

# Integrating patient complexity into health policy: a conceptual framework

Peter Maree <sup>1,2,5</sup> BA(Hons.), BSc Hons. Medicine, PhD Candidate, Manager Strategy and Planning

Roger Hughes <sup>1</sup> BSc, Grad Dip Nut Diet, PGrad Dip Hlth Promo, MPH, PhD, Professor of Public Health and Health Services Education

Jan Radford <sup>3</sup> MBBS, FRACGP, Associate Professor of General Practice

Jim Stankovich <sup>1,4</sup> BA, PhD, Adjunct Senior Research Fellow, Senior Research Fellow

Pieter Jan Van Dam <sup>1</sup> BN, GradCert (Clinical Teaching), GradDipN, MCN, PhD, Director Healthcare Redesign

<sup>1</sup>Tasmanian School of Medicine, College of Health and Medicine University of Tasmania, Private Bag 34, Hobart, Tas. 7001, Australia. Email: roger.hughes@utas.edu.au; pieter.vandam@utas.edu.au

<sup>2</sup>Department of Health, 22 Elizabeth Street, Hobart, Tas. 7000, Australia.

<sup>3</sup>General Practice, Tasmanian School of Medicine, College of Health and Medicine University of Tasmania, Private Bag 34, Hobart, Tas. 7001, Australia. Email: j.radford@utas.edu.au

<sup>4</sup>Department of Neuroscience, Central Clinical School, Monash University, Melbourne, Vic. 3004, Australia. Email: jim.stankovich@monash.edu

<sup>5</sup>Corresponding author. Email: peter.maree@health.tas.gov.au

## Abstract.

**Objective.** Clinicians across all health professions increasingly strive to add value to the care they deliver through the application of the central tenets of people-centred care (PCC), namely the ‘right care’, in the ‘right place’, at the ‘right time’ and ‘tailored to the needs of communities’. This ideal is being hampered by a lack of a structured, evidence-based means to formulate policy and value the commissioning of services in an environment of increasing appreciation for the complex health needs of communities. This creates significant challenges for policy makers, commissioners and providers of health services. Communities face a complex intersection of challenges when engaging with healthcare. Increasingly, complexity is gaining prominence as a significant factor in the delivery of PCC. Based on the World Health Organization (WHO) components of health policy, this paper proposes a policy framework that enables policy makers, commissioners and providers of health care to integrate a model of complexity into policy, subsequent service planning and development of models of care.

**Methods.** The WHO components of health policy were used as the basis for the framework. Literature was drawn on to develop a policy framework that integrates complexity into health policy.

**Results.** Within the framework, complexity is juxtaposed between the WHO components of ‘vision’, ‘priorities’ and ‘roles’.

**Conclusion.** This framework, supported by the literature, provides a means for policy makers and health planners to conduct analyses of and for policy. Further work is required to better model complexity in a manner that integrates consumer needs and provider capabilities.

**What is known about the topic?** There is a growing body of evidence regarding patient complexity and its impact on the delivery of health services, but there is little consideration of patient complexity in policy, which is an important consideration for service provision.

**What does this paper add?** This paper presents an argument for the inclusion of patient complexity in health policy and provides a framework for how that might occur.

**What are the implications for practitioners?** The inclusion of patient complexity in policy could provide a means for policy makers to consider the factors that contribute to patient complexity in service provision decisions.

Received 19 December 2019, accepted 19 June 2020, published online 19 November 2020

## Introduction

Health practitioners, across all professions, strive to deliver care according to the principles of people-centred care (PCC).<sup>1–3</sup> Inherent in the definition of PCC is a commitment to customise the delivery of care around the needs of communities.<sup>4</sup> PCC represents attempts by the health system to align itself with the context of the patient. The introduction of PCC initiatives has the unintended consequence of introducing greater complexity into an already complex health system by trying to cater to the contextual complexity of patients.<sup>5,6</sup> Despite the best intentions of individual practitioners and services, current health service design continues to make widespread implementation of PCC difficult.<sup>7</sup> The aims of this study were to start making a case to better understand this complexity, formally acknowledge it via a policy framework and, importantly, not to view system and patient complexity as two mutually exclusive concepts. It could be argued that patient and system complexity are more easily defined by their similarities than their differences. Health systems are non-linear, have relationships between their components, are constantly evolving and are uncertain.<sup>8</sup>

A disconnect exists between policy creation, funding, health system design and practice that hinders efforts to deliver PCC<sup>9</sup> and does not create a policy climate that supports PCC at a health system level.<sup>5,10</sup> We argue that this is due to the complex nature of the health needs of communities<sup>5,11</sup> inherent in the fundamentals underpinning PCC and the lack of active engagement of policy with patient complexity.

Although policy recommendations,<sup>12</sup> models<sup>13–15</sup> and guidelines on complex care do exist,<sup>16–20</sup> healthcare systems continue to struggle to engage with consumers who have increasingly complex needs.<sup>21–23</sup> Calls have been made for a paradigm shift<sup>9,24,25</sup> in the way care is delivered, highlighting the fragmented nature of health care and the continued lack of coordination<sup>26,27</sup> and integration.<sup>28–31</sup> Commissioning for integration and coordination of care requires health planning, funding structures, frameworks and tools to guide, support and evaluate systemic reforms. In order to develop policy, a clear statement and understanding is required of what value should be delivered with implementation and how that relates to PCC.

Using PCC as a starting point, we offer a brief discussion of the complex nature of the health needs of communities, with reference to those factors that make some communities more vulnerable to poor health outcomes, followed by a simple value framework that integrates complexity within a policy structure. The framework was designed to facilitate the insertion of a conceptual model of complexity into the framework with the aim of creating an environment where patient complexity is better understood, acknowledged and integrated into the commissioning cycle to improve how vulnerable communities engage with care.

## Methods

The literature was drawn on to argue for the integration of complexity within a policy framework. To develop the narrative, a literature search was undertaken using PubMed and searching for key themes in the titles of articles (see Box 1).

