Chapter 13
The Future of Pharmacy Practice Research

Zaheer-Ud-Din Babar and Anna Birna Almarsdóttir

Abstract The chapter starts by outlining the current and future scenario related to pharmacy practice research. This chapter then sets the scene by discussing issues that are pertinent for practice research. These issues are changes in population demographics, changes in technology, the role of the pharmacy as an institution and consumer behaviour as well as changes in the pharmacy profession. It also outlines the major shifts in pharmacy practice research, which include interprofessional collaboration and teamwork with patients, describing and measuring outcomes of interventions as well as patients' cultural diversity. It concludes by drawing attention to methodologies that would be most commonly used in future pharmacy practice research. Some of the future methodological challenges could be the emergence of big and complex datasets, dealing with electronic health records and pharmacy practice researchers' adoption of a myriad of mixed methodologies. The Chapter also includes a conceptual model at the end.

13.1 Introduction

It is estimated that 81% of American adults take at least one medicine per week and one quarter of them take at least five (Slone Epidemiology Center at Boston University, 2005). Medicines continue to be the most common medical treatment offered to patients, and they contribute significantly to the healthcare budget (Babar and Susan, BMJ Open 4:e004415, 2014).

Around the globe, medicine use is changing with changing disease patterns and advances in technology and science (Kaplan et al., World Health Organization,

Z. Babar (✉)
Department of Pharmacy, School of Applied Sciences, University of Huddersfield, Huddersfield, UK
e-mail: z.babar@hud.ac.uk

A. Birna Almarsdóttir
Department of Pharmacy, Faculty of Health and Medical Sciences, University of Copenhagen, Copenhagen, Denmark

Z. Babar (ed.), *Pharmacy Practice Research Methods*,
https://doi.org/10.1007/978-981-15-2993-1_13

Geneva, 2013). However, the less than optimal use of medicines commonly results in poor health outcomes and unnecessary cost. The traditional roles of dispensing, distribution and administration fall under the umbrella of pharmacy practice, but so too does the optimal use of medicines and the activity associated with this. This chapter discusses the current state of pharmacy practice and the associated research in this field. In addition, there is a focus on the methods being used, the context and likely content of future practice research and the potential policy implications of such research. The key drivers of change that will influence the field of pharmacy practice research include (1) population demographics, (2) technology (informatics and health/pharmaceutical/device technologies), (3) pharmacy as 'institution' and as 'profession', (4) consumers of healthcare services and (5) new research capabilities building on technological changes. These drivers of change for pharmacy practice research are considered here, and four plausible shifts that are likely to emerge in the coming decades are argued.

13.2 Population Demographics

According to official United Nations (UN) population estimates, the world population of 7.7 billion will increase to 8.5 billion in 2030 and will further increase to 9.7 billion in 2050 and 10.9 billion in the year 2100 (United Nations 2019).

The population increase between now and 2050 is expected to come from developing countries. The increase is projected to take place in high-fertility countries, mainly sub-Saharan African countries. By contrast, the population of the more developed regions is expected to change minimally or even shrink between 2019 and 2050 because of sustained low levels of fertility and, in some places, high rates of emigration. In 2018, for the first time in history, persons aged 65 years or over worldwide outnumbered children under age 5. Projections indicate that by 2050 there will be more than twice as many persons above 65 as children under 5. By 2050, the number of persons aged 65 years or over globally will also surpass the number of adolescents and youth aged 15–24 years (United Nations 2019).

Global demographic change encompasses far more than declining fertility and an ageing population. Social and human capital is far more mobile than it once was. Immigration has resulted in multicultural populations in most developed countries (Kymlicka 2010). For example, in the USA, 321 different languages are spoken. By 2050, current racial and ethnic minorities will constitute 50% of the total population of the USA (US Census Bureau 2014).

Health disparities among these populations are of particular concern (Ling et al. 2008), and it will be important to think about how these demographic changes will affect medicine use, health, disease and public policy. This demographic change will be coupled with technological shifts alongside an ageing population living with long-term conditions. Together, these issues will have considerable influence on pharmacy practice activities and the optimal use of medicines (Babar et al. 2014). As such, a proactive research agenda that focuses on these challenges is warranted.

The process of globalisation has led to an increasingly interconnected world, with both benefits and costs to the health sector. The speed and ease of shared information,

advancements to healthcare delivery and health policy and the increased pace of discovery through international research collaborations can all facilitate improvements to population health. At the same time, a significant increase in international travel forges the spread of communicable diseases, for example, the 2003 epidemic of severe acute respiratory syndrome (SARS) and the growth of antibiotic-resistant pneumococcus species. Health priorities, for which the supply and use of medicines is often central, must increasingly be viewed from a global perspective (Murdan et al. 2014).

