Supplementary File 1

Review of published frameworks and theories for conceptualising services for people with multiple long-term conditions

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In this supplementary file, we present the methods and results of a literature review looking at frameworks and theories for conceptualising services for people with multiple long-term conditions. We do not restrict the patient age range but consider the issues related to living with multiple-long term conditions for children and young people and adults of all ages.

Throughout the review of literature, we consider:

- Does the framework/theory help shape how we approach our research questions?
- What are the common features in the frameworks/theories, if any?
- In what way is providing effective and efficient health and social care services for a person with multiple conditions X, Y, Z, different from providing effective and efficient services for a series of individuals one of whom has condition X alone, another who has condition Y alone and another who has condition Z alone?
- How does integrated care look different from 'non-integrated' or fragmented care in practice?
- Is attention paid to improved patient care or reduced costs?
- What is the role of the patient as compared to the role of health care professionals (i.e. what is the balance between patient self-management and professional care)?

Methods

We conducted a literature review of frameworks and theories for conceptualising services for people with multiple long-term conditions. The aim of the review was to help identify potential frameworks that would be most appropriate to inform the overarching analysis across the BRACE portfolio of evaluations.

We recognise there is no single agreed definition and classification of 'multiple long-term conditions' or 'multimorbidity'[1]. As a working definition of multiple long-term conditions, we refer to the World Health Organisation definition: "the coexistence of two or more chronic conditions in the same individual"[2], which is also reflected and elaborated by the National Institute for Health and Care

Excellence in their guideline NG56 'Multimorbidity: clinical assessment and management' as 'the presence of two or more long-term health conditions, which can include:

- defined physical and mental health conditions such as diabetes or schizophrenia
- ongoing conditions such as learning disability
- symptom complexes such as frailty or chronic pain
- sensory impairment such as sight or hearing loss
- alcohol and substance misuse.'[3]

Search strategy

A search strategy was developed to build a literature base of frameworks and theories that help to conceptualise or evaluate services for people with multiple long-term conditions. The Health Management Information Consortium (HMIC) via Ovid was used to perform the searches with no time limit (1979 to July 2019). The search included terms related to 'frameworks', 'models' and 'theories' (and their derivatives); 'service delivery', 'needs' and 'demands'; and 'multiple long-term conditions' and associated terms. The search was initially focused on the out-of-hospital setting, including terms related to the community setting and out-of-hospital settings; but this was found to overly restrict the results in the original scoping search (n=4) and therefore was not included in the final search strategy. See Table S1.1.

The grey literature was searched using Google Scholar and similar terms as described above. Sources specifically sought out included: The Health Foundation, The King's Fund, Nuffield Trust, and the National Institute for Health and Care Research (NIHR).

Snowball searching was conducted from the above sources to find additional relevant resources.

Category	Terms
Frameworks and theories	1) exp models/ 2) exp frameworks/ 3) model$.ti. 4) framework$.ti. 5) theor$.ti. 6) concept$.ti. 7) 1 or 2 or 3 or 4 or 5 or 6
Service delivery	8) exp service delivery/ 9) exp service demand/ 10) exp service needs/ 11) 8 or 9 or 10
Long-term conditions	12) exp integrated care/ 13) exp self-care/ 14) exp chronic disease/ 15) exp chronic illness/ 16) exp long term care/ 17) exp complex needs/ 18) complex need$.ti. 19) long-term condition$.ti. 20) long term condition$.ti. 21) LTC.ti. 22) chronic care$.ti. 23) continuity of care$.ti. 24) (multimorbid$ or multi-morbid$).ti. 25) Morbid$.ti. 26) (Multiple adj2 (diseas$ or diagnosis or illness$ or condition$ or morbid$)).ti. 27) (Coexisting adj2 (diseas$ or diagnosis or illness$ or condition$ or morbid$)).ti. 28) (Co-existing adj2 (diseas$ or diagnosis or illness$ or condition$ or morbid$)).ti. 29) (Concurrent adj2 (diseas$ or diagnosis or illness$ or condition$ or morbid$)).ti. 30) (Comorbid$ adj2 (diseas$ or diagnosis or illness$ or condition$ or morbid$)).ti. 31) (Co-morbid$ adj2 (diseas$ or diagnosis or illness$ or condition$ or morbid$)).ti. 32) Multiple co-morbid$.ti. 33) Multiple comorbid$.ti. 34) 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 or 29 or 30 or 31 or 32 or 33
Community services	35) exp community health services/ 36) exp community services/ 37) exp community health care/ 38) community service$.ti. 39) community health service$.ti. 40) out of hospital$.ti. 41) out-of-hospital$.ti. 42) 35 or 36 or 37 or 38 or 39 or 40 or 41
Final Search	43) 7 and 11 and 34

