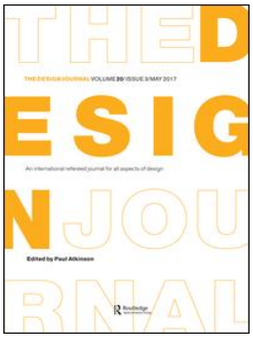

The Design Journal

An International Journal for All Aspects of Design

ISSN: 1460-6925 (Print) 1756-3062 (Online) Journal homepage: https://www.tandfonline.com/loi/rfdj20

Health Design: Mapping current situations, envisioning next steps

Guillermina Noël

To cite this article: Guillermina Noël (2017) Health Design: Mapping current situations, envisioning next steps, The Design Journal, 20:sup1, S2304-S2314, DOI: 10.1080/14606925.2017.1352746

To link to this article: https://doi.org/10.1080/14606925.2017.1352746

DESIGN FOR NEXT
EAD12-ROME

Design for Next

12th EAD Conference
Sapienza University of Rome
12-14 April 2017

doi: 10.1080/14606925.2017.1352746

Health Design: Mapping current situations, envisioning next steps

Guillermina Noël*

Lifelong Learning Office, University of Alberta, Canada
*Corresponding author e-mail: fnoel@ualberta.ca

Abstract: Healthcare systems are under high pressure, from chronic disease, and aging populations with their consequent array of issues. Healthcare professionals are asked to deliver better care with fewer resources, increasing efficiency and efficacy. Simultaneously, patients expect more personalized therapies and physicians are discovering the benefits of making patients more active in their own care. This paper outlines the challenge to arrive at healthcare decisions that are based not only on data but also on the patient's values and preferences. However, helping healthcare to face this challenge requires designers to develop new skills and competences. The paper proposes some general competences that designers need to develop to provide design solutions to satisfy users and healthcare systems' needs.

Keywords: design sciences, evidence-based medicine, human-centred design, patient-centred care, design education

1. Introduction

Design, arising from a culture of innovation and furnished with more than 50 years of creating and developing efficient human-centred methods can help face the current challenges posed to healthcare systems by chronic disease and aging populations.

There has been and there is much activity in the intersection between health and design. Design organizations such as IDEO, Philips and Steelcase have a constant flow of health design projects, and they are recognized as being on the forefront of design practice. All this could give the wrong impression that there is nothing to worry about.

The need for design and health to collaborate, however, is far greater than the supply, and the present partnership between health and design suffers from several problems: a) the designers that work for the health field are often not educated to perform a systematic approach to the tasks, and respond to the demands in uninformed ways, that are not accountable and do not lead to significant quality improvement; b) often, the designs are not implemented, and if they are, their performance is frequently not measured; c) the design job is frequently done by design students or recent graduates because those who commission the projects believe that design only has to do with giving a professional look to products; and d) many times design products – particularly visual presentations of information – are conceived and crafted without even consulting a designer.

There is a need for interdisciplinary collaborations that would integrate design and health in a problem-based learning context, with participation of industry and government, to make sure that the projects confronted are realistic, situated in actual contexts, and a high priority to address, and that the professionals educated are able to respond to the complex and ever changing demands for growth in health and design knowledge and capabilities. The merging of health and design in education is necessary for the creation of a common ground and of a common language. These are indispensable conditions to foster and enact a culture of collaboration.

This paper outlines the current challenges in healthcare and the opportunities this situation presents to the design sciences; it also proposes future steps to provide implementable design solutions able to satisfy users and healthcare systems' needs.

2. New challenges, new opportunities: Evidence-based and People-centred care.

Overcoming some healthcare challenges, such as achieving patient-centred care, requires applying human-centred design and presents new opportunities for the design sciences.