13.3 Technology

The traditional model of community pharmacy is being challenged, and technology is the largest driver of change in pharmacy practice. The increased use of technology includes automation (robotics), e-prescribing, e-communication, integrated patient records, electronic health monitoring and internet retailing. These technological advances impact on how patients and consumers are accessing and using pharmacy services and medicines (Smith et al. 2013). Robotics and electronic prescribing are reshaping the dispensing of medicines, and this has the potential to release pharmacists to undertake more patient-centred care (Smith et al. 2013). However, the pace of technological development varies among countries. For example, dispensing with robots has become widespread within hospital pharmacy and in community pharmacy in some countries such as the Netherlands when compared with the UK.

There is already increased availability of diagnostics (among these pharmacogenomics tests) and electronic health monitoring devices either as stand-alone or as part of smart phones. This means that consumers are now in a position to be more aware of their health status. Companies like Google and Apple have developed new applications, tools and devices whereby consumers are much more aware of their health status and will be able to store their electronic health record (EHR). This technological development means that consumers are already more aware of disease states and medications, and as a result, pharmacists need to remain current with skill sets and knowledge. This also introduces important data streams that are already tapped into by commercial enterprises, but researchers in pharmacy practice need to be prepared to tap into.

Use of the internet to supply pharmaceuticals is also becoming more common, for example, through established networks such as Amazon. It is even possible that such players may take over the bulk of standardised dosage form medicine distribution. Pharmacogenomic tests are becoming available to patients, which pushes the industry and pharmacists to deliver medicines and services that can take this information into account for each individual patient (The Medical Futurist 2016). There are currently advances being made in printing of medicines (the so-called pharmacoprinting and 3D printing) that tailors specific treatment regimens to each patient's needs and lifestyle (Kaae et al. 2018). It is not certain how this new technology will be handled in the healthcare and community pharmacy sectors, and there are a number of scenarios being proposed; it could be envisioned that pharmacies would receive the 'blueprint' prescription for the personalised medicine for each patient from the doctor and then print the doses for the patient using chemical 'ink' (Kaae et al. 2018; Gayomali 2013). In this manner active components, excipients and dosages can be

tailored to the specific needs of the individual (Gayomali 2013). Artificial intelligence (AI) is making inroads into healthcare, and this impacts pharmacy practice in at least three ways: first, medicines will become more tailored to individual needs as AI is able to work on the data being collected about each individual patient to come up with solutions for their medical needs; second, AI may overtake many of the roles of information provision by humans; last, AI will impact the training and education of health professionals, among these pharmacists and pharmacy technicians.

Developments such as these already are changing and are further expected to revolutionise the face of healthcare and pharmacy practice and the research underpinning it. With this in mind, the future research agenda must align with addressing these influences and challenges.

13.4 Role of Pharmacy as 'Institution' and 'Profession'

13.4.1 Community Pharmacy as 'Institution'

With over 40,000 registered pharmacists in England alone, pharmacy is the third largest health profession after medicine and nursing. Internationally, health systems are increasingly recognising the role of pharmaceutical care and community pharmacy (Scottish Government 2013; Pharmaceutical Care 2012). As many health systems are under pressure due to shortages of funding and manpower, community pharmacy has a window of opportunity in many countries where they are the most accessible type of care.

In England community pharmacy is under pressure, as NHS funding for dispensing and other services is constrained, reimbursement of drug costs is diminishing, non-pharmaceutical sales are falling and the oversupply of pharmacies and pharmacists also contributes to this pressure (Health and Social Care Information Centre 2012). Internationally, this will only be reversed if pharmacies are able to create new extended roles based on patient-centred care and persuade funders to purchase services as part of wider programmes of public health, treatment of common ailments, care for people with long-term conditions and so forth (Smith et al. 2013).

However, much has been written about the role of pharmacy as an institution in society and the state of play—'where it is' and 'where it should be going'—community pharmacy seems to be marginalised in the health and social care system at local and national levels. Pharmacy is seen by others as an insular profession, busy with its own concerns and missing out on debates and decisions that other health and social care organisations are engaging with in the wider world of health policy (Smith et al. 2013; Lewis et al. 2014).

It is not clear to healthcare and social professionals, policymakers, patients and the population at large what is meant by the terms 'pharmaceutical care' and 'medicine optimisation'. Even within pharmacy itself, there is an alarming lack of consensus about these concepts and about which pharmacist services fall under them (Blöndal 2017). Consumers also have misconceptions about the role of pharmacists.

A 2008 consumer survey in the UK found that 43% of people would consider consulting a pharmacist for tests related to their long-term condition but that only 6% had actually done so (Which 2008). This raises very important questions about the actual availability and services that pharmacists can provide for patients, in comparison with the assertions often made about the potential of pharmacy to deliver such care (Smith et al. 2013).