Where possible, papers referring to specific service provision or clinical conditions were excluded in preference to papers referring to broad system design. The reason for this approach

### Box 1. Summary key search terms for narrative

Note these terms are not exclusive; expanded terms were used in addition to those listed to add richness to the narrative

Complexity
Policy
Multimorbidity
Value-based health care
People-centred care
Guidelines
Recommendations
Framework(s)
Vulnerability
Value framework
Health service utilisation

was to search for agnostic evidence applicable to broader system design to minimise the risk of imposing frameworks, developed for individual services, on the broader system. Published editorials were included because these articles often capture broad sentiment and directions for research. Every effort was made to limit the time period of published articles to the past 10 years; however, from time to time key articles arose that fell outside this time frame.

## Results and Discussion

### *PCC, complexity and health policy*

Enabling the delivery of PCC at a health system level requires health policy and subsequently commissioners of health services to engage with patient complexity. This paper proposes that health policy should recognise and incorporate components of patient complexity in order to deliver PCC. Communities comprise a collection of individuals; thus, the terms ‘complexity’ and ‘patient complexity’ are used interchangeably throughout this paper, with their use depending on the context under discussion.

### *What is PCC?*

PCC is defined by the World Health Organization (WHO) as follows:

*In order to ensure truly people centred services, priority must be given to provide the right services (care type) in the right place (care setting) through strategic processes that allow the complementary and coordinated delivery of services through the lens of a person [community] and their respective needs and preferences.<sup>32</sup>*

The definition of PCC provided above has been altered with permission (J. Tello, pers. comm.), with the word ‘person’ replaced with ‘community’. The reasoning behind this alteration was to broaden the definition of PCC to communities, which is more in line with the focus of health system policy development and design.

By definition (right care, right place, according to a community’s needs), the delivery of PCC requires a high degree of ‘personalisation’ of health service delivery around a community’s needs and preferences.<sup>33</sup> Given the heterogeneity of needs

within communities, aspiring to this ideal creates significant challenges for policy makers, commissioners and providers of services to deliver services,<sup>34,35</sup> leading, arguably, to a wide variety of approaches to policy analysis. Acknowledgement of this heterogeneity and complexity are echoed in ongoing calls for a shift away from fragmented service delivery towards integrated care models that match consumer needs.<sup>11,32,36</sup> In order to match these needs, policy makers and commissioners of health services need to proactively engage with complexity at a policy and health system planning level.<sup>37</sup>

### What is complexity?

Grembowski *et al.* provide the following broad definition, which captures the cumulative<sup>15</sup> and heterogeneous nature of complexity:

*Complexity emerges when the persistence and progression of diseases and courses of treatments, as well as the many contextual factors inherent in both patients' lives and the delivery of effective and efficient healthcare are considered.*<sup>13</sup>

'Complexity' is a term that can have a variety of meanings depending on the context. In a pure clinical context, 'clinical' or 'medical' complexity<sup>38</sup> refers to individual patients where comorbidity is the central feature.<sup>39</sup> Typically, this type of complexity refers to a combination of the severity of an illness, active multimorbidity, diagnostic complexity and the degree of impairment or disability resulting from the medical conditions.<sup>40</sup> It refers to the patient who is challenging from a purely clinical standpoint.

However, the complexity referred to in this paper has a wider scope; although it is inclusive of 'clinical complexity', the discussion refers to the broader socioecological context of the determinants of health of vulnerable communities or populations. Used in this context, complexity results from an interplay of social, behavioural, environmental and medical factors,<sup>41,42</sup> and is used to refer to those populations that are typically more vulnerable to poor health outcomes. Vulnerable communities are described as those whose health outcomes are 'exacerbated by unnecessarily inadequate healthcare'.<sup>43</sup> These communities can be defined in any number of ways: Aboriginal and Torres Straits Islander peoples, members of the lesbian, gay, bisexual, transgender, queer and intersex (LGBTQI) community, rural and regional communities, migrants, people with English as an additional language, trauma-affected families, single parents, people with a low socioeconomic status, people living with complex multimorbidity and people with low health literacy, among others. Some individuals are exposed to multiple vulnerabilities with a cumulative effect on complexity. It is widely recognised that health outcomes for these communities are poorer.<sup>44-46</sup> Members of vulnerable communities experience more rapid accumulation of diseases during their life course, resulting in both a higher prevalence of multimorbidity<sup>47,48</sup> and higher degrees of multimorbidity at earlier ages.<sup>49</sup>

Boehmer *et al.*<sup>50</sup> in their evaluation of the implementation of the chronic care model (CCM) found that most models based on the CCM did not account for the accumulated complexity and burden associated with multimorbidity, such as coordinating care, the demands of living with chronic conditions, the

treatment burden and the accumulated effects of polypharmacy. The CCM, developed partly in response to multimorbidity and the basis upon which many models are developed, is aligned more with health system goals, single conditions and health care utilisation than the therapeutic burden for consumers and their ability to engage with care.<sup>50</sup>

### Communities and complexity

A complex interplay of a multitude of factors contributes to health outcomes.<sup>15,51,52</sup> For multimorbid vulnerable populations, health service utilisation varies between healthcare settings. Often these populations are high users of acute health care.<sup>53-58</sup> High rates of acute care are accessed because this care is perceived by the consumer as more accessible, less costly and of higher quality.<sup>59,60</sup> For many, it could be argued that acute care is not necessarily the right care or the right setting, departing from the ideal of PCC and placing significant burden on the acute care setting. This has resulted in many services implementing strategies such as hospital avoidance and substitution measures<sup>61-63</sup> in an effort to stem the tide into the acute setting. Attempts to address funding structures aside,<sup>29</sup> much can be done at a policy level to help address the complex needs of vulnerable communities. Addressing the health of vulnerable populations requires both a top-down and bottom-approach, not necessarily doing more but doing things differently.<sup>64</sup>

### Health policy

'Health policy' (as opposed to 'public policy') in this paper refers to those 'courses of action (and inaction) that affect the set of institutions, organisations, services, and funding arrangement of the health and healthcare system'.<sup>65</sup>

'The key objective of health policy should be to create the conditions that ensure good health for the entire population'.<sup>66</sup> There is a clear link between the objective of health policy and PCC. Health policy in this context is clearly a complex issue.<sup>67,68</sup> However, health policy is still developed around specific diseases and there are calls for a more holistic approach to policy.<sup>69</sup> Health systems, with multiple triaging, stratification, segmentation, classification, categorisation and prioritisation systems that serve to modulate the delivery of care to achieve a mix of demand management and fiscal control, are traditionally designed around and geared towards managing the acuity of single conditions.<sup>70-72</sup>

However, as populations age and living with multiple chronic conditions increasingly becomes a feature of the healthcare environment,<sup>73</sup> there are growing calls for complexity to be acknowledged as part of the health landscape.<sup>12,27,41,68,74</sup> Grudniewicz *et al.*<sup>75</sup> coined the term 'complexity-compatible' policy, which applies to policy that strikes a balance between consistency and flexibility to allow for the heterogeneity of needs within communities.