Table S1.1. Ovid search string (run on 7 October 2019, no time restriction)

Results

The search resulted in 78 papers on frameworks and theories. Below we highlight seven frameworks or theoretical models that appeared to be the most relevant and appropriate for our work to understand and conceptualise services for people with multiple long-term conditions.

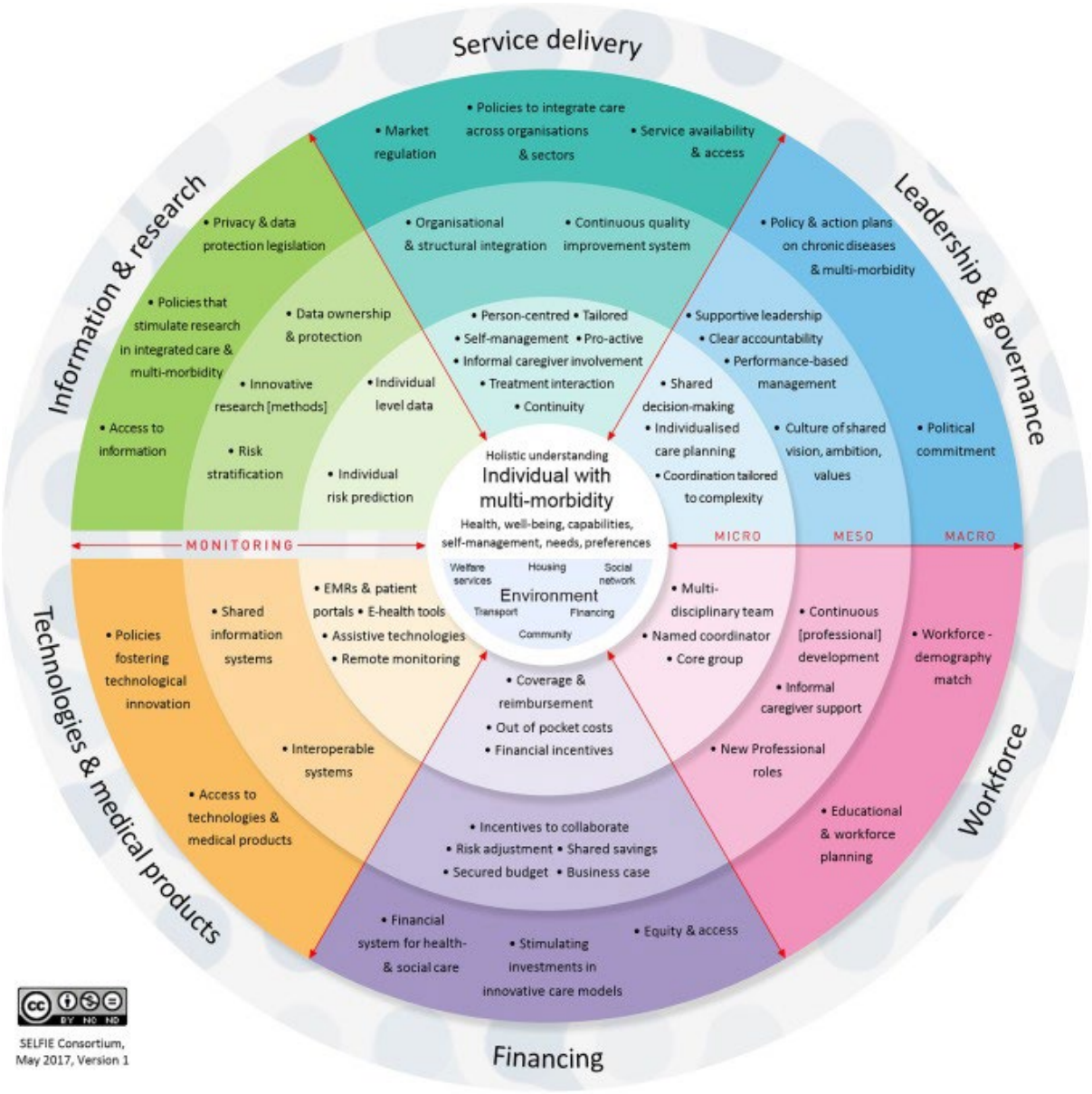
Sharing Evidence Routine for a Person-Centred Plan for Action