The global picture of the 'place' of community pharmacy as an institution is also rather varied. In some parts of the world, pharmacy has been gaining a foothold, as is seen in the USA (Lewis et al. 2014). Conversely, relatively strong professional systems have been dismantled and restructured where pharmacy has moved to a more commercial identity, such as in some Nordic countries (Almarsdóttir and Traulsen 2009; Wisell et al. 2019). The question could be raised as to whether community pharmacies in their current form may disappear if only seen as commercial sellers of medicines and be replaced by mail order, robot technology and automatic delivery of medications. However, this grim picture of the future of community pharmacy may be offset by the fact that community pharmacists in some countries are increasingly being asked by burdened healthcare systems to take on new more patient care-oriented tasks such as vaccinations, adherence counselling and non-medical prescribing. This makes for new opportunities for research within pharmacy practice utilising the enormous data being generated about patient care both at the pharmacy and in other parts of the systems where patients may be treated.

In the coming decades, community pharmacies (as other healthcare institutions) will use more virtual reality and online consulting than ever before, fuelled by demand from new generations of patients who feel more comfortable with this means of communication. Distribution to the customers may be happening mostly by internet retailing, drones or kiosks (The Medical Futurist 2016). New remuneration and incentive systems will have to be proposed and devised for community pharmacies (Nagaria et al. 2019). This change in communication and remuneration opens up a fruitful avenue of pharmacy practice research.

13.4.2 The Pharmacy Profession

In line with the developments of pharmacy as 'institution', earlier research focused on the dual role of the community pharmacist as a business person, which was juxtaposed to that of a healthcare professional (Kronus 1975; Hindle and Cutting 2002). In this focus, their education, job content and satisfaction have been of interest. Deprofessionalisation and loss of autonomy to business have been important topics within this research. Researchers in Canada and Australia have suggested that despite increased efforts and important policy initiatives (Canadian Pharmacists Association 2008; The Fifth Community Pharmacy Agreement 2010), pharmacists themselves are the ultimate barriers to change (Rosenthal et al. 2010; Mak et al. 2011), whilst others believe that there needs to be a bigger emphasis on professional competency, enhanced leadership skills and a push towards organisational change

(Tsuyuki and Schindel 2008; Scahill et al. 2009). Each year, 84% of adults in England visit a pharmacy at least once, 78% of these attendances being for health-related reasons. Whilst medicine use reviews (MUR) and new medicine services for chronic illnesses are now widely available in pharmacies, some pharmacies are still not taking advantage of the opportunities afforded by these programmes to provide screening, diagnosis, advice, medicine support and public health services. There needs to be a significant change in this area, as the low preparedness of pharmacists indicates that research on pharmacists and how the world views them is not the most promising way forward. Instead, the research focus needs to shift to how patients, other healthcare professionals and pharmacists work together, i.e. to where and how clinical services are carried out, the outcomes of these services and how to best integrate pharmacists into the healthcare team through innovative care models. At the same time, the pharmacy profession has to adjust to new technology, such as robotics, AI and virtual modes of communication, and this brings an extra disruptive scenario that is important to study.

Another important dimension is that access differences between rural (and less privileged) areas and urban (more privileged) areas are increasing, so the pharmacists in order to serve remote areas will have to be a broader healthcare provider. The pharmacist—if placed in a remote area—will have a special place in a given community, know his or her 'patients' histories and provide basic care for their illnesses with appropriate medicines (The Medical Futurist 2016), which will make for important rural pharmacy practice research.

13.5 Role and Expectations of Consumers

The lay public is becoming more literate and better educated with more resources at their disposal than was the case 20–30 years ago. The literature dealing with trends in consumerism of healthcare defines the 'new consumer' as having the following characteristics: being information strong, information seeking, non-authoritarian and increasingly demanding (Winkler 1987; Herzlinger 1997; Traulsen and Noerreslet 2004).

One very important phenomenon is the baby boomers coming into retirement age (Barr 2014). As noted above, this demographic shift will put pressure on healthcare systems and speed up the requirement for development of new models of care which are cost-effective, integrated and team based. The boomers' political prowess and sheer numbers will force pharmacy to adapt to this through monitoring carefully what this group wants from pharmacy and the wider healthcare sector and how the cohort might influence the healthcare agenda. Digital health empowers these citizens and makes for a more equal partnership between patients and providers. Polypharmacy patients are a special group of the older generations and polypharmacy is still on the rise. This trend in healthcare has led to research into deprescribing taking off as field of interest within pharmacy practice. There are many viable research avenues related to this focus, such as how rapid technological and societal

developments (i.e. patient empowerment and pharmacoprinting) will play with respect to deprescribing.