Our understanding of this heterogeneity affects decision making within organisations and health systems. With heterogeneity comes the risk of a loss of certainty and agreement around strategic directions and operational decisions. A more sophisticated engagement with complexity will establish an environment in which political judgements around health may be improved. The less certainty and agreement, the less

technically rational and the more political and judgmental the decision making process<sup>76</sup> becomes. Kernick,<sup>77</sup> in his discussion on complexity and health care organisation, relates four models of health care evolution. The models move through a continuum from managerial command to purchaser–provider split, integrating cooperation and finally understanding the system as a complex adaptive system. As systems evolve through these stages, the capability to better understand and elucidate complexity emerges, shifting the organisation closer to agreement and certainty around complexity; in addition, there is a shift towards building relationships and gaining a better understanding of patterns among the system’s components.

Although much has been written on patient complexity and complex systems, the challenge remains for policy makers and commissioners of health services as to how to include, operationalise and evaluate complexity in the health policy and planning context.<sup>68,78–81</sup> This is especially pertinent for communities who struggle, for a wide variety of reasons, to engage with health care and are thus vulnerable to poor outcomes.<sup>48,82</sup> Despite these difficulties, paradoxically, these communities are often high users of health services, especially acute services.<sup>59,83,84</sup> Thus, the question is, how do we include ‘complexity’ in health policy?

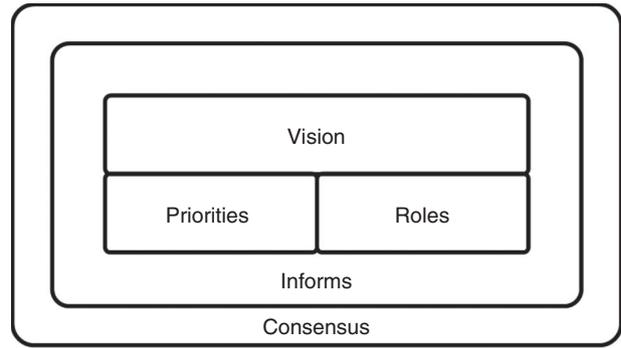
#### Policy framework

The essential elements of health policy as listed by the WHO<sup>85</sup> are: (1) a vision; (2) clarify priorities; (3) define roles; (4) inform people; and (5) create consensus. These components are schematically arranged and presented in Fig. 1.

A policy framework should enable both the analysis of policy and an analysis for policy.<sup>65</sup> Analysis for policy is a prospective exercise in policy development, whereas analysis of policy is a retrospective inquiry of current policy. When undertaking policy analysis (prospective or retrospective), the policy context and process is as important as the policy content, as are the actors in the process.<sup>86</sup> Thus, the juxtapositions and interactions between these components are important when considering policy analysis, hence the schema presented in Fig. 1.

What is not evident from Fig. 1 is the systemic role that context, actors and processes play in introducing complexity into policy. Thus, complexity needs to be acknowledged and potentially leveraged within a policy context. For policy to be people centred, it needs to engage with complexity, which, in turn, needs to be included in any associated policy framework. The degree to which complexity is actively considered in health policy is variable across service providers and jurisdictions.<sup>75,87–89</sup>

Analysis for policy development is an interplay between three components: process, content and context.<sup>65</sup> The authors of this paper contend that complexity plays a significant role in articulating the context within which health policy is implemented, subsequently shaping the process and informing the content. Therefore, complexity should play a key contextual role in health policy, with both consumers and providers as key actors. There is a symbiotic relationship between consumers and providers. Both voices are essential: without the consumer voice advocating for inclusion of context at a system level, PCC will



**Fig. 1.** Conceptual health policy schema, created, with permission, from the World Health Organization expectations of health policy.<sup>86</sup>

simply be a hollow aspiration. The reciprocal relationship is also true, in that any contextual advocacy by consumers without the system’s capability to respond is just as hollow.

#### Where does complexity fit within policy?

Grembowski *et al.*<sup>13</sup> discuss the role of complexity for people with multiple chronic conditions. Their model explains the role of complexity and elucidates the elements that may affect complexity. Furthermore, their model provides us with a clue as to where complexity may fit within a policy framework. Grembowski *et al.*<sup>13</sup> place complexity conceptually between people’s ‘needs’ and ‘service provision’ (Fig. 2), creating a link between providers and consumers of health services.

Applying the definition of PCC, it could be safely argued that, for any health system, a community’s health needs should be prioritised in some form. Furthermore, the roles of services and subsequent service design should be clearly articulated. Thus, it could be reasonably argued that ‘priorities’ and ‘roles’ in the WHO schema (Fig. 1) align with ‘needs’ and ‘services’ respectively from the model of Grembowski *et al.*<sup>13</sup> (Fig. 2).

#### Integrating complexity in policy

Given the above, a definition or model of complexity would be placed beneath an overarching service ‘vision’ and between ‘priorities’ and ‘roles’ (Fig. 3).

This juxtaposition will enable ‘complexity’ to engage with the core components of policy (vision, priorities and roles) while being central to the process of engagement and consensus building. To be compatible, a model of complexity should have a clear link with each the vision, priorities and roles of actors within the policy context. How this may work in practice can be demonstrated using the example of a regional health service. One would expect a clear articulation of a vision, the priorities and the roles of various providers and consumers within the service. Any subsequent model of complexity should at the very least have clearly articulated links between each of these components. By placing complexity notionally at the heart of policy allows it to be fully integrated and considered within policy. Whichever eventual model of complexity is inserted within the framework in Fig. 4, its design, components and functionality should in some way link to the vision, priorities and roles of the health system in question. The fully integrated health policy framework is presented in Fig. 4.

