Emerging Trends and the Way Forward in Design in Healthcare: An Expert’s Perspective

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Abstract: In this paper the authors provide a new perspective on the emerging trends and way forward for design in healthcare. The article is based on an analysis of 20 chapters and 26 case studies contributed by design research experts for an international book in Design for Health (currently in press) edited by the authors. The paper aim is to provide design researchers, with an interested in health, with new insights. Focusing on the five identified emergent trends in design for health the authors discuss how designers can contribute to different dimensions of health (in public, acute, chronic healthcare and in ageing well), as dictated by several of the healthcare challenges and opportunities created by design research and the advent of digital technology. The analysis reveals that design has the capacity to contribute significantly to future healthcare. It has also revealed that the key agenda going forward and requiring immediate attention is that of preventative healthcare.

Keywords: Design in healthcare, challenges, emerging trends, design research

1. Introduction and Background

Ever since the Kings Fund Hospital Bed project began in 1962 (Campbell-Preston, 1967) designers have been undertaking projects for health, architects have of course been designing hospitals ever since these institutions were established. These design projects have, however, remained within the different professional domains in design, for instance in product, communication, architecture. It is only relatively recently we have seen a greater body of work from diverse design work and an increase in design research focusing on health and healthcare issues (Chamberlain et al, 2015).

Traditionally designers have paid particular attention to acute and chronic care, through new medical products, prostheses, hospital, clinic and care home design (Jones, 2013; Tosi et al, 2016); for example they have focussed on restoration of health, through design and technology (Mawson et al., 2017).
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2013; Ludon et al., 2014). More recently the complex picture of maintaining population wellbeing, of health (illbeing) prevention has begun to emerge, and thus the role of designers indirectly in supporting the promotion of healthy lifestyle or in their contribution to illbeing (AUTHORS, 2011). This responsibility means designers perhaps now need to consider morally and ethically how they can ensure that they ‘do no harm’ and that they might deliberately decide to promote healthy lifestyles and therefore prevent illhealth.

Design of course has now broadened its skill base and its application. Service design (Meroni and Sangiorgi, 2011) has introduced a new opportunity to address the improved delivery of products and service both within and outside the healthcare system (Bate and Robert, 2006; Lee, 2011; Hugentobler, 2015). Behaviour design -grounded in psychology and behaviour change theory- has enabled designer to ‘design out’ barriers found across objects, services, spaces, environments (Niedderer et al., 2014) and to influence and/or shape human behaviour (Michie et al, 2011).

The ‘Design in Policy’ field is introducing new approaches to developing policy and aiding innovation in organisational, local, regional and national governance (Bason, 2014). Design interactions is a new way of considering how we can improve the relationship between people, products, places and services and of course technology trends, such as the ‘internet of things’, offer great opportunities in providing new ways to connect people with services and products that can contribute to healthier lifestyles and mechanisms to support people with acute and chronic conditions.

Furthermore the strength in user-centred design has led to participatory design, co-design and co-creation (Sanders, 2002; Sanders and Stappers, 2008; Couvreur and Goossens, 2011), whereby a much closer relationship is developed between the design professional and the individuals and communities who have a stake in the outcome of any design activity.

In light of the above, the contribution and future potential of design for health can be explored through the lens of traditional design disciplines, such as architecture, communication, product, service, policy, interactions and behaviour design whilst spanning key healthcare areas, such as in public, acute, chronic healthcare and ageing well. It is within the aforementioned design and healthcare areas we have explored the challenges, opportunities and emerging trends for design in healthcare.

Having presented the background on design for health, the next section focuses on the methodology employed for the data analysis and a presentation of the key results. This is followed by a discussion section, which presents and explores in more detail the emerging trends in design in healthcare. This discussion in preceded by a small section that provides background on the key healthcare challenges that help understand better the emergence of the identified trends. Lastly we conclude by presenting the ways forward for design in healthcare.

2. Methodology and Results

Thematic analysis was employed for data analysis (Gibbs, 2007), where all data collected are involved in a process of identifying themes throughout coding, indexing, and categorizing towards drawing themes. More precisely, the code generation was done by looking at each paragraph of each chapter of the Design for Health book and coding data, by writing notes through the use of sticky notes and electronic notes within the electronic version of the book. After the data coding and collation, we started to look for overarching themes based on the area of interest and investigation. For inclusion,
a theme should have been discussed in length by at least two or more chapters\(^2\). In our initial theme search, several more sub-themes were identified, which in the review of the main themes were integrated into larger themes to allow for clarity and consistency. This process produced a number of themes, which were reviewed among the team and then consolidated and updated to provide the themes, shown in Figure 1.