The Sharing Evidence Routine for a Person-Centred Plan for Action (SHERPA) framework aims to facilitate communication between health professionals and patients, towards 'person-centred, evidence-informed, interpretative, collaborative decision making for all patients, especially those with multimorbidity'[4]. The framework was developed from the authors' reflections on their own clinical practice, teaching evidence-based practice to general practitioners, and an existing model of care for individuals with complex needs[5]. It consists of three steps: share problems; link problems; and plan together. The three steps are iterative rather than sequential. The model recognises that the clinician and patient need to make judgements and decisions together, given that neither has complete information and that each has differing perspectives.

Sustainable intEgrated chronic care modeLs for multi-morbidity: delivery, FInancing, and performancE

The SELFIE Framework (**S**ustainable int**E**grated chronic care mode**L**s for multi-morbidity: delivery, **FI**nancing, and performanc**E**) was developed following a scoping literature review and through expert discussion meetings. It describes a conceptual framework that supports the development, description, implementation and evaluation of integrated care for multi-morbidity funded by the EU Horizon 2020 programme grant. The patient and their environment are at the core of the framework and concepts of integrated care are described at the micro-, meso- and macro- level and are divided based on six WHO components: service delivery; leadership and governance; workforce; financing; technologies and medical products; and information and research (Figure S1.1)[6].

Figure S1.1 SELFIE Framework for integrated care for multimorbidity (Leijten et al., 2018)



Multimorbidity Care Model

This model was developed by the European Union Joint Action on Chronic Diseases and Healthy Ageing across the Life Cycle (JA-CHRODIS)[7]. The authors identified five components from the Chronic Care Model and Innovative Care for Chronic Conditions Model: self-management support; delivery system design; decision support; clinical information systems; and interaction with community partners. Since these models referred to single as compared to multiple chronic conditions, a systematic review of comprehensive care programs for patients with multiple long-term conditions was conducted, alongside an expert panel discussion, which led to the development of the final model. The final model consists of 16 components across five categories: delivery of care, decision

support, self-management support, information systems and technology, and social and community resources.

Three-goal model

The concept of goal-oriented care (as opposed to disease-oriented care) for elderly patients with chronic multimorbidity was developed from interviews with GPs (n=15) and geriatricians (n=18). The authors identified three types of goals from their qualitative analyses (Figure S1.2): disease-specific or symptom-specific goals (e.g. incorporating personal choices in diagnostic trajectories and treatments), functional goals (goals reducing limitations in functioning) and fundamental goals (translation of elements like values, core relationships and priorities in life, into concrete goals). Fundamental goals are implicitly and explicitly applied in daily practice. The authors hypothesised that 'the explicit setting and application of fundamental goals could lead to patient-specific clinical decisions concerning diagnostic trajectories or treatments by translating values, personal history and core relationships into useable reference points for decision making'[8].