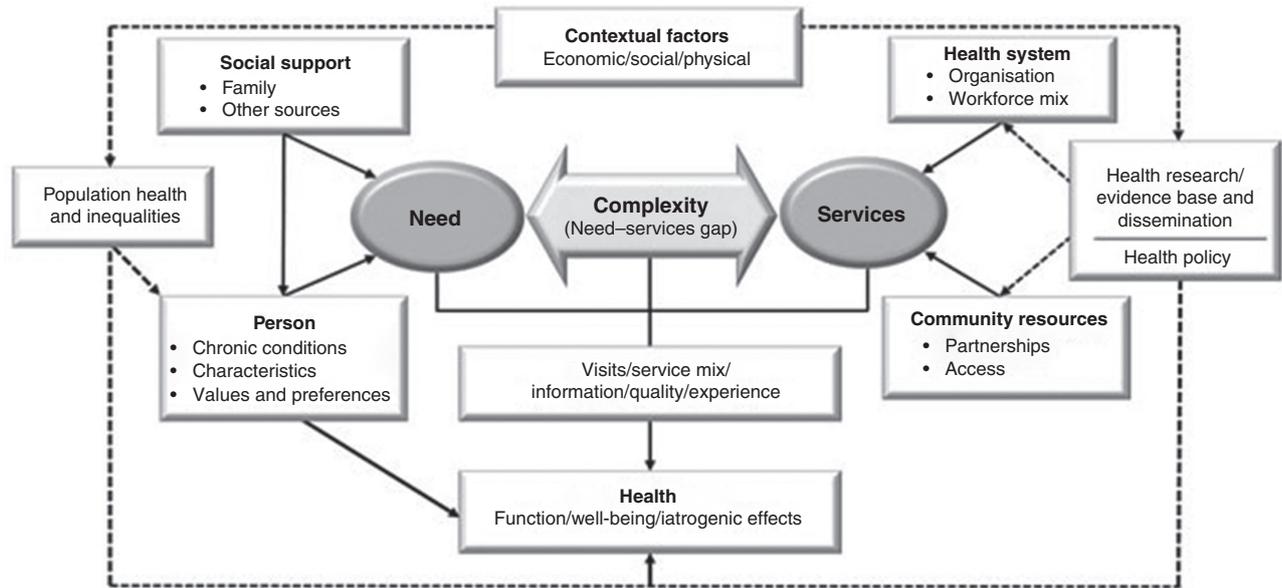


Fig. 2. Conceptual model of the role of complexity in the care of patients with multiple chronic conditions. (Reproduced with permission from Grembowski *et al.*<sup>13</sup>).

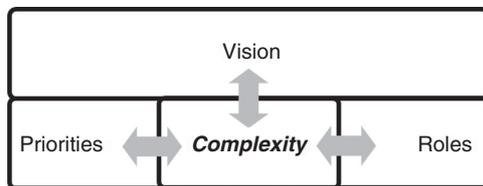


Fig. 3. Health policy schema that includes complexity. (Modified with permission WHO Global Reference 283254).

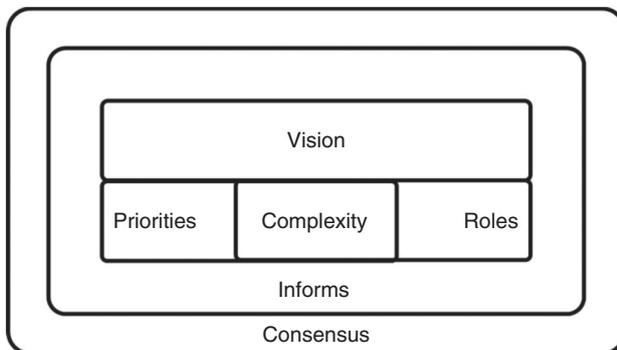


Fig. 4. New health policy framework that integrates complexity.

*Operationalising complexity*

Commissioning consists of three broad phases: the planning, procurement and monitoring of health and care services.<sup>90</sup> Operationalising patient complexity is achieved by using the elements of patient complexity to inform and guide the design, delivery and evaluation of services across both care types and care settings. For example, to plan and deliver which services, where and how to integrate them, through existing or novel

funding, system and governance structures to reduce fragmentation and discontinuity of care are needed. By using the components of patient complexity, we can better understand the barriers vulnerable communities face engaging with care, and thus improve access and equity. Some argue that this already occurs; in theory, yes, but in practice not necessarily in a uniform and consistent manner.<sup>82,89,91,92</sup>

An existing challenge surrounding the commissioning services to support complexity is the dual challenge of patient complexity and system complexity. These are often perceived as antagonistic; we argue that that the paradigm shift is to view these in a synergistic way. The complexity across the health system can be viewed as an asset, to be leveraged, matched to patient complexity as outlined in a model such as that of Grembowski *et al.*<sup>13</sup> (Fig. 2). This creates a policy environment within which PCC can flourish because of the system, not despite it.

It should be noted at this point that many models relating to patient complexity have been developed.<sup>5,15,38,93,94</sup> A detailed discussion is beyond the scope of this paper, but should be the subject of future work and discussion. By integrating patient complexity in a policy framework, we can start investigating mechanisms as to how to create a system environment within which PCC can thrive at scale.

Several questions will require further work: (1) which model of complexity best integrates with an organisation’s vision, priorities and roles; and (2) how is this given effect in practice to inform system and service design? Further conceptual research is required to answer these and other questions.

**Conclusion**

A policy framework is provided that integrates complexity into health policy in a systematic manner. A model of complexity is required that is able interface with the component vision,

priorities and roles of policy while still being central to building consensus and informing key actors in policy. Development of a model of a compatible complexity model is underway as a follow-up paper in the form of a systematic review. This framework creates the basis for further discussion, research and development of complexity-compatible policy<sup>75</sup> and a more systematic inclusion of complexity within broader health policy and subsequent commissioning of health services.

### Competing interests

The authors declare no competing interests.