Another important and impactful phenomenon is the 'digital natives', who are the younger generations born after the advent of the internet and cheap computing. These young people (as opposed to older generations) feel comfortable with internet-based communication, use their phones for a wide range of needs and do not find face-to-face interaction to be more natural than electronic as mode of communication. The baby boomers are of course also tech savvy and use IT, but they are also interested in physical consultation.

Social media is used by many (especially chronically ill) patients to garner support and empower them in relations to healthcare (Kingod 2018). One way of increasing empowerment is using augmented reality (AR) which gives more real-life and vivid information in order to learn about the patient's drugs, instead of the patient information leaflet that is very hard to understand by patients. In a broad sense, the asymmetry of information between healthcare professionals and patients is decreasing as a result of both technological advances and because the younger generations will find it more natural to be a partner in healthcare.

Medical normality, what is an illness and what should be treated with medicines and medical devices, is becoming ever more fluid (REF). This phenomenon appears in that lifestyle-related problems are being increasingly being treated with medicines. Conversely, some groups of patients are increasingly being treated by non-pharmaceutical means instead of medicines, i.e. for chronic pain.

13.6 New Horizons for Pharmacy Practice Research

As the institution and profession of pharmacy develops within the realm of rapidly changing healthcare technology, healthcare systems and patient populations, it faces future challenges and has to respond to these. This will mean four types of major shifts for research within pharmacy practice. Some of these shifts are well under way in many countries.

13.6.1 From Uniform Pharmacy Practice/Pharmacist Implemented Interventions to Cross-Disciplinary or Interprofessional Collaboration and Team Work with Patients

The opinion has been voiced that pharmacy practice research all too often has been aimed at evaluating narrowly focused pharmacy services and the world view of these (Almarsdottir et al. 2013). In addition, the challenges faced by healthcare systems are forcing providers and professionals to implement more large-scale

team-based healthcare services. This is an opportunity for pharmacists to get involved and/or build on models of care that have been generated internationally. Smaller projects started by enthusiastic 'trail blazers' within pharmacy have often shown positive results, since these pioneer pharmacists have high motivation and sound connections within the community they work in. Making their models transferrable to a larger scale and different settings is the challenge facing both practitioners and researchers. Pharmacy practice researchers can play an important role, with their knowledge of pharmaceutical policy analysis and implementation research. As a consequence, increased emphasis has to be put on researchers being well versed in implementation science and action research. Action research and related research approaches inherently involve all pertinent stakeholders in projects and in implementing organisational changes to improve medicines use.

In order to get more recognised as important collaborators in interprofessional collaboration, pharmacy practice researchers will have to prepare to ally with researchers from disciplines outside mainstream health services research, such as anthropology, language psychology, innovation science, philosophy, education and rhetorics. These less 'orthodox' disciplines are becoming more recognised by funders as relevant and important research fields that will help understand and change the healthcare system. Pharmacy practice researchers have often worked without using social science theory and models, but it is of great importance when expanding the alliance to new disciplines to emphasise the theoretical underpinnings of the research. As an example, when working with pharmacist-general practitioner collaborative models, one should review already existing models that can explain how collaborations can be built and tested (Bardet et al. 2015).

13.6.2 From Describing and Measuring Outcomes of Interventions Towards Systematising and Understanding Implementation of Large-Scale Initiatives

Policymakers and administrators commission healthcare services and purchase specific clinical interventions. It will not suffice to plan an intervention without being able to demonstrate its value to purchasers, based on theoretical and empirical merits. Questions that need to be answered include:

- What does the intervention entail?
- Why are individual components of the intervention chosen?
- What is the long-term cost for the organisation?
- Is the intervention cost-effective to the organisation, the healthcare system or society?
- And what impact will interventions have on the way the organisation works?

There has been enough research into effects and outcomes carried out (Smith et al. 2013). What is required is a shift to focus on implementation research and how

decision makers can be influenced to incorporate pharmacy in large-scale health services planning. Researchers will also need to follow the trend towards increased team work within healthcare and refrain from studying interventions undertaken by pharmacy in a vacuum.

Placing the patient at the centre of the system has been a weakness of pharmacy practice research which is focused on itself as a subject of study. Future pharmacy practice research will have to shift towards studying collaborative models, identifying problem areas and reaching consensus on systematised approaches. It will be even more important to listen to professions that pharmacists will collaborate with and to social and organisational scientists in order to avoid the programmes' failure due to unobserved negative attitudes. Clinical pharmacology is one of the most important disciplines to ally with in this respect (Burckart 2012). Similarly, healthcare authorities and their administrators may want to impress by implementing new services such as medication reviews but may omit setting up real outcome goals and institute process indicators that will not improve process. For example, an outcome measure of how many interventions the pharmacists suggest to GPs may actually be counterproductive and lead to both lower quality and alienation of doctors from the project. Researching successful collaborative approaches will be one of the most important strands in pharmacy practice in the future (see, for example, Snyder et al. 2010).