Figure S1.2 Three-goal model for clinical practice (Vermunt et al., 2018)

Modelling successful primary care for multimorbidity: a realist synthesis of successes and failures in concurrent learning and healthcare delivery

This study incorporates a realist synthesis to understand two main areas: 1) issues related to concurrent healthcare delivery and professional experiential learning; and 2) conceptualisations of success and failure where the cure of illness is not an option. The realist review took into account perspectives of trainee doctors, general practitioners, and patients. Findings pointed to important

elements of needs-based learning concurrent with needs-based care in multimorbidity, which are reflected in Figure S1.3. Context, mechanisms and outcome are represented as three separate cogs, with each tooth of the cog as a separate aspect of context (including space, organisational flexibilities, resources, and leadership to create a culture that favours trust, openness, and innovation), mechanisms (self-efficacy, trade-off decision-making, co-construction of success and failure in social interactions, and genuine collaboration) and outcome (individual and social knowledge sense-making, transformative learning, shared decision-making, shared responsibilities, dynamic personalised goals, development of self-efficacy, learning to live with expectation of unpredictability and uncertainty).[9]

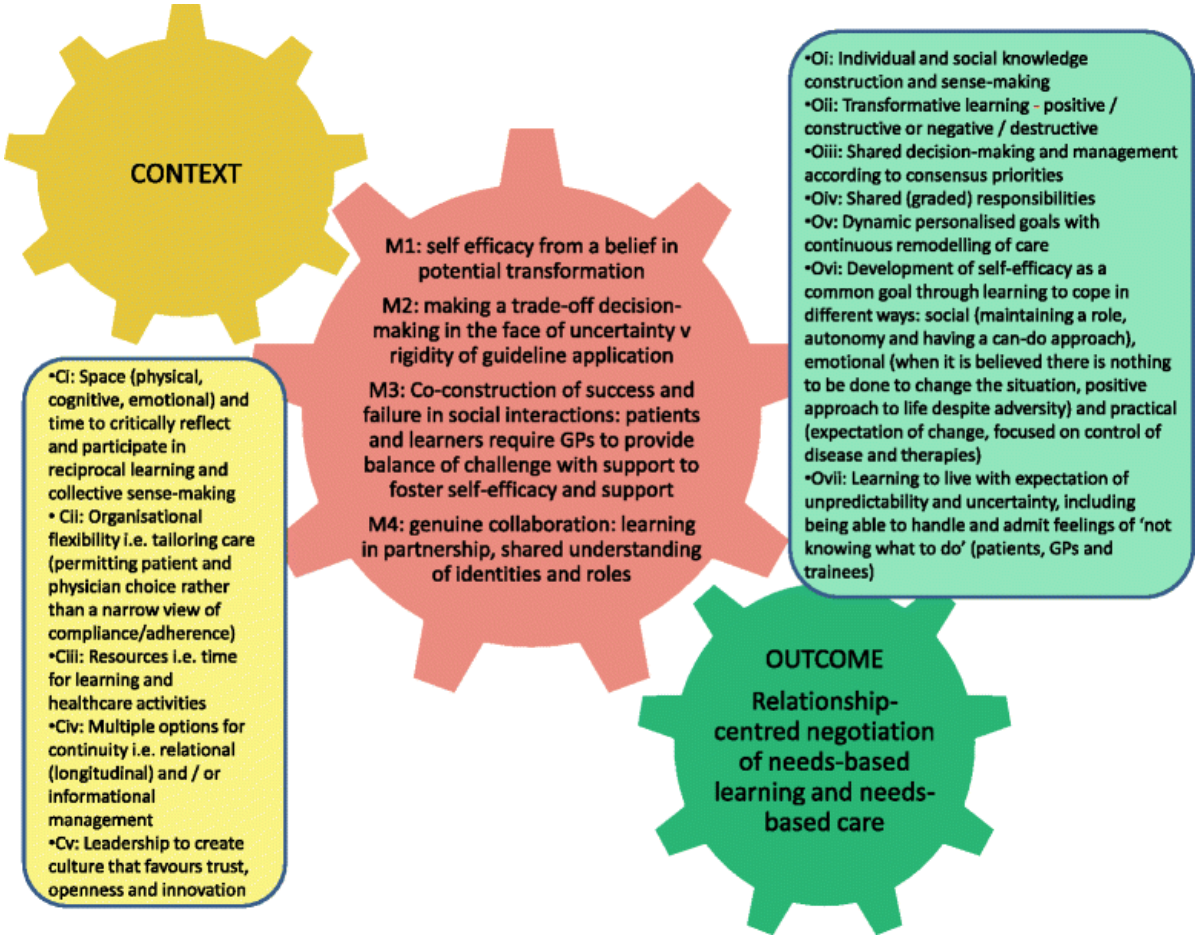


Figure S1.3 Context, mechanisms and outcomes (Yardley et al., 2015)