### Acknowledgements

The authors acknowledge the funding contribution supporting this work made by the Commonwealth of Australia under the National Partnership Agreement 'Improving Health Services in Tasmania'.

### References

- Houben-Wilke S, Augustin IM, Vercoulen JH, Ranst D, Vaate E, Wempe JB, Spruit M, Wouters E, Franssen F. COPD stands for complex obstructive pulmonary disease. *Eur Respir Rev* 2018; 27: 180027. doi:10.1183/16000617.0027-2018
- Adams T, Sarnak D, Lewis J, Convisar J, Young SS. What do clinicians who deliver maternity services think patient-centered care is and how is that different for vulnerable women? A qualitative study. *J Pregnancy* 2018; 2018: 5853235. doi:10.1155/2018/5853235
- Ward L, Powell RE, Scharf ML, Chapman A, Kavuru M. Patient-centered specialty practice: defining the role of specialists in value-based health care. *Chest* 2017; 151: 930–5. doi:10.1016/j.chest.2017.01.006
- Miles A. Tailoring care to individuals and populations within resource-poor settings: a review and commentary on the World Health Organization Report People-Centred Care in Low and Middle Income Countries. *Int J Pers Cent Med* 2011; 1: 113–18. doi:10.5750/ijpcm.v1i1.29
- Hower KI, Vennedey V, Hillen HA, Kuntz L, Stock S, Pfaff H, Ansmann L. Implementation of patient-centred care: which organisational determinants matter from decision maker's perspective? Results from a qualitative interview study across various health and social care organisations. *BMJ Open* 2019; 9: e027591. doi:10.1136/bmjopen-2018-027591
- Nies H. Communities as co-producers in integrated care. *Int J Integr Care* 2014; 14: 1–4. doi:10.5334/ijic.1589
- Sturmberg JP, O'Halloran DM, Martin CM. People at the centre of complex adaptive health systems reform. *Med J Aust* 2010; 193: 474–8. doi:10.5694/j.1326-5377.2010.tb04004.x
- Fajardo-Ortiz G, Fernández-Ortega MÁ, Ortiz-Montalvo A, Olivares-Santos RA. The dimension of the paradigm of complexity in health systems. *Cir Cir* 2015; 83: 81–6. doi:10.1016/j.circen.2014.03.001
- Reeve J. Primary care redesign for person-centred care: delivering an international generalist revolution. *Aust J Prim Health* 2018; 24: 330–6. doi:10.1071/PY18019
- Lindblad S, Ernestam S, Van Citters AD, Lind C, Morgan TS, Nelson EC. Creating a culture of health: evolving healthcare systems and patient engagement. *QJM Int J Med*. 2017; 110: 125–9.
- Chong JL, Matchar DB. Benefits of population segmentation analysis for developing health policy to promote patient-centred care. *Ann Acad Med Singapore* 2017; 46: 287–9.
- Commonwealth Fund. Designing a high-performing health care system for patients with complex needs: ten recommendations for policymakers. 2017. Available at: <https://www.commonwealthfund.org/publications/fund-reports/2017/sep/designing-high-performing-health-care-system-patients-complex> [verified 18 June 2018].
- Grembowski D, Schaefer J, Johnson KE, Fischer H, Moore SL, Tai-Seale M, Ricciardi R, Fraser J, Miller D, LeRoy L. A conceptual model of the role of complexity in the care of patients with multiple chronic conditions. *Med Care* 2014; 52: S7–S14. doi:10.1097/MLR.0000000000000045
- Safford MM, Allison JJ, Kiefe CI. Patient complexity: more than comorbidity. The vector model of complexity. *J Gen Intern Med* 2007; 22: 382–90. doi:10.1007/s11606-007-0307-0
- Shippee ND, Shah ND, May CR, Mair FS, Montori VM. Cumulative complexity: a functional, patient-centered model of patient complexity can improve research and practice. *J Clin Epidemiol* 2012; 65: 1041–51. doi:10.1016/j.jclinepi.2012.05.005
- Giuliana G, Stewart D, Chang K, Eldred J, Chenok K, Kothari P. Complex care management toolkit. San Francisco: California Quality Collaborative; 2012. Available at: [http://www.calquality.org/storage/documents/cqc\\_complexcaremanagement\\_toolkit\\_final.pdf](http://www.calquality.org/storage/documents/cqc_complexcaremanagement_toolkit_final.pdf) [verified 28 August 2018].
- Goodwin N, Sonola L, Thiel V, Kodner DL. Co-ordinated care for people with complex chronic conditions Key lessons and markers for success. London: The Kings Fund; 2013.
- Department of Health, Government of Western Australia. Planning for a complex care needs patient at KEMH. 2009. Available at: <https://www.wnhs.health.wa.gov.au/~media/Files/Hospitals/WNHS/For%20health%20professionals/Clinical%20guidelines/OG/WNHS.OG.Complex-CarePlanningfor.pdf> [verified 15 October 2020].
- Williams S. Complex care management guidelines. Grand Rapids: Michigan Centre for Clinical Systems Improvement; 2015 p. 28.
- Humowiecki M, Kuruna T, Sax R, Hawthorne M, Hamblin A, Turner S, Mate K, Sevin C, Cullen K. Blueprint for complex care: advancing the care for individuals with complex health and social needs. Camden: National Centre for Complex Health and Social Needs; 2018.
- Paddison CAM, Saunders CL, Abel GA, Payne RA, Campbell JL, Roland M. Why do patients with multimorbidity in England report worse experiences in primary care? Evidence from the General Practice Patient Survey. *BMJ Open* 2015; 5: e006172. doi:10.1136/bmjopen-2014-006172
- Zhou C, Tang S, Wang X, Chen Z, Zhang D, Gao J, Ghose B, Feng D, He Z, Yaya S, Feng Z. Satisfaction about patient-centeredness and health-care system among patients with chronic multimorbidity. *Curr Med Sci* 2018; 38: 184–90. doi:10.1007/s11596-018-1863-8
- van der Heide I, Snoeijs S, Quattrini S, Struckmann V, Hujala A, Schellevis F, Rijken M. Patient-centeredness of integrated care programs for people with multimorbidity. Results from the European ICARE4EU project. *Health Policy* 2018; 122: 36–43. doi:10.1016/j.healthpol.2017.10.005
- Greenhalgh T, Papoutsi C. Studying complexity in health services research: desperately seeking an overdue paradigm shift. *BMC Med* 2018; 16: 1–6. doi:10.1186/s12916-018-1089-4
- Dudley N, Lee SJ, Stijacic-Cenzer I, Ritchie CS. Prevalence of multimorbidity among older adults with advanced illness visits to U.S. subspecialty clinics. *J Pain Symptom Manage* 2018; 56: e4–6. doi:10.1016/j.jpainsymman.2018.03.012
- Schoen C, Osborn R, Squires D, Doty M, Pierson R, Applebaum S. New 2011 survey of patients with complex care needs in eleven countries finds that care is often poorly coordinated. *Health Aff* 2011; 30: 2437–48. doi:10.1377/hlthaff.2011.0923
- Rudin RS, Gidengil CA, Predmore Z, Schneider EC, Sorace J, Hornstein R. Identifying and coordinating care for complex patients. *Rand Health Q* 2017; 6: 2.
- Wammes JIG, van der Wees PJ, Tanke MAC, Westert GP, Jeurissen PPT. Systematic review of high-cost patients' characteristics and healthcare utilisation. *BMJ Open* 2018; 8: e023113. doi:10.1136/bmjopen-2018-023113
- Stokes J, Struckmann V, Kristensen SR, Fuchs S, van Ginneken E, Tsiachristas A, Mölken M, Sutton M. Towards incentivising integration:

- a typology of payments for integrated care. *Health Policy* 2018; 122: 963–9. doi:10.1016/j.healthpol.2018.07.003
- 30 Donner CF, Carrozzi L, Maio S, Baldacci S, Pistelli F, Viegi G, Purro A, Torchio R, Clini E, Amaducci S, ZuWallack R, Goldstein R, Morgan M, Bourbeau J, Vagheggini G, Wouters E. Integrating the care of the complex COPD patient. *Monaldi Arch Chest Dis* 2017; 87: 1. doi:10.4081/monaldi.2017.786
  - 31 Goodwin N. Thinking differently about integration: people-centred care and the role of local communities. *Int J Integr Care* 2014; 14: 1. doi:10.5334/ijic.1736
  - 32 World Health Organization (WHO). Roadmap: strengthening people centred health systems in the WHO European Region. Copenhagen: WHO; 2013.
  - 33 Greene SM, Tuzzio L, Cherkin D. A framework for making patient-centered care front and center. *Perm J* 2012; 16: 49–53. doi:10.7812/TPP/12-025
  - 34 Porter M. Value-based health care delivery. *Ann Surg* 2008; 248: 144–50.
  - 35 Kane PM, Murtagh FEM, Ryan K, Mahon NG, McAdam B, McQuillan R, Ellis-Smith C, Tracey C, Howley C, Raleigh C, O’Gara G, Higginson I, Daveson B. The gap between policy and practice: a systematic review of patient-centred care interventions in chronic heart failure. *Heart Fail Rev* 2015; 20: 673–87. doi:10.1007/s10741-015-9508-5
  - 36 Nicholson K, Makovski TT, Stranges S. The integration of primary care and public health to improve population health: tackling the complex issue of multimorbidity. *Int J Public Health* 2019; 64: 983–4. doi:10.1007/s00038-019-01278-1
  - 37 Leykum LK, Pugh J, Lawrence V, Parchman M, Noël PH, Cornell J, McDaniel R. Organizational interventions employing principles of complexity science have improved outcomes for patients with Type II diabetes. *Implement Sci* 2007; 2: 28–36. doi:10.1186/1748-5908-2-28
  - 38 Islam R, Weir C, Fiol GD. Clinical complexity in medicine: a measurement model of task and patient complexity. *Methods Inf Med* 2016; 55: 14–22. doi:10.3414/ME15-01-0031
  - 39 Bonavita V, De Simone R. Towards a definition of comorbidity in the light of clinical complexity. *Neurol Sci* 2008; 29: 99–102. doi:10.1007/s10072-008-0898-1
  - 40 Kuipers P, Kendall E, Ehrlich C, McIntyre M, Barber L, Amsters D, Kendall M, Kuipers K, Muenchberger H, Brownie S. Complexity and health care: health practitioner workforce services, roles, skills and training, to respond to patients with complex needs. Brisbane: Queensland Health; 2011. Available at: [https://www.health.qld.gov.au/\\_\\_data/assets/pdf\\_file/0027/150768/complexcarefull1.pdf](https://www.health.qld.gov.au/__data/assets/pdf_file/0027/150768/complexcarefull1.pdf) [verified 15 October 2020].
  - 41 Grant RW, Ashburner J, Hong C, Chang Y, Barry M, Atlas S. Defining patient complexity from the primary care physician’s perspective a cohort study. *Ann Intern Med* 2011; 155: 797–804. doi:10.7326/0003-4819-155-12-201112200-00001
  - 42 Loeb DF, Binswanger IA, Candrian C, Bayliss EA. Primary care physician insights into a typology of the complex patient in primary care. *Ann Fam Med* 2015; 13: 451–5. doi:10.1370/afm.1840
  - 43 Waisel D. Vulnerable populations in healthcare. *Curr Opin Anaesthesiol* 2013; 26: 186–92. doi:10.1097/ACO.0b013e32835e8c17
  - 44 Aday LA. Health status of vulnerable populations. *Annu Rev Public Health* 1994; 15: 487–509. doi:10.1146/annurev.pu.15.050194.002415
  - 45 George S, Daniels K, Fioratou E. A qualitative study into the perceived barriers of accessing healthcare among a vulnerable population involved with a community centre in Romania. *Int J Equity Health* 2018; 17: 41. doi:10.1186/s12939-018-0753-9
  - 46 Hahn EA, Cella D. Health outcomes assessment in vulnerable populations: measurement challenges and recommendations. *Arch Phys Med Rehabil* 2003; 84: S35–42. doi:10.1053/apmr.2003.50245
  - 47 Moin JS, Moineddin R, Upshur REG. Measuring the association between marginalization and multimorbidity in Ontario, Canada: a cross-sectional study. *J Comorb* 2018; 8: 1–9. doi:10.1177/2235042X18814939