The goal of Evidence-based medicine is to produce and deliver high quality and relevant research to healthcare providers and patients to ensure the safest and best possible care. Healthcare systems across nations are required to apply best practices. These are "evidence-informed practices addressing high-priority areas that are central to quality and safety" (Accreditation Canada, 2015, p. 7). The ultimate goal is to change practice and improve quality. The problem is how to make this evidence easily available to healthcare professionals and patients, and how to transfer this into clinical practices. The process to implement this knowledge into practice, products or policy is called Knowledge Translation. "The existing gap between current best evidence and evidence-based practice is a concern that most clinicians can relate to and has been an issue for decades" (Lang, Wyer, & Haynes, 2007, p. 355).

In addition, healthcare systems are transforming their current practices to achieve the Triple Aim. Donald Berwick (Hill, 2013) defines it as an approach to achieve: 1) better care: provide effective, patient-centred, timely, and equitable care; 2) better population health: promote better decisions and life style choices, inform the population about how to reduce health risks, reduce environmental threats; and 3) lower cost: optimize the system structure and service to reduce costs. This includes avoiding over-diagnosis and overtreatment. Bodenheimer and Sinsky (2014) wonder about the need to add a fourth aim: to improve the work life of healthcare professionals. "Burnout among the health care workforce threatens patient-centeredness and the Triple Aim. Dissatisfied physicians and nurses are associated with lower patient satisfaction" (p. 574). But the problem goes beyond patient satisfaction, as a healthcare provider explained:

> For some vocations, a bad day at the office means: "I dropped a carton of eggs" or "I broke the copier". …In medicine, however, a bad day usually means, "We lost a toddler"; "A young family lost their baby"; "She will never walk again"; and 'Time of death …". The list could go on and on; the point is, the magnitude at which we affect the world of each individual person in healthcare is far different than most jobs. (Anonymous, 2016)

Moreover, the WHO has recently issued a call to implement people-centred strategies to health services (WHO, 2015). This makes personalised care a priority.

All this calls for the design sciences to collaborate with healthcare, since environments, equipment and digital products, communications and services are all aspects whose design quality has a direct impact on the quality and the efficiency of healthcare services. This requires a stronger and more planned collaboration between design and healthcare. “Health care is not just another service industry. Its fundamental nature is characterized by people taking care of other people in times of need and stress” (Institute of Medicine, 2001, p. 6). This demands interdisciplinary approaches where design, in all its areas of expertise, can be of great use, particularly when conceived as a human-centred activity.

2.1 Human-centred design can help achieve evidence-based care.

As mentioned above, Knowledge Translation initiatives aim to bridge the knowledge-to-practice gap between researchers and knowledge users. The application of research synthesis to improve clinical practices is a current challenge. Knowledge Translation is a process that includes synthesis, dissemination, exchange and application of evidence to improve health, to provide better health services and products, and improve the healthcare system (Canadian Institute of Health Research, n.d.). Unfortunately, “many interventions found to be effective in health services research studies fail to translate into meaningful patient care outcomes across multiple contexts. In fact, some estimates indicate that two-thirds of organizations’ efforts to implement change fail” (Damschroder et al., 2009, p. 2). Blase, Fixsen, Sims, and Ward (2015) explained that “to be usable, an innovation must not only demonstrate the feasibility of improving outcomes, but it also must be well operationalized so that it is teachable, learnable, doable, and able to be assessed” (p. 5). Human-centred design begins with understanding people’s needs and preferences when performing activities, and it ends with new solutions to help people achieve their goals with ease. Human-centred design approaches play a key role in helping to create plans to implement Knowledge Translation initiatives.