13.6.3 Patients Are Increasingly Culturally Diverse and Active Analysers and Decision Makers Who Use IT to Their Advantage

With the baby boomers ageing, there will be a domineering group of people expecting healthy ageing who involve many different approaches to prevention and life enhancement. They are more health literate, critical and information seeking than the generations before them, and they have a stronger voice in healthcare politics (Barr 2014). Younger generations also bring new ways of using healthcare and health information. This will impact all of healthcare research. On the pharmacy practice front, this will go hand in hand with demand for evidence for practising in a certain way. Why pharmacists do as they do will be questioned, just as for other healthcare professionals. This will mean that interventions need to be interpreted and founded not only in professional but in patient rationalities.

The trends reviewed regarding the ageing of the population constituting the baby boomers, coupled with fast-evolving IT decision support systems for patients and healthcare professionals, will mean that they have more (evidence-based) information about health and medicines ready at their fingertips which they are able to use due to their high level of health literacy and will show little or no submissiveness to authority, rather looking at health professionals as partners in their decisions about healthcare and lifestyle. This will make physicians, pharmacists and other healthcare professionals into 'guides/facilitators/advocates' and not all-knowing experts. Another impor-

tant development is that insulated patient communities are emerging due to social media. These communities build on and amplify their own rationalities and are not open to incorporating healthcare information in their decision-making (Kingod 2018).

Practising pharmacists and their pharmacy researcher colleagues will have to adapt to this new reality by studying how they use the informatics available and how this information/informatics influences citizens. It will become even more imperative for pharmacists to maintain patient-centredness, since the patients of all ages who trust healthcare professions will require pharmacists to have a holistic view of them and be guides in their quest for good health.

Cultural differences—especially within countries with significant immigration—make for a burgeoning field of research within the pharmacy practice sector. This trend will be escalated as the empowered citizens are primarily a phenomenon of the inhabitants of industrialised developed countries. There will also be large minority groups within this part of the world who have recently immigrated and will need a totally different healthcare approach, due to less health and IT literacy.

13.6.4 Blurring of Boundaries Between What Has Been Termed Pharmacy Practice Research and Related Fields

Many researchers who classify themselves pharmacy practice researchers also work in departments that define their work as part of drug utilisation research (DUR), clinical pharmacy, pharmaceutical policy, health services research, health economics or social pharmacy. Some pharmacy practice researchers can even relate to having one or more of these as areas of expertise. As pressure increases to participate in large multidisciplinary research consortia, the relationship between those working in the fields of DUR, pharmacoepidemiology, social science theories and clinical pharmacy research will be expected to intensify and develop a common front towards the public. There is increased interest in the capacities for real-world data collection at pharmacies. This can be sold to interested parties, such as the pharmaceutical industry. This in turn will mean that the boundaries between pharmacy practice research and disciplines such as health economics, outcomes research, DUR and pharmacoepidemiology will be blurred. Other research areas such as pharmacogenetics and drug formulation—which have not traditionally been integrally connected with pharmacy practice research—may also increasingly be invited to ‘enter this space’ or may be a competence of many who define themselves as pharmacy practice researchers.

13.7 Future Uses of Methods in Pharmacy Practice Research

As demonstrated within previous chapters of this book, there are a wide variety of methods in use within pharmacy practice research. Historically, the research area has been characterised by being more inclusive of qualitative methods than related

pharmaceutical subjects such as pharmacoepidemiology and drug utilisation research (DUR). One of the reasons for this has been noted as the inclusion of the patient/user perspective in pharmacy practice research. This is currently more fluid and changing, as being outlined in the chapter on pharmacoepidemiological methods in the book. These related fields are moving towards more breadth in methodological and design choices (Wettermark et al. 2016).

Another important development is the increased availability of 'big data' in many countries around the globe. Big data in healthcare refers to electronic health datasets so large and complex that they are difficult (or impossible) to manage with traditional software and/or hardware nor can they be easily managed with traditional or common data management tools and methods (Raghupathi and Raghupathi 2014). This development will increase the pressure on pharmacy practice researchers to be knowledgeable about the use of extensive datasets in understanding the patient/user perspective and in evaluating pharmacy practice-related healthcare initiatives. More breadth will be required of researchers within the field, although those involved in qualitative methodologies may also have to become savvier in using big secondary qualitative data.