Based on of 20 chapters (of approximately 8,000 words each) and 26 case studies a total of 18 themes have appeared across different healthcare settings (public, acute, chronic healthcare and ageing well) and design disciplines (architecture, communication, product, service, behaviour design). Closer analysis and further categorisation of the themes revealed three main categories under which each one of the themes can be grouped. These are challenges, opportunities and emerging trends for design in healthcare (see Figure 1). Although this paper focuses on the emerging trends, we offer a brief overview of the themes that our thematic analysis revealed in relation to the research challenges, opportunities in design in healthcare.

**Figure 1. Main themes and their grouping following thematic analysis of the book chapters.**

More precisely the thematic grouping of ‘challenges’ refers to current and emerging demands and issues that healthcare is facing and design is called upon to respond to. Under this group seven main themes have been identified, namely long-term healthcare, aging, social interaction and support,
environment and lifestyle, non-communicable diseases, wellbeing and mental health, active life/living. These themes have either been highlight
ed explicitly by authors in the Design for Health book as key challenges or have implicitly been discussed across several of the book chapters.

Moving on, under the thematic group of ‘opportunities’ seven themes have emerged, namely health communication, prototyping, co-design, evidence-based design, digital design salutogenic design and holistic design. Within the context of the Design for Health book the thematic group of opportunities refers to methodologies and approaches where design offers value and benefits within healthcare, as identified and discussed by authors across several chapters the aforementioned book. The value and importance of several of these, in terms of their contribution to problem-finding and problem-solving across different sectors of healthcare (public, acute, chronic) can be more explicitly found in the case studies presented in the Design for Health book.

As its name suggests, the third thematic group of ‘emerging trends’ refers to emerging and future directions of healthcare practices, services and provision as dictated by several of the challenges identified and discussed in this book (see Figure 1) as well as opportunities created by digital technology. Under this thematic group five themes have been identified, namely self-care/health management, person-centric healthcare, holistic healthcare, community healthcare and preventative healthcare.

Figure 2 illustrates, how the three thematic groups are interconnected. More precisely, the challenges in healthcare are influencing the emerging trends, whilst the opportunities created by design can contribute in addressing the health challenges and emerging trends. We explore in detail themes revealed under the emerging trends thematic group in the following section.
3. Discussion

3.1 Key Challenges in Design in Healthcare

Prior to discussing in detail the emerging trends in healthcare it is most helpful to present some of the key challenges in health revealed by our thematic analysis and echoed by the literature.

Further analysis of the themes under the thematic group of challenges, indicated a casual (although often not proven) relationship and a sphere of influences between these, as depicted in Figure 3. Starting from the inner circle of the nested circle diagram below, we can see that the environment and lifestyle affect our personal health at a holistic level, influencing our wellbeing and mental health, our opportunities for social interaction and the extent of how active our lives are. These in turn have an impact on our ageing process and the prevalence of non-communicable diseases. The rise of those along with an ageing population pose a massive challenge and strain to long-term healthcare access, provision and management affecting each individual. It is the first three in Figure 3 that we present and discuss below as they relate the most to the emerging trends.

More precisely long-term healthcare emerged in the Design for Health book as one of the main challenges faced in design in healthcare today. The theme was discussed in several chapters across all four healthcare settings presented in the aforementioned book. Long-term conditions fit well to the ‘wicked problem’ definition of Horst and Rittel’s (1973). As the number of people with long-term (or chronic) health conditions increases through living longer and with changing lifestyles a massive challenge in maintaining present levels of high quality patient care at an affordable cost emerges (Daar, 2007). The physical, social and socio-economic environments in which people live shape their behaviour and directly affect population health. In fact the Marmot report drew a link between better health and higher socioeconomic position in society providing six policy recommendations for reducing health inequalities. According to the report there is a social gradient in health – the lower a person’s social position, the worse his or her health (Marmot et al., 2010). This is further exacerbated by the rise of non-communicable diseases and the number of people with two or more long-term...
conditions (comorbidity and multiple morbidity\(^3\)) (Barnett et al., 2012; Uijen et al., 2008). The challenges created by comorbidity and multimorbidity require a personalized approach to the design of interventions and to the service design of patient pathways within the existing chronic healthcare system.