Guidelines are frequently used as tools to translate knowledge. However, “the effectiveness of guidelines as tools to facilitate the translation of evidence into practice has been inconsistent” (Campbell-Scherer, et al., 2014, p. E2). Guidelines need to be presented in a physician (or other health professional) friendly format (Glasziou & Haynes, 2005), and transformed into efficient decision-aids to make the information accessible to patients and families, and facilitate shared decision-making between patients and physicians. Agoritsas et al. (2015) explain:

> Good shared decision-making requires clinicians to have access to detailed knowledge and ideally summaries of the latest evidence and the means to share it in a way that supports thoughtful deliberation, something that cannot be done on the fly. (p. 2)

Glasziou & Haynes (2005) outline a 7 steps process to go from evidence into action. Health care professionals need to be: 1) aware of the evidence, 2) accept the evidence (be persuaded), 3) apply it (understand risks and benefits), 4) implement it (this might require training), 5) act on it (incorporate the evidence into daily practice and habits, this might require reminders), 6) agree to (communicate the evidence to the patient, discuss risks and benefits, and agree on a course of action; this requires decision-aids), 7) adhere to (the patient must comply and follow the treatment; reminders and information sheets for the patient and family might be necessary). Glasziou & Haynes (2005) estimates that “80% transfer at each of seven stages would result in only a 21% patient usage” (p. 5). Design has a pivotal role to facilitate the transferring of knowledge at each of these stages. From the design of guidelines and data visualizations to make the evidence accessible and persuasive, to the

design of training materials and decision-aids to facilitate shared decision-making, human-centred design can help increase the effectiveness of this implementation process.

2.2 Human-centred design can help achieve patient-centred and personalized care.

As already mentioned, current models of medical practice call for the adoption of patient-centred care approaches. The House of Care places personalised care at the centre of the delivery system (Coulter, Roberts, & Dixon, 2013), helping health professionals and patients achieve better health outcomes (Coulter, et al., 2015), by recognizing their assets (Feeley & Mair, 2013; Burke & Segrin; 2015). Wagner's Chronic Care Model highlights the need to support patients to set goals to improve their health, manage their diseases, address barriers, and create plans to achieve goals (Wagner, et al., 2001). This requires health providers and patients' constructive engagement to collaboratively plan care paths (Institute for Health Improvement, 2001; Coulter, et al., 2015; Elwyn, et al., 2014).

Personalized patient-centred care requires active participation by all users, both patients (and their families) and healthcare professionals. Hence, there is a growing commonality of approaches between healthcare and design. More and more, we see user-centred methodologies applied in healthcare (Montori, Breslin, Maleska, & Weymiller, 2007). "Using a design research approach akin to participatory action research, patients, clinicians, and designers contributed to the development of a novel interactive decision aid" (Breslin, Mullan, & Montori, 2008, p. 471). Designing for people and caring for people both require a deep knowledge of "people," and their incorporation in the design process. However demanding this can be, it is indispensable if one is committed to doing things optimally. Victor Montori said:

> Design… is about the needs of the user, and requires deep empathy with the user to identify those needs. Clinicians to be effective have to demonstrate deep empathy with the patients to understand what the nature of their dilemma is, and to match the available treatments and approaches to the nature of that dilemma… (Yale School of Management, 2010).

Tan and Szebeko (2009), on the attention that design is receiving from other disciplines, elaborated, "this attention has not been for the flashy, expensive or colourful products of design, but for the people-centred thinking and co-design approaches which are increasingly becoming relevant to a number of different contexts, such as healthcare" (p. 185). Similarly, Witteman et al. (2015) stated, "we… use a conceptual framework of user-centered design, a longstanding and proven framework and methodology for the development of products, services, and systems that has yet to be widely applied in the domain of health care" (p. 2).

Patient-centred approaches to healthcare require a change from applying evidence-based information to cure a patient, to sharing information between researchers and healthcare providers and between healthcare providers, patients and families so that they become active partners in the care process. In this new approach to healthcare (WHO, 2015), healthcare providers' roles move from curing to enabling and empowering. "Health services must go beyond an emphasis on the hospital …towards a more coordinated approach that embraces primary and community care-led strategies" (WHO, 2015, p.12). This requires transformation of roles, models, relationships, responsibilities, accountability, and of ways of delivering and accessing information.