The House of Care Model

The House of Care model[10] (Figure S1.4) distinguishes itself from other models of integrated care delivery in two primary ways: it 'encompasses all people with long-term conditions, not just those with a single disease or in high-risk groups'; and the core of the model is centred around collaborative personalised care planning. The model was developed to help primary care professionals adapt the chronic care model to their own situation. It deliberately simplifies a

complex approach: the centre of the house represents care planning, the left wall represents the 'engaged and informed patient', the right wall represents the health care professional, the roof represents organisational systems and processes, and the base or floor of the house represents the local commissioning plan. These components are interdependent and are all needed to keep the house together. The model draws a clear connection between personalised care planning at the individual level and local commissioning (including social care and public health) to leverage community resources.

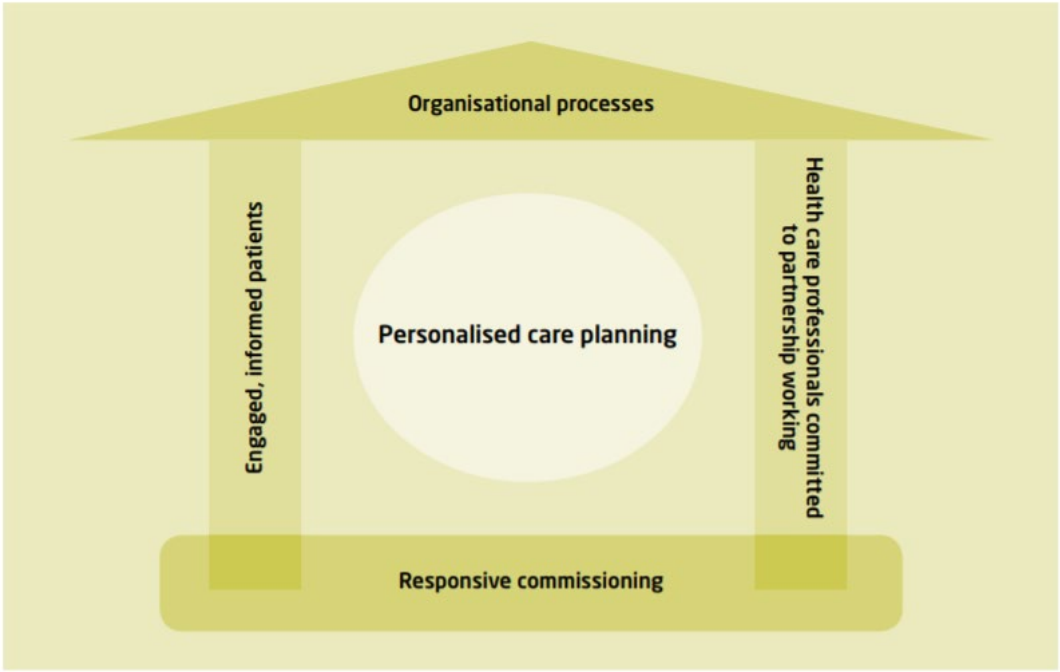


Figure S1.4 The House of Care Model (Coulter et al., 2013)

The Foundations Framework for Developing and Reporting New Models of Care for Multimorbidity

The authors of this framework undertook a scoping review of primary care models for chronic conditions and multimorbidity. The search resulted in 39 models, which were analysed in terms of common elements, their structure and groupings. This resulted in a framework, comprised of foundations and elements, illustrated in Figure S1.5.[11] The foundations include the theoretical basis, such as principles of the Chronic Care Model[12] including self-management and decision support, and the defined target population. Three categories of care elements include: (1) clinical focus; (2) organisation of care delivery; and (3) support for model delivery. The authors use this framework to describe the focus and gaps of current care models. For example, they identified 13 elements of

organisation of care delivery and found that most models included case management (90% of models), integration with social care or community care (82%), integration with secondary care (74%), and a multidisciplinary approach (72%).