**Non-communicable diseases** (NCDs) refer to non-infectious chronic diseases, lasting for long periods of time and progressing slowly. According to the WHO NCDs kill 38 million people each year, with eight out of ten deaths being preventable (Alwan, 2011). Tobacco use, physical inactivity, excessive alcohol use and unhealthy diets all increase the risk of dying from an NCD. Challenges under this theme include raising awareness and engaging the public in understanding the risk factors of developing NCDs; shaping health-promoting behaviours through design that minimise the risk factors; designing interventions for managing NCDs whilst improving quality of life and reducing death rates.

The theme of an **aging population** is one of the most widely discussed challenge within the Design for Health book. We live in an aging world. The United Nations estimate that 1.4 billion people will be over 60 years old by 2030 (United Nations, 2016). In the UK there are currently 11.4 million people over 65 and by 2040, 24.2% will be aged over 65 (Age UK, 2016). The challenges that an increasingly ageing population brings into healthcare are several and multifaceted. The changing age demographics mean that the likelihood of acquiring a chronic disease is on the increase. On top of that an increased number of older people are suffering from multiple and complex health conditions (Marengoni, 2011; Salive, 2013) placing an additional demand on the existing healthcare and in particular chronic healthcare services. This changing age structure means diminishing workforce to sustain public healthcare raising challenges on the funding and existence of public healthcare provision. Within the context of living longer comes the **challenge of strategically placing research focus on preventative services, interventions and support mechanisms that favour and place emphasis on living healthier into older years** (disease-free life expectancy) rather than solely focusing on life expectancy. Currently though one of key challenges designers and healthcare professionals need to address within this context is the increasing demand for supporting independency and independent living at home and in community settings. The emerging trends presented below shed light on ways design can address some of the challenges discussed above.

### 3.2 Emerging Trends in Design in Healthcare

The thematic analysis revealed a number of emerging trends in the field of design in healthcare, which have been depicted in Figure 4. With a focus on the person (starting from the centre of the diagram), person-centric healthcare appears first, followed by the emerging trend of self-health care management, community and holistic healthcare. Preventative / health promoting care is situated at the outer edge of the circle of healthcare diagram. We examine these in more detail below.

**Person-centric healthcare** forms one of the key emerging themes in the Design for Health book, having been encountered across several chapters. The move from patient-centred to person-centric healthcare is starting to emerge in the literature and relevant reports (Royen et al, 2010; Peek et al., 2007; Price, 2006; Eaton et al., 2015; Raleigh et al., 2015; The Health Foundation, 2014). Within this context the challenge and opportunity for design in healthcare is to place the person as an active agent in all aspects of healthcare, from the promotion to the delivery and treatment. The focus here

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\(^3\) Comorbidity refers to index chronic diseases are coexisting with other diseases, whereas multimorbidity refers to any co-occurrence of medical conditions within a person. Based on definitions by van den Akker, M., Buntinx, F. and Knottnerus, J.A., 1996. Comorbidity or multimorbidity: what’s in a name? A review of literature. *The European Journal of General Practice, 2*(2), pp.65-70.
is designing for a person rather than for a patient aiming at improving a person’s quality of life along with health.

Service design has an essential role to play here by placing the person at the epicentre of the design and development process, leading to a service responsive to the needs of the individual. Co-design will contribute actively in this process by empowering the individual in the process of redesigning healthcare services towards their needs but also recognising the value of healthcare on the person (Robert, 2013). In terms of behaviour design, person-centric healthcare will place focus on a person’s internal and external behaviour, where the interests, needs and motivations will be at the centre of the design process. Instead of explicitly changing a person’s behavior, person-centric healthcare design will seek to minimize or eliminate (design out) the problems and barriers that prevent health-promoting behaviours. For architecture design, person-centric healthcare design will create a more direct link between the place, person and health, placing the person’s health at the forefront of the environment design. Salutogenic design can actively contribute towards this. Salutogenic design refers to the embedding of preventative care strategies in our built environment, by placing focus on factors that support human health and well-being (Rao, 2007; Codinhoto 2009), rather than on factors that cause disease (Dilani and Armstrong, 2007; Golembiewski, 2012). Although predominately architecture-focused salutogenic design has also applications in other design disciplines within public health and ageing well, such as in behaviour and service design.

Within product design the core value of person-centricity in healthcare will be reclaimed and reflected not only on the product outcomes, but also the process. Person-centric healthcare design teams will place empathetic design and deep ethnographic insights at the heart of the process combining their qualitative findings with evidence-based design.