Design can bring to healthcare its abilities to question assumptions, to ask what if. This can help leaders, managers, and healthcare providers to wonder about their current practices, and what could be changed to improve care quality. Design can also bring its philosophy of empathy, observational and listening skills and other qualitative processes so that healthcare professionals can effectively work in teams, and engage with patients, families, and communities in a more humane and holistic way.

Human-centred design can help health professionals not only understand what is like to live with a chronic condition, a terminal disease, or a communication disability, but also situate people in their social, economic and cultural context to uncover health barriers and facilitators. Moreover, human-centred design can also help healthcare managers and administrators understand what is like to be a burnout nurse, or a physician overwhelmed by administrative tasks.

In this context the goal of design is no longer to produce visually appealing objects or communications, but to help all the users involved in healthcare: clinicians, nurses and other professionals interacting directly with patients, as well as hospital administrators, technicians and patients' families to better respond and adapt to daily demands. Designers have moved from the design of healthcare tools to the design of situations where people interact with other people, services, products, environments and communications (Frascara, 2002). This however requires designers to develop new skills and competences. The following map illustrates (Figure 1) a possible way to see the health design situation and how design can help achieve Evidence-Based and People-centred care.

Mapping how design can help achieve Evidence-Based & People-centred care

Applying design sciences to improve health outcomes

Evidence Stage	Goal	Current reality	Design Sciences can…	What is needed
Identification of health relevant knowledge gaps 1	*Better:* diagnosis, treatment, use of resources, processes, and tools to achieve better health outcomes at lower costs.	*My grant application to co-create personalized care plans was rejected. The reviewers are Lab-centred, not patient-centred.*	Help researchers, health professionals, patients & families to identify issues and plan the research. *What is best for patients, their families, providers, and society?*	To achieve People-centred care, reviewers need to be familiar with the value of design.
Knowledge synthesis 2	*Production of guidelines and* publication of systematic reviews and studies in journals.	*I am managing the project for the next X guideline. We are putting all the evidence available there.*	Help achieve co-created guidelines in which the content is consulted with all users involved. This will facilitate acceptance and use.	Stakeholders & managers need training in participatory approaches.
Knowledge awareness 3	*Make the information available to* health professionals. And also to patients, families, + community.	*I receive 3 new guidelines every second week.* *This is overwhelming!*	Help disseminating the information in a physician-centred way (or other health professional). And make it timely and relevant.	Project managers need training in user-centred design to understand the current reality.
Acceptance 4	*Persuade* health professionals, and also to patients, families, + community, about the value of the evidence.	*This is impossible to read and apply. The page is text dense, the information is so ambiguous. My patients are not like this.*	Help achieving valuable, complete, concise, accessible, easy to interpret and use evidence. This will help develop interest and intention to use.	Specialists developing guidelines need training in user-centred design.
Application 5	*Understand* benefits and harms to make appropriate decisions.	*Where does my patient fit within these guidelines?*	Help guidelines developers to address the different situations of different patients.	Guidelines developers need to be aware of the value of co-creation.
Skills Development 6	*Incorporate* evidence into practice. *Acquire* new skills and ways of doing things to incorporate the evidence.	*We need to provide support to health professionals so that they can incorporate this evidence, but we don't have resources.*	Help creating new processes and tools. Develop new services and systems to reduce errors, misuse, and support implementation.	Leaders need to identify priorities consulting with all the users involved.
Acting 7	*Apply* the new evidence. Implement the new habit or behaviour.	*Oh my! I need to remember to use this tool. I have enough things in my head already.*	Help creating systems and strategies that remind and nudge professionals to incorporate the new practice.	Leaders need to identify barriers and nudge providers to act on evidence.
Share-decision making 8	*Recognize* patients as experts in their own life and honour it. Identify needs, assets, values, and social context.	*I wanted to talk with my doctor about treatment options, but he ignored my questions.*	Help designing and evaluating decision-aids to support kind and effective conversations and arrive at shared-decision making.	Leaders need to make every possible effort to support patient-centred care.
Patient compliance 9	*Identify and understand* treatments' demands to help patients succeed.	*I need to do X test tomorrow so I cannot have breakfast and I will arrive late to work. I also need one more pill.*	Help developing participatory research to understand what is it like to be a patient and provide solutions that respond to the patients needs and preferences.	Healthcare systems need to provide health solutions that fit each patients' life.