Pharmacy practice researchers will increasingly be using new social science methods. Social sciences are increasingly crossing disciplinary boundaries in their use of methods. Examples of this are computer-assisted content analysis, simulating scenarios of how actors may behave, comparative scenario analysis of plausible futures and ever more use of case studies to identify holes in data collection and explaining outlier cases when using larger datasets. Examples of qualitative methods that are not entirely new, but will be used more in the future, are narratives, photovoice, netnography, praxiography, psycholinguistics and rhetorical analysis. Examples of quantitative methods that are not entirely new, but will increasingly be used in the future, are machine learning, data mining and language recognition. Other likely advances in already used methods are using avatars as interviewers and machine learning where there is improved syntax and language processing capabilities for text, audio and visual data. Due to the increased availability of time series and other real-world big datasets, there will be heightened possibilities of using natural experiments (also termed quasi-experiments). Forecasting based on these large datasets will become ever more relevant in order for pharmacy practice to survive in an ever faster changing environment.

Due to the expansion of techniques available and challenges faced, researchers will have to be able to use a larger palette of methods and be ready to use mixed methods. They will have to be even more knowledgeable about various designs and methods when working in teams of researchers who do not have the same educational background. Pharmacy practice researchers need to be clearer about who they are, where they sit on the epistemological spectrum and what special competences they bring to large-scale interdisciplinary projects.

Funders of research have views of what they want to achieve and how this should be evaluated. As key stakeholders, they are likely to require a broad healthcare services focus and be less likely to fund pharmacy-focused research. These projects are then often led and administered by social science-trained persons who make crucial decisions on funding. Therefore, pharmacy practice researchers will have to closely follow developments in methods and theories within the social sciences.

13.8 Futuristic Model of Pharmacy Practice

This model depicts multiple elements, and influencers that are likely to impact on the future of pharmacy practice. As can be seen from Fig. 13.1, there are various layers of this model showing how different factors transcend, interact and the overall impact they have on the future. The central core impacting on future is "medicines", "drugs", and "pharmaceuticals" and it's the core business of pharmacy. But the way medicines are "accessed" and "used" could impact on patient health outcomes. However, the current and future use of medicines largely depend on "workforce", "digital health" and "professional acceptance." These factors are important and they would impact on the future and the way pharmacy is practiced.

The outer layer to this is the "health", to which pharmacy and medicines are a fundamental part of health and a discussion is perhaps difficult about the future without having a broader health context into it. "Public policy", "consumers", "patients" and the "governments" sit on another vital layer outside to it. These are key players which would set the tone for a broader engagement with the future of health and ultimately towards the "future of pharmacy". The last layer outside is the "change". The change is permanent and there could be many external, internal, intrinsic and extrinsic factors continually forcing change.

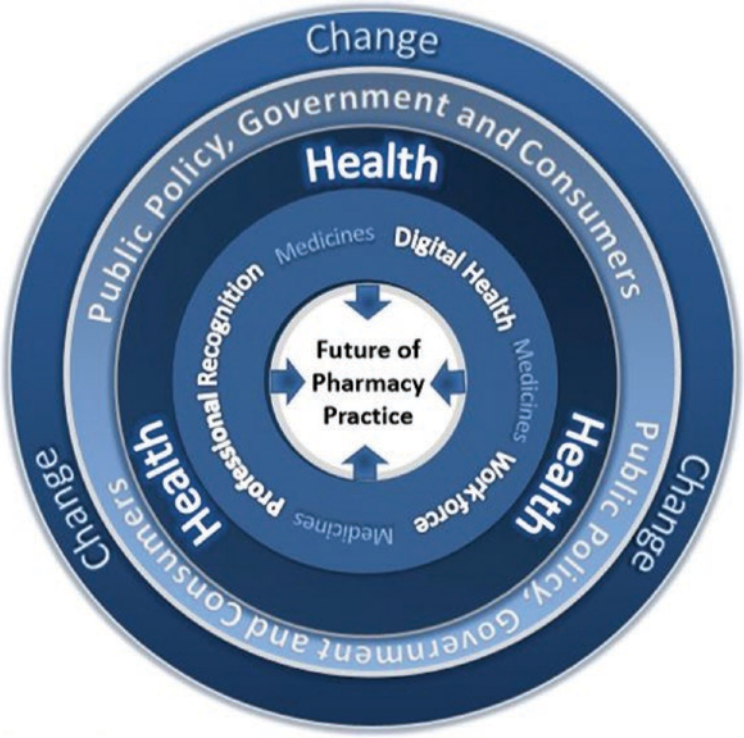

Fig. 13.1 The futuristic model of pharmacy practice

13.9 Summary

The chapter has outlined the changes in pharmacy practice research. The key drivers of change to influence pharmacy practice research are population parameters, changes in technology, consumers of healthcare services and new research capabilities building on technological changes. As the institution and profession of pharmacy develop within the realm of rapidly changing healthcare technology, it faces future challenges and has to respond to these. The growing focus on pharmacy practice research would include interprofessional collaboration and teamwork with patients, describing and measuring the outcomes of interventions as well as cultural diversity of patients. The future methodological development in pharmacy practice research would be the emergence of big data and dealing with large and complex electronic health records. Due to the expansion of techniques available and challenges faced, researchers will have to be able to use a larger palette of methods and be ready to use mixed methods. Also, as most research projects are often led and administered by social science researchers, pharmacy practice researchers will have to closely follow developments in methods and theories within the social sciences.