The implications and impact of person-centric healthcare are twofold. On one hand it will provide more person-agnostic services and on the other hand it will partly shift the responsibility of care from the service provider to the service user. This leads into the next emerging theme of self-management healthcare.

Figure 4. Circle of emerging trends in design in healthcare: hierarchical depiction of emerging trends revealed by the thematic analysis with a focus placed on the individual person.
Self-management healthcare programmes are being increasingly introduced across the world (Ouwens et al., 2005; Beaglehole et al., 2008; Brady, 2013) as a response to the high economic burden, placed by an ageing population and the increased prevalence of chronic disease. In light of the increase and penetration of digital technologies across both the home and the healthcare setting, there is the expectation that patients with the support of technology and in particular personal medical devices, may be motivated and empowered to monitor and manage their own health status. There are several examples in the literature of projects that have focused on the design of personal medical devices for the self-management of different healthcare conditions for public as well as chronic health (Bitterman, 2011), such as weight management (Abraham, 2012), diabetes management (Clarke and Foster, 2012) and stroke rehabilitation management (Mawson et al., 2014). Although each project and personal health device presented is different, they all agree in that to enable self-management, the person with the chronic illness and health professional need to work together within a participatory network of relatives, friends, and service organisations. This presents opportunities for the application of co-design in the shaping of self-management products as well as services, since within co-design lie key characteristics, such as empowerment, control and motivation that allow this goal to be realised.

Particularly for service design, self-management of healthcare poses a challenge and opportunity at the same time. As in order to facilitate effective self-management of chronic health conditions at a national healthcare scale, radical rethinking is required about how public health services are organised and delivered, including how technologies can be integrated into healthcare systems to promote and support self-management. On top of and within the redesign of self-management healthcare there are opportunities for design research and practice to create the necessary conditions required to provide people with chronic health conditions not only with personal health products but also the required skills and knowledge to manage their own condition more easily and efficiently in order to maintain or enhance their health, emotional and social well-being.

Embracing and implementing a self-care management model will undoubtedly have implications on service delivery, shifting more services into the community and patients’ homes. Community healthcare is, hence, another of the emerging trends our thematic analysis revealed. Community-based healthcare services are expected to increase on one hand placing personal health within a social context and on the other hand, facilitating healthcare outside the envelope of primary and secondary healthcare provision. Within this context of service migration into the community there are design opportunities in terms of community-located service design, products and behaviour design within community healthcare services, as well as design of built environments that promote a more social and community-based healthcare delivery system.

Within the topic of design in healthcare, the theme of holistic healthcare emerges from the literature (Kolcaba, 2003; Wade, 2009; Royen et al., 2010) and the thematic analysis of the Design for Health book as a key trend. More precisely several chapters in the book highlighted the need for a holistic approach and mindset in the design of products, services, built environments and behaviours with healthcare. In this context holistic refers to every aspect of a person’s life including physical functioning, mental wellbeing, social and professional aspects of their lives. It is within the envelope of holistic healthcare where the challenges of wellbeing and mental should be addressed by design. Independent research reviews, such as the National Prevention Research Initiative (NPRI) report have indicated that there needs to be better understanding of the complex interaction between individual behaviour and risk factors, and social, cultural, health-care and other determinants of health (NPRI Scientific Review Group, 2015). Our current environment and adopted ill-health lifestyles has contributed to an increasingly high negative impact on our mental health and
wellbeing. Wellbeing can be thought of in the context of an individual, community but also national wellbeing. In 2010 a Measuring National Wellbeing Programme was launched in the UK aimed at providing a better understanding of national wellbeing. Amongst other finding the report concluded that the biggest challenge is to turn the evidence on wellbeing into action, so that policies truly reflect our quality of life (Self, 2014).

Salutogenic design (Dilani and Armstrong, 2007) can also play a key role in the emerging trend of preventative and health promoting care. Similarly to the trend of self-management healthcare, this trend is also necessitated by the economic challenges and the prevalence of chronic diseases. The environment and lifestyle are catalyst for the increase of ill-health promoting risk factors, such physical inactivity, unhealthy diet, anxiety and stress. Shifting the focus of healthcare delivery and provision from chronic healthcare into public healthcare will require the redesign of our current services as well as built environment and it will be a long-term strategy. However the benefits from such change will be invaluable for people’s health and wellbeing. Communication and behaviour design can significantly contribute towards the realisation of health promoting and preventative care too.