Improve health outcomes

Figure 1. The map presents the current stage of Evidence-Based, how design can help achieve, and what needs to change to achieve Evidence-Based and People-centred care.

3. Health design: New skills & competences.

Healthcare practice has been and is changing, partly because society has changed, partly because complex inter-related factors have resulted in epidemics like the opioids addiction, obesity, diabetes and their consequences. This challenges health professionals, patients and families to deal with multiple chronic disease management. Patients now have higher expectations about the care received and about their participation in their own health maintenance. Healthcare services are changing too, moving from the hospital to the community, from curing to enabling and adopting inter-professional and collaborative approaches to care.

While physicians before where caring for patients with an infection by prescribing an antibiotic, today they are also caring for patients with chronic conditions that need personalized care treatment plans. A similar situation occurred in design, where designers before where communicating an event through a poster, but today they are also working with researchers to create tools to help identify the patients' needs, values, preferences, and social situation, so that primary care physicians can decide care paths in collaboration with patients.

A people-centred approach to care requires new skills and competences. One of these competences is the ability to keep people and their contexts in mind when conceiving solutions to health and healthcare problems so that they respond to the needs of individuals, families, communities, health professionals and systems. While before physicians were prescribing an antibiotic, today they need to consider if patients can afford it, if they have access to drinkable water, if they have access to food, and how the antibiotic routine could alter the patients' life style.

The type of problems both disciplines confront and how to confront them has changed. Heifetz (1994) identified three types of situations. Type I are those that require technical solutions, such as prescribing an antibiotic or designing a poster. They can be solved applying technical knowledge. Type II situations, however, require solutions where both patients and physicians are responsible for the success of the solution. Applying technical knowledge is not enough to solve the problem; learning is also necessary. These situations require adaptive change. For example a heart surgery will be effective in restoring health, only if the patient quits smoking, changes the diet, starts exercising and reduces stress. The responsibility for success is shared. Heifetz (1994) stated: "In Type II situations, the problem is definable but not clear-cut solution is available" (p. 74). Type III situations are those where the problem is unclear and learning is required. The solution (or solutions) to treat an obese patient with chronic pain, sleep disorders and depression most likely will not be a diet. Learning is necessary to understand the root causes of the different problems and agree with the patient on how to achieve health outcomes. Adaptive work is necessary, people (both physician and patient) need to change their ways of caring.

If solutions to Type II and Type III are proposed with a poor understanding of the situations, then the design solutions would not be effective, or implementable. As Norman and Stappers (2015) explain "implementing the recommendations frequently proves difficult, long and lengthy, subject to repeated revisions, and in many cases, impossible" (p. 91). New expertise is needed to understand constraints, conflicts of interest, reduce frustrations, identify possibilities for change, consider what might work, deal with unforeseeable issues, and arrive at effective implementable solutions and successful collaborations.

Design education has in the main been project and craft based, and design strategies were normally addressed with insufficient knowledge of the areas that could provide evidence. "My experience with some of the world's best design schools in Europe, the United States, and Asia indicate that the students are not well prepared in the behavioral sciences" (Norman, 2010). Unfortunately most

graduated students are not ready to work in the health sector, “it is not enough to mean well: one must also have knowledge” (Norman, 2010). The author of this paper has seen many times design proposals that cannot be implemented because the designers lacked understanding of the content, or because the designers lacked knowledge of behavioural, perceptual and cognitive factors, or because the development of the “solution” did not take into account cultural and environmental factors of the context of implementation. Emphasis on the “creative” aspect of design has played against the quality of the final outcome. This goes frequently hand in hand with a lack of measure of performance of the design. Performance evaluation methods “are well understood by cognitive scientists, but seldom known or understood by designers” (Norman, 2010).