References

Almarsdottir AB, Kaae S, Traulsen JM. Opportunities and challenges in social pharmacy and pharmacy practice research. Res Social Adm Pharm. 2013;10(1):252–5.

Almarsdóttir AB, Traulsen JM. Multimethod research into policy changes in the pharmacy sector – the Nordic case. Res Social Adm Pharm. 2009;5(1):82–90.

Babar ZU, Gray A, Kiani A, Vogler S, Ballantyne P, Scahill S. The future of medicines use and access research: using the Journal of Pharmaceutical Policy and Practice as a platform for change. J Pharm Policy Pract. 2014;7:8. http://www.joppp.org/content/7/1/8

Babar Z-U-D, Susan F. Identifying priority medicines policy issues for New Zealand. BMJ Open. 2014;4(5):e004415.

Bardet JD, Vo TH, Bedouch P, Allenet B. Physicians and community pharmacists collaboration in primary care: a review of specific models. Res Soc Adm Pharm. 2015;11:602–22.

Barr P. The boomer challenge. Trustee. 2014;67:13–6.

Blöndal AB. Bringing pharmaceutical care to primary care in Iceland. Doctoral dissertation, University of Iceland. 2017.

Burckart GJ. Clinical pharmacology and clinical pharmacy: a marriage of necessity. Eur J Hosp Pharm. 2012;19:19–21.

Canadian Pharmacists Association. Blueprint for pharmacy: designing the future together. Ottawa, ON: Canadian Pharmacists Association; 2008. http://blueprintforpharmacy.ca/docs/pdfs/2011/05/11/BlueprintVision.pdf. Accessed 11 Nov 2014.

Gayomali C. Can you 3D print drugs? The week, 26 June. 2013. http://theweek.com/article/index/246091/can-you-3d-print-drugs.

Health and Social Care Information Centre. General pharmaceutical services in England: 2002–03 to 2011–12. 2012. www.hscic.gov.uk/searchcatalogue?productid¼49731&q¼title%3a%22general+pharmaceutical+services%22&sort¼relevance&size¼10&page¼1#top.

Herzlinger RE. Market-driven health care: who wins, who loses in the transformation of America's largest service industry. New York: Addison–Wesley; 1997.

Hindle K, Cutting N. Can applied entrepreneurial education enhance job satisfaction and financial performance? An empirical investigation in the Australian Pharmacy Profession. J Small Bus Manag. 2002;40:162–7.

