realist synthesis used to develop the integrative framework enhances understanding of the logic model by documenting the 'theory of change', i.e. the programme theory, and explaining the underlying mechanisms at work that contribute to the production of the intervention effects (Hudon et al., 2017). The theory of change refers to mechanisms by which change is expected (Funnel & Rogers, 2011). As argued by Patton (2008), "Specifying the causal mechanisms transforms a logic model into a theory of change". Chen (2015)), cited by Mayne (2015), says that theories of change are models of how change is expected to happen (*ex ante case*) or how change has happened (*ex post case*). In this perspective, for a same logic model, several theories of change may exist, which could offer different readings of the intervention or could be embedded to offer a pluridisciplinary conceptualization of the causal mechanisms (Mayne, 2015).

Our study sheds light on the complementary roles of logic modelling and RS for conducting a logic analysis. Logic analysis describes and elucidates the role of structural factors, while the integrative framework highlights the intangible factors and emphasizes their importance. In the first phase of this study, the logic model showed how and why structural factors (context, activities, and material resources) were expected to interact and to produce the expected outcomes. In the second phase of the logic analysis, the RS highlighted the importance of intangible factors such as the quality of human relationships, listening, trusting, adapting to the specific needs of patients, support, etc. to the success of health interventions. Logic models are usually figures

representing a chain of actions, and attempt to capture intangible factors that may be difficult to represent graphically. An approach such as the integrative framework, based on written narrative, compensates for this potential weakness of logic models by providing space for the description of intangible factors. The integrative framework, although essentially a theoretical exercise, provides a complementary viewpoint that enriches the understanding of the intervention and ultimately improves the results of the program evaluation itself.

In this article, the RS was used to build the integrative framework. Such a use deepens understanding of the subject under evaluation and enhances the capacity of evaluators willing to conduct a logic analysis. Building the integrative framework is arguably the most difficult stage of a logic analysis and the methodology used for this step is often not detailed enough in previously published articles. With this study, we provide more guidance on how to conduct a logic analysis with validity, taking advantage of established and robust methodologies existing in the evaluation field.

5. Lessons learned

Along the evaluation process, evaluators may encounter some difficulties in comparing the logic model to the integrative framework due to different formulations or concepts that are not presented, named the same way in different domains of expertise or evolve according to particular contexts (Tremblay et al., 2013). This study is no exception to this challenge. The key actors involved and the program itself evolved between the first and the second phases of analysis. As stated by Rey et al. (2011), 'change is a complex and unpredictable phenomenon that necessarily involves multiple actors […] whose roles in the organization can evolve over time'. It is particularly true for the CM program in Saguenay-Lac-Saint-Jean because of the reorganization, in 2015, of the healthcare system by the government of Quebec that resulted in many changes to teams and to structures.

To overcome these difficulties, evaluators sustained constant exchanges with partners to be informed about program planning and to obtain validation of work documents (intervention tools, program model, etc.) by asking for feedback and comments. Inviting partners to be involved in knowledge transfer activities (e.g. to be co-authors of articles) have also helped to update information and validate it. The evaluators' familiarity with the program implementation developed through their participation and from focus groups and in-depth interviews with key informants were other strategies that facilitated an informed evaluation at each phase of the study (Brousselle & Champagne, 2011).

6. Conclusion

The study demonstrates the relevance and usefulness of logic analysis in the understanding of a CM program for frequent users of healthcare services. By comparing the logic model to the integrative framework, the logic analysis helped to identify key intangible and structural factors for the intervention to be effective which, ultimately, translated into the identification and prioritization of strategies, by decision-makers and health professionals, to improve the CM program for frequent users.

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