Departing from the possible situation mapped in Figure 1 (the map), it could be possible to outline some competences that designers should have to help achieve Evidence-Based and people centred care. These are:

1. Skills in qualitative and participatory research. Human-centred research to co-identify issues with all the people involved.
2. Knowledge and understanding of technical writing and co-creation skills.
3. Knowledge and skills in information presentation and human-centred design.
4. Abilities to consult and involve all users; understanding about information processing, perception and motivation.
5. Qualitative and participatory human-centred research skills.
6. Human-centred and co-creation skills to ideate strategies.
7. Knowledge of ethnographic and behavioural theory.
8. Understanding of decision-making and knowledge of prototype evaluation.
9. Understanding of the complexity of behaviour change and design support solutions to achieve patients’ compliance.

Unfortunately, some health professionals’ lack of understanding about the design discipline, results in projects that start with “we need a…” (website, poster, etc) instead of starting by first questioning what could be designed to help people achieve their goals or how might we address this problem from a design sciences point of view. Usually these professionals do not value design research and monitoring implementation. This results in frustrations on both parts, and poor design solutions. Frequently, a lack of knowledge among health professionals of how to assess design solutions, has led to the choice of poor proposals.

Figure 2 proposes some general competences that designers and leaders, policy makers, and health professionals working in the health design intersection might need to develop:

Design learners	Healthcare learners
• Knowledge and skills in communication, service or industrial design to address complex healthcare problems. • Knowledge of theories and methods related to design. • Knowledge of scientific methods in order to gain insight through research done by other professionals in different fields. • Ability to develop research to understand problems, propose solutions, test effectiveness, provide evidence that the solution proposed is appropriate for the healthcare context and group of users, and to monitor implementation. • Ability to listen to different points of view, and work in interdisciplinary teams. • Ability to understand complex healthcare environments and the connections between different areas (home, ward, hospital, organization, Ministry of Health); to be aware that a solution for a group of users might not work for others; to be aware of technical languages, knowledge differences, values and preferences, needs, expectations, and ways of doing research in healthcare.	• Understanding of the knowledge and skills required in communication, service or industrial design to address complex healthcare problems. • Understand that the design process does not start with *how* but with *what needs to be done* to respond to people's needs. • Understand design as an investment and not as an expense, where iteration of prototyping and testing contribute to the quality and effectiveness of products, and reduce cost. • Awareness of the value of evidence from other disciplines and of its application. • Ability to not only listen to the users, but partner with them at all stages of the design process. • Ability to understand design as an evidence-based, outcomes oriented accountable discipline. • Ability to suppress personal likes and assumptions, and pay attention to the needs and preferences of the users.

Figure 2. Some of competences necessary to work in health design.

The development of these skills will result: a) in increased awareness about the value of design sciences, the need for partnership, better understanding of roles, responsibilities and ways of collaborating in health design teams; and b) in the development of the ability to arrive at co-created health innovations that can be implemented.

4. Conclusion

There has been and there is much activity at the intersection between health and design. However, the health and design collaboration suffers from several problems.

Health practitioners could benefit from a better understanding of what design can offer in terms of methods and strategies, based on the profession's long experience in a human-centred design practice. Design is fundamentally planning, programming, conceiving and making things with performance goals in mind. However, to work in a user-centred, evidence-based and outcomes-oriented approach to designing requires professionals to be prepared to work in interdisciplinary teams, and to have a basic knowledge of research, perception, cognition, behaviour, and ergonomics, along with a sensitivity for cultural differences and a capacity for empathy. Design practice, like medical practice, cannot be separated from research. Not only research in general, as basic research, but research as associated with every project, since every case has unique features that require the creation of new and reliable information.