Kaae S, Lind JLM, Genina N, Kälvemark Sporrong S. Unintended consequences for patients of future personalized pharmacoprinting. Int J Clin Pharm. 2018;40:321–4.
Kaplan W, Wirtz VJ, Mantel-Teeuwisse A, Stolk P, Duthey B, Laing R. Priority medicines for Europe and the World: 2013 update. Geneva: World Health Organization; 2013.
Kingod N. The tinkering m-patient: co-constructing knowledge on how to live with type 1 diabetes through Facebook searching and sharing and offline tinkering with self-care. Health. 2018:1–17. https://doi.org/10.1177/1363459318800140.
Kronus CL. Occupational values, role orientations and work settings: the case of pharmacy. Socio Q. 1975;16:171–83.
Kymlicka W. The current state of multiculturalism in Canada and research themes on Canadian multiculturalism 2008–2010. 2010. http://www.cic.gc.ca/english/pdf/pub/multi-state.pdf.
Lewis NJW, Shimp LA, Rockafellow S, Tingen JM, Choe HM, Marcelino MA. The role of the pharmacist in patient-centered medical home practices: current perspectives. Integr Pharm Res Pract. 2014;3:29–38.
Ling AM, Panno NJ, Shader ME, Sobinsky RM, Whitehead HN, Hale KM. The evolving scope of pharmacy practice: perspectives from future pharmacists. 2008. http://www.pharmacy.ohiostate.edu/forms/outreach/intro-to-pharmacy/Evolving_Scope_of_Pharmacy_Practice.pdf.
Mak VSL, Clark A, Poulsen JH, et al. Pharmacists' awareness of Australia's health care reforms and their beliefs and attitudes about their current and future roles. Int J Pharm Pract. 2011;20(1):33–40.
Murdan S, Blum N, Francis SA, Slater E, Alem N, Munday M, Taylor J, Smith F. The global pharmacist. UCL School of Pharmacy. 2014. http://www.ioe.ac.uk/Global_Pharmacist_-_FINAL.PDF.
Nagaria RA, Hasan SS, Babar ZUD. Pharmacy, pharmaceuticals and public policy: solving the puzzle. Res Soc Adm Pharm. 2019; https://doi.org/10.1016/j.sapharm.2019.07.010.
Pharmaceutical Care. Policies and practices for a safer, more responsible and cost-effective health system. European Directorate for the Quality of Medicines & HealthCare. 2012. https://doi.org/EDQM.www.edqm.eu/en/pharmaceutical-care-1517.html.
Raghupathi W, Raghupathi V. Big data analytics in healthcare: promise and potential. Health Inform Sci Syst. 2014;2:3.
Rosenthal M, Austin Z, Tsuyuki RT. Are pharmacists the ultimate barrier to pharmacy practice change? CPJ. 2010;143(1):37–42.
Scahill SL, Harrison J, Sheridan J. The ABC of New Zealand's ten year vision for pharmacists: awareness, barriers and consultation. Int J Pharm Pract. 2009;17(3):135–42.
Scottish Government. Prescription for excellence: a vision and action plan for the right pharmaceutical care through integrated partnerships and innovation. Edinburgh: Scottish Government; 2013. www.scotland.gov.uk/publications/2013/09/3025.
Slone Epidemiology Center at Boston University. Patterns of medication use in the United States 2005: a report from the Slone Survey. 2005. http://www.bu.edu/slone/SloneSurvey/AnnualRpt/SloneSurveyWeb.Report2005.pdf. Accessed 23 June 2008.
Smith J, Picton C, Dayan M. Now or never: shaping pharmacy for the future, the report of the Commission on future models of care delivered through pharmacy November 2013. London: Royal Pharmaceutical Society of Great Britain; 2013. http://www.rpharms.com/promoting-pharmacy-pdfs/moc-report-full.pdf.
Snyder ME, Zillich AJ, Primack BA, Rice KR, McGivney MAS, Pringle JL, Smith RB. Exploring successful community pharmacist-physician collaborative working relationships using mixed methods. Res Social Adm Pharm. 2010;6(4):307–23.
The Fifth Community Pharmacy Agreement between the Commonwealth of Australia and the Pharmacy Guild of Australia. 2010. http://www.guild.org.au/docs/default-source/public-documents/tab%2D%2D-the-guild/Community-Pharmacy-Agreements/fifth-community-pharmacy-agreement.pdf. Accessed 11 Nov 2014.

The Medical Futurist. The bright future of pharmacies. Downloaded 29. 2016. July 2019 from: https://medicalfuturist.com/the-bright-future-of-pharmacies/.

Traulsen JM, Noerreslet M. The new consumer of medicine – the pharmacy technicians' perspective. Pharm World Sci. 2004;26:203–7.

Tsuyuki RT, Schindel TJ. Changing Pharmacy Practice: The Leadership Challenge. Canadian Pharmacists Journal / Revue Des Pharmaciens Du Canada, 2008;141(3):174–180. https://doi.org/10.3821/1913701X2008141174CPPTLC20CO2.

U.S. Census Bureau. Population projections, U.S. interim projections by age, sex, race, and Hispanic origin: 2000–2050. 2014. http://www.census.gov/ipc/www/usinterimproj/.

United Nations, Department of Economic and Social Affairs, Population Division. World population prospects 2019: highlights (ST/ESA/SER.A/423). 2019.

Wettermark B, Elseviers M, Almarsdottir AB, Andersen M, Benko R, Bennie M, Eriksson I, Godman B, Krska J, Poluzzi E, Taxis K, Vander Stichele R, Vlahovic-Palcevski V. Introduction to drug utilization research. In: Elseviers M, et al., editors. Drug utilization research: methods and applications. Chichester: Wiley-Blackwell; 2016. p. 3–12. ISBN: 978-1-118-94978-8.

Which. A test of your own medicine. Oct 2008. p. 12–15.

Winkler F. Consumerism in health care: beyond the supermarket model. Policy Polit. 1987;15(1):1–8.

Wisell K, Winblad U, Kälvemark Sporrong S. Diversity as salvation? – a comparison of the diversity rationale in the Swedish pharmacy ownership liberalization reform and the primary care choice reform. Health Policy. 2019;123:457. https://doi.org/10.1016/j.healthpol.2019.03.005.