Preventative and holistic healthcare should be viewed in combination. The importance of this has been highlighted by the national prevention research initiative (NPRI) report. The NPRI report was created based on a scientific group established to review the outputs from 70+ projects (receiving £34 million of funding by 16 research funders in the UK between 2005-2014), aimed at reducing the burden of chronic non-communicable disease by investigating the role of health-related behaviour, particularly alcohol consumption, smoking, diet and physical activity. Based on the report to achieve greater reductions in the population illness or health risk could result from applying these interventions at multiple levels (individual, group, community and/or population-level) (NPRI Scientific Review Group, 2015).

4. Conclusions: the Way Forward for Design in Healthcare

We have presented and discussed, following a thematic analysis of the Design for Health book chapters, five emergent trends designers are called upon to address within the context of healthcare (self-care/health management, person-centric healthcare, holistic healthcare, community healthcare and preventative healthcare).

What the analysis of the Design for Health book chapters has revealed is that the key agenda going forward and requiring immediate attention is that of preventative healthcare. We know that the cost of healthcare delivery is increasing (Appleby, 2013; Thomas and Wise, 2015). We know that we have an increasing and ageing population (Ortiz-Ospina and Roser, 2016; Deloitte, 2016). The issue is how to reduce the cost and burden of disease, particularly of non-communicable disease, by focusing more research work around prevention and looking at how design can work in prevention.

Figure 5 illustrates the contribution of lifestyle to disease and provides examples of design disciplines and the attention they can pay to health prevention and care. There of course many more areas in health prevention and health care that designers can focus their skills and attention on, genetic and childhood health, ageing society and the growth of dementia are just two examples. Indeed designer’s might benefit from assessing their contribution against the life-course from prenatal, childhood, adulthood through to older life and death, looking at the individual and their community
in the context of various environments, such as cities, various geographies and continents, various socio economic situations and various behaviour conditions. In the same way multi/interdisciplinary teams that embrace not only the user but also all the diverse range of skills and expertise related to a specific challenge are a common feature of project teams, the opportunity is for designers to take a lead and facilitate that collaborative approach.

Figure 5. The Relationship Between the Physical Environment and Non-communicable Disease. (Adapted from AUTHORS, 2011).

However, if designers are to play the leading role that we have seen they can do, there are some imperatives to address, first how to we train designers for a future role where they not only apply design for health challenges, but are able to lead multidisciplinary groups and make major decisions that will influence behaviour contributing to long term prevention and better overall population health. This raises a second imperative how do designers work with different sectors, how do they provide the evidence of the impact of design, how do they influence these sectors and indeed who should they be, for instance how can town planners or healthcare professionals or policy makers understand the value of bringing a design perspective in. We need designers trained to understand these diverse perspectives and be able converse in a manner that the specialists in other areas can understand.

Designers will still continue to design products and services for health but if we are to reduce the cost of healthcare and improve the quality of life in and beyond western societies, we need to look at how to ensure that designers are key part of teams identifying the problems and designing the solutions.
Appendix

List of Design for Health book chapters:

1. A brief history of Western medicine and healthcare
2. Challenges and opportunities for design

THEME 1 DESIGN FOR PUBLIC HEALTH

3. Services: soft service design around the envelope of healthcare
4. Behaviours: behaviour-change interventions for public health
5. Architecture: the beneficial health outcomes of salutogenic design
6. Communications: the contribution of typography and information design to health communication

THEME 2 DESIGN IN ACUTE HEALTH

7. Architecture: healing architecture
8. Products: product design in acute health
9. Communications: designing care bundle documentation to support the recognition and treatment of acute kidney injury: a route to quality improvement

THEME 3 DESIGN IN CHRONIC HEALTH

10. Behaviours: design and behaviour change in health
11. Communications: communication design in chronic health
12. Services: service design in chronic health
13. Products: designing products for chronic health
14. Architecture: urban design and wellbeing
15. Design innovation: embedding design process in a charity organisation: evolving the double diamond at Macmillan Cancer Support

THEME 4 DESIGN FOR AGEING WELL

16. Services: exploring how a service design approach can facilitate co-design of supportive communities and service frameworks for older people
17. Products: negotiating design within sceptical territory: lessons from healthcare
18. Communications: visual information about medicines for older patients
19. Architecture: workplace health and wellbeing: can greater design participation provide a cure?
20. Behaviours: behavioural strategies of older adults in the adoption of new technology-based products: the effects of ageing and the promising application of smart materials for the design of future products
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