While current design programs produce graduates that can work as junior professionals in traditional areas, most graduates are not normally ready for a rigorous and accountable practice. The demands of health design require an education not usually available. This is where the need arises for the conception and creation of courses and programs aimed at providing graduates the opportunity to acquire: a) the interdisciplinary knowledge and skills that are required; b) to work within an accountable approach where every important decision can be sustained by evidence and explained with clarity; and c) to posses the capacity for empathy and the right disposition required to work in the health sector, understanding the many nuances that this complex environment involves.

As a society we have a responsibility to make sure that we create the necessary learning opportunities to educate professionals that have the knowledge and skills needed to confront current health issues, and that can also adapt to respond to new unforeseeable challenges. I invite my colleagues in the design sciences to reflect about this.

5. References

Accreditation Canada. (2015). *Required Organizational Practices: Handbook 2016.* Retrieved from https://accreditation.ca/sites/default/files/rop-handbook-2016-en. pdf

Agoritsas, T., Heen, A. F., Brandt, L., Alonso-Coello, P., Kristiansen, A., Akl, E. A. Vandvik, P. O. (2015). *Decision aids that really promote shared decision making: The pace quickens*. BMJ, 350, 1-5.

Anonymous. (2016, November 17). *My colleague's suicide showed how vulnerable medical professionals can be.* The Guardian. Retrieved from https://www.theguardian.com/healthcare-network/2016/nov/17/colleagues-suicide-shows-vulnerable-medical-professionals-can-be

Blase, K., Fixsen, D., Sims, B., & Ward, C. (2015). *Implementation science: Changing hearts, minds, behavior, and systems to improve educational outcomes.* Retrieved from http://fpg.unc.edu/resource-list/752

Bodenheimer, T., & Sinsky, C. (2014). *From triple to quadruple aim: Care of the patient requires care of the provider.* Annals of Family Medicine, 12(3), 573–576.

Burke, T. J., & Segrin, C. (2015). *Weight-related social control in couples associations with motives, constraints, and health behaviors.* Communication Research, 0093650215590606.

Breslin, M., Mullam, R. J., & Montori, V. M. (2008). *The design of a decision aid about diabetes medications for use during the consultation with patients with type 2 diabetes.* Patient Education and Counseling, 73, 465–472.

Campbell-Scherer, D., Rogers, J., Manca, D., Lang-Robertson, K., Bell, S., Salvaggio, G., …Grunfeld, E. (2014). *Guideline harmonization and implementation plan for the BETTER trial: Building on existing tools to improve chronic disease prevention and screening in family practice*. Canadian Medical Association Journal, 2(1), E1-E10. Retrieved from http://www.cihr-irsc.gc.ca/e/29418.html#2

Canadian Institute of Health Research. (n.d.). *Knowledge Translation - Definition*. Retrieved from: http://www.cihr-irsc.gc.ca/e/29418.html#2

Coulter, A., Roberts, S., & Dixon, A. (2013). *Delivering better services for people with long-term conditions: Building the house of care.* London: The King's Fund.

Coulter, A., Entwistle, V. A., Eccles, A., Ryan, S., Shepperd, S., & Perera, R. (2015). *Personalised care planning for adults with chronic or long-term health conditions*. The Cochrane Library.

Damschroder, L., Aron, D., Keith, R., Kirsh, S. Alexander, J., & Lowery, J. (2009). *Fostering implementation of health services research findings into practice: A consolidates framework for advancing implementation science*. Implementation Science, 4(50).

Elwyn, G., Lloyd, A., May, C., van der Weijden, T., Stiggelbout, A., Edwards, A., ... & Grande, S. W. (2014). *Collaborative deliberation: a model for patient care.* Patient education and counseling, 97(2), 158-164.