  - 48 Mondor L, Cohen D, Khan AI, Wodchis WP. Income inequalities in multimorbidity prevalence in Ontario, Canada: a decomposition analysis of linked survey and health administrative data. *Int J Equity Health* 2018; 17: 90. doi:10.1186/s12939-018-0800-6
  - 49 Dekhtyar S, Vetrano DL, Marengoni A, Wang H-X, Pan K-Y, Fratiglioni L, Calderón-Larrañaga A. Association between speed of multimorbidity accumulation in old age and life experiences: a cohort study. *Am J Epidemiol* 2019; 188: 1627–36.
  - 50 Boehmer KR, Dabrh AMA, Gionfriddo MR, Erwin P, Montori VM. Does the chronic care model meet the emerging needs of people living with multimorbidity? A systematic review and thematic synthesis. *PLoS One* 2018; 13: e0190852. doi:10.1371/journal.pone.0190852
  - 51 Manning E, Gagnon M. The complex patient: a concept clarification. *Nurs Health Sci* 2017; 19: 13–21. doi:10.1111/nhs.12320
  - 52 Nelson MLA, Hanna E, Hall S, Calvert M. What makes stroke rehabilitation patients complex? Clinician perspectives and the role of discharge pressure. *J Comorb* 2016; 6: 35–41. doi:10.15256/joc.2016.6.63
  - 53 Antonelli-Incalzi R, Ancona C, Forastiere F, Belleudi V, Corsonello A, Perucci CA. Socioeconomic status and hospitalization in the very old: a retrospective study. *BMC Public Health* 2007; 7: 227. doi:10.1186/1471-2458-7-227
  - 54 Edmiston N, Petoumenos K, Smith DJ. Multimorbidity, not HIV markers predicts unplanned admission among people with HIV in regional NSW. *Intern Med J* 2018; 8: 706–713.
  - 55 McGrath RJ, Stransky ML, Seavey JW. The impact of socioeconomic factors on asthma hospitalization rates by rural classification. *J Community Health* 2011; 36: 495–503. doi:10.1007/s10900-010-9333-7
  - 56 Schifano P, Marinacci C, Cesaroni G, Belleudi V, Caranci N, Russo A, Perucci C. Temporal and geographic heterogeneity of the association between socioeconomic position and hospitalisation in Italy: an income based indicator. *Int J Equity Health* 2009; 8: 33. doi:10.1186/1475-9276-8-33
  - 57 Takahashi PY, Ryu E, Hathcock MA, Olson JE, Bielinski SJ, Cerhan JR, Rand-Weaver J, Juhn J. A novel housing-based socioeconomic measure predicts hospitalisation and multiple chronic conditions in a community population. *J Epidemiol Community Health* 2016; 70: 286–91. doi:10.1136/jech-2015-205925
  - 58 Thompson AJ, Saran S. Multi-morbidity as a driver of high cost, high resource utilisation and future risk. *Int J Integr Care* 2016; 16: A243. doi:10.5334/ijic.2791
  - 59 Chan CQH, Lee KH, Low LL. A systematic review of health status, health seeking behaviour and healthcare utilisation of low socioeconomic status populations in urban Singapore. *Int J Equity Health* 2018; 17: 39. doi:10.1186/s12939-018-0751-y
  - 60 Kangovi S, Barg FK, Carter T, Long JA, Shannon R, Grande D. Understanding why patients of low socioeconomic status prefer hospitals over ambulatory care. *Health Aff (Millwood)* 2013; 32: 1196–203. doi:10.1377/hlthaff.2012.0825
  - 61 Ham C, Imison C, Jennings M. Avoiding hospital admissions: lessons from evidence and experience [Seminar highlights]. London. The Kings Fund; 2010. Available from: <https://www.kingsfund.org.uk> [verified October 2020].
  - 62 Lawn S, Zabeen S, Smith D, Wilson E, Miller C, Battersby M, Masman K. Managing chronic conditions care across primary care and hospital systems: lessons from an Australian hospital avoidance risk program using the Flinders chronic condition management program. *Aust Health Rev* 2018; 42: 542–9. doi:10.1071/AHI7099
  - 63 Voss S, Black S, Brandling J, Buswell M, Cheston R, Cullum S, Kirby K, Purdy S, Solway C, Taylor H, Bengier J. Home or hospital for people with dementia and one or more other multimorbidities: what is the potential to reduce avoidable emergency admissions? The HOMEWARD Project Protocol. *BMJ Open* 2017; 7: e016651. doi:10.1136/bmjopen-2017-016651
  - 64 Tangcharoensathien V, Mills A, Das MB, Patcharanarumol W, Buntan M, Johns J. Addressing the health of vulnerable populations: social