Feeley, D., & Mair, R. (2013). Forward. In E. Loeffler, G. Power, T. Bovaird, F. Hine-Hughes (Eds). *Co-production of Health and Wellbeing in Scotland*. Governance International, Edinburgh. Retrieved from http://www.govint.org/fileadmin/user_upload/publications/Co-Production_of_Health_and_Wellbeing_in_Scotland.pdf

Frascara, J. (2002). *People-centered design: Complexities and uncertainties*. In J. Frascara (Ed.), Design and the social sciences: Making connections (pp. 33–39). London, UK: Taylor & Francis.

Glasziou, P., & Haynes, B. (2005). *The paths from research to improved health outcomes*. Evidence Based Nursing, 8(2), 36–38.

Heifetz, R. A. (1994). *Leadership without easy answers*. Harvard University Press.

Heintze, C., Metz, U., Hahn, D., Niewöhner, J., Schwantes, U., Wiesner, J., & Braun, V. (2010). *Counseling overweight in primary care: an analysis of patient–physician encounters*. Patient education and counseling, 80(1), 71–75.

Hill, C. (2013). *At the turning point: Donald Berwick discusses health care improvement*. Retrieved from https://www.youtube.com/watch?v=cZhad4PxUIE

Institute for health improvement. (2016). *What is shared-decision making?* [Video file]. Retrieved from http://www.ihi.org/education/ihiopenschool/resources/Pages/Activities/VictorMontoriSharedDecisionMaking.aspx

Institute of Medicine. (2001). *Crossing the quality chasm: A new health system for the 21st century.* Retrieved from https://iom.nationalacademies.org/~/media/Files/Report%20Files/2001/Crossing-the-Quality-Chasm/Quality%20Chasm%20 2001%20%20report%20brief.pdf

Lang, E. S., Wyer, P. C., & Haynes, R. B. (2007). *Knowledge translation: closing the evidence-to-practice gap.* Annals of emergency medicine, 49(3), 355–363.

Montori, V. M., Breslin, M., Maleska, M., & Weymiller A. J. (2007). *Creating a con-versation: Insight from the development of a decision aid.* PLOS Medicine, 4(8), 1303–1307.

Norman, D. (2010). *Why design education must change*. Core 77. Retrieved from http://www.core77.com/posts/17993/why-design-education-must-change-17993

Norman, D., & Stappers, P. J. (2016). *DesignX: Design and complex sociotechnical systems*. She Ji: The Journal of Design, Economics, and Innovation, 1(2).

Tan, L., & Szebeko, D. (2009). *Co-designing for dementia: The alzheimer 100 project*. Australian Medical Journal, 1(12), 185–198.

Wagner, E. H., Austin, B. T., Davis, C., Hindmarsh, M., Schaefer, J., & Bonomi, A. (2001). *Improving chronic illness care: translating evidence into action*. Health affairs, 20(6), 64–78.

Witteman, H. O., Dansokho, S. C., Colquhoun, H., Coulter, A., Dugas, M., Fagerlin, A., … Witteman, W. (2015). *User-centered design and the development of patient decision aids: Protocol for a systematic review.* Systematic Review, 4(11), 3–8. Retrieved from http://www.systematicreviewsjournal.com/content/4/1/11

World Health Organization. (2015). *WHO global strategy on people-centred and integrated health services: interim report*. Retrieved from: http://www.who.int/servicedeliverysafety/areas/people-centred-care/en/

Yale School of Management. (2010). *Physicians and designers*. Retrieved from http://nexus.som.yale.edu/design-mayo/?q=node/104

About the Authors:

Guillermina Noël is a designer with a mission, to improve health and healthcare. To achieve her goal she applies a human-centred, evidence-based, outcomes-oriented and interdisciplinary approach. She holds a PhD in Design Sciences from the University IUAV of Venice, Italy, and a Master of Design from the University of Alberta, Canada. Her experience includes reducing antibiotic prescription, improving nutritional habits, improving safety in hospitals, and communicating best practices to healthcare providers.