- inclusion and universal health coverage. *J Glob Health* 2016; 8: 020304. doi:10.7189/jogh.08.020304
- 65 Buse K, Mays N, Walt G. Making health policy. 2nd edn. Maidenhead: Open University Press; 2012.
- 66 Navarro V. What is a national health policy? *Int J Health Serv* 2007; 37: 1–14. doi:10.2190/H454-7326-6034-1T25
- 67 Hamilton AB, Wiltsey-Stirman S, Finley EP, Klap R, Mittman BS, Yano EM, Oishi S. Usual care among providers treating women veterans: managing complexity and multimorbidity in the era of evidence-based practice. *Adm Policy Ment Health* 2020; 47: 244–53. doi:10.1007/s10488-019-00961-y
- 68 Plsek PE, Greenhalgh T. The challenge of complexity in health care. *BMJ* 2001; 323: 625–8. doi:10.1136/bmj.323.7313.625
- 69 Pourbohloul B, Kieny M-P. Complex systems analysis: towards holistic approaches to health systems planning and policy. *Bull World Health Organ* 2011; 89: 242. doi:10.2471/BLT.11.087544
- 70 Durso SC. Using clinical guidelines designed for older adults with diabetes mellitus and complex health status. *JAMA* 2006; 295: 1935–40. doi:10.1001/jama.295.16.1935
- 71 Millar E, Dowell A, Lawrenson R, Mangin D, Sarfati D. Clinical guidelines: what happens when people have multiple conditions? *N Z Med J* 2018; 131: 73–81.
- 72 Tinetti ME, Naik AD, Dodson JA. Moving from disease-centered to patient goals-directed care for patients with multiple chronic conditions: patient value-based care. *JAMA Cardiol.* 2016; 1: 9–10. doi:10.1001/jamacardio.2015.0248
- 73 Porter T, Ong BN, Sanders T. Living with multimorbidity? The lived experience of multiple chronic conditions in later life. *Health (N Y)* 2020; 24: 701–18. doi:10.1177/1363459319834997
- 74 Mount JK, Massanari RM, Teachman J. Patient care complexity as perceived by primary care physicians. *Fam Syst Health* 2015; 33: 137–45. doi:10.1037/fsh0000122
- 75 Grudniewicz A, Tenbansel T, Evans JM, Steele Gray C, Baker GR, Wodchis WP. ‘Complexity-compatible’ policy for integrated care? Lessons from the implementation of Ontario’s Health Links. *Soc Sci Med* 2018; 198: 95–102. doi:10.1016/j.socscimed.2017.12.029
- 76 Stacey RD. Strategic management & organisational dynamics. 2nd edn. London: Pitman; 1996.
- 77 Kernick D. Complexity and healthcare organisation. In: Sweeney K, Griffiths F, eds. Complexity and healthcare: an introduction. Abingdon: Radcliffe Medical Press; 2002.
- 78 Allshouse C, Comeau M, Rodgers R, Wells N. Families of children with medical complexity: a view from the front lines. *Pediatrics* 2018; 141: S195–201. doi:10.1542/peds.2017-1284D
- 79 Chandraratne N, Harrison C, Siriwardena A, Pathirathna K. A comparison of policies and guidelines related to multimorbidity in the UK, Australia and Sri Lanka. *Aust J Gen Pract* 2018; 47: 15–19. doi:10.31128/AFP-09-17-4346
- 80 Kitson A, Marshall A, Bassett K, Zeitz K. What are the core elements of patient-centred care? A narrative review and synthesis of the literature from health policy, medicine and nursing. *J Adv Nurs* 2013; 69: 4–15. doi:10.1111/j.1365-2648.2012.06064.x
- 81 Mondor L, Maxwell CJ, Hogan DB, Bronskill SE, Gruneir A, Lane NE, Wodchis W. Multimorbidity and healthcare utilization among home care clients with dementia in Ontario, Canada: a retrospective analysis of a population-based cohort. *PLoS Med* 2017; 14: e1002249. doi:10.1371/journal.pmed.1002249
- 82 Stajduhar KI, Mollison A, Giesbrecht M, McNeil R, Pauly B, Reimer-Kirkham S, Dosani N, Wallace B, Showler G, Meagher C, Kvakic K, Gleave D, Teal T, Rose C, Showler C, Rounds K. ‘Just too busy living in the moment and surviving’: barriers to accessing health care for structurally vulnerable populations at end-of-life. *BMC Palliat Care* 2019; 18: 11. doi:10.1186/s12904-019-0396-7
- 83 Bowen M, Marwick S, Marshall T, Saunders K, Burwood S, Yahyouche A, Stewart D, Paudyal V. Multimorbidity and emergency department visits by a homeless population: a database study in specialist general practice. *Br J Gen Pract* 2019; 69: e515–e525. doi:10.3399/bjgp19X704609
- 84 Frölich A, Ghith N, Schiøtz M, Jacobsen R, Stockmarr A. Multimorbidity, healthcare utilization and socioeconomic status: a register-based study in Denmark. *PLoS One* 2019; 14: e0214183. doi:10.1371/journal.pone.0214183
- 85 World Health Organization (WHO). Health policy. 2018. Available at: [http://www.who.int/topics/health\\_policy/en/](http://www.who.int/topics/health_policy/en/) [verified 20 November 2018].
- 86 Walt G, Gilson L. Reforming the health sector in developing countries: the central role of policy analysis. *Health Policy Plan* 1994; 9: 353–70. doi:10.1093/heapol/9.4.353
- 87 Ogbuabor D, Onwujekwe O, Ezumah N. Muddling through policy-making: a complex adaptive systems perspective on policy changes in a free maternal and child healthcare program in Enugu State, Nigeria. *Niger J Clin Pract* 2019; 22: 682–9.
- 88 Clifford B, Wilson A, Harris P. Homelessness, health and the policy process: a literature review. *Health Policy* 2019; 123: 1125–32. doi:10.1016/j.healthpol.2019.08.011
- 89 Calderón-Larrañaga A, Fratiglioni L. Multimorbidity research at the crossroads: developing the scientific evidence for clinical practice and health policy. *J Intern Med* 2019; 285: 251–4. doi:10.1111/joim.12872
- 90 Wenzel L. What is commissioning and how is it changing? London: The King’s Fund. 2017. Available at: <https://www.kingsfund.org.uk/publications/what-commissioning-and-how-it-changing> [verified 20 November 2018].
- 91 Salanitro AH, Safford MM, Houston TK, Williams JH, Ovalle F, Payne-Foster P, Allison J, Estrada C. Patient complexity and diabetes quality of care in rural settings. *J Natl Med Assoc* 2011; 103: 234–40. doi:10.1016/S0027-9684(15)30297-2
- 92 Ricci-Cabello I, Violan C, Foguet-Boreu Q, Mounce L, Valderas J. Impact of multi-morbidity on quality of healthcare and its implications for health policy, research and clinical practice. A scoping review. *Eur J Gen Pract* 2015; 21: 192–202. doi:10.3109/13814788.2015.1046046
- 93 Bircher J, Hahn EG. Understanding the nature of health: new perspectives for medicine and public health. Improved wellbeing at lower costs. *F1000Res* 2016; 5: 167. doi:10.12688/f1000research.7849.1
- 94 Zullig LL, Whitson HE, Hastings SN, Beadles C, Kravchenko J, Akushevich I, Maciejewski M. A systematic review of conceptual frameworks of medical complexity and new model development. *J Gen Intern Med* 2016; 31: 329–37. doi:10.1007/s11606-015-3512-2