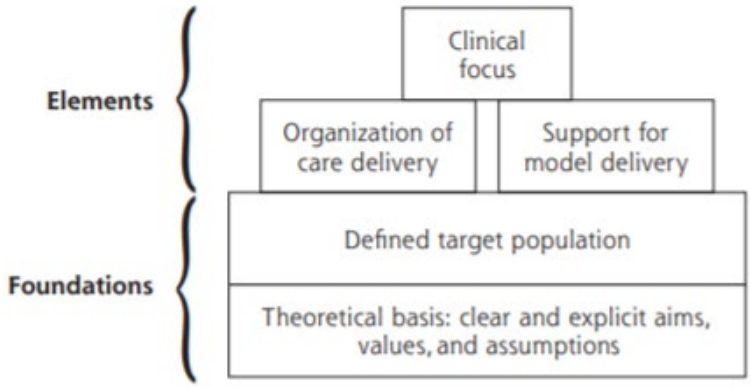


Figure S1.5 The Foundations Framework (Stokes et al., 2017)

References

1. The Academy of Medical Sciences. Multimorbidity: a priority for global health research 2018. https://acmedsci.ac.uk/file-download/82222577 (Accessed 23 February 2023)
2. World Health Organization. Multimorbidity: Technical Series on Safer Primary Care; 2016. https://apps.who.int/iris/bitstream/handle/10665/252275/9789241511650-eng.pdf;jsessionid=134B666EACCD92A2158822CA1C45E8SB?sequence=1 (Accessed 7 October 2019)
3. National Institute for Health and Care Excellence. *NICE guideline [NG56]*; 2016. https://www.nice.org.uk/guidance/ng56 (Accessed 7 October 2019)
4. Jack E, Maskrey N, Byng R. SHERPA: a new model for clinical decision making in patients with multimorbidity. Lancet 2018;**392**:1397-9. https://doi.org/10.1016/s0140-6736(18)31371-0
5. Lennox C, Kirkpatrick T, Taylor RS, Todd R, Greenwood C, Haddad M*, et al.* Pilot randomised controlled trial of the ENGAGER collaborative care intervention for prisoners with common mental health problems, near to and after release. Pilot Feasibility Stud 2018;**4**:15. https://doi.org/10.1186/s40814-017-0163-6
6. Leijten FRM, Struckmann V, van Ginneken E, Czypionka T, Kraus M, Reiss M*, et al.* The SELFIE framework for integrated care for multi-morbidity: Development and description. Health Policy 2018;**122**:12-22. https://doi.org/https://doi.org/10.1016/j.healthpol.2017.06.002
7. Palmer K, Marengoni A, Forjaz MJ, Jureviciene E, Laatikainen T, Mammarella F*, et al.* Multimorbidity care model: Recommendations from the consensus meeting of the Joint Action on Chronic Diseases and Promoting Healthy Ageing across the Life Cycle (JA-CHRODIS). Health Policy 2018;**122**:4-11. https://doi.org/https://doi.org/10.1016/j.healthpol.2017.09.006
8. Vermunt NP, Harmsen M, Elwyn G, Westert GP, Burgers JS, Olde Rikkert MG*, et al.* A three-goal model for patients with multimorbidity: A qualitative approach. Health Expect 2018;**21**:528-38. https://doi.org/10.1111/hex.12647
9. Yardley S, Cottrell E, Rees E, Protheroe J. Modelling successful primary care for multimorbidity: a realist synthesis of successes and failures in concurrent learning and healthcare delivery. BMC Fam Pract 2015;**16**:23. https://doi.org/10.1186/s12875-015-0234-9
10. Coulter A, Roberts S, Dixon A. Delivering better services for people with long-term conditions: Building the house of care; 2013.

https://www.kingsfund.org.uk/sites/default/files/field/field_publication_file/delivering-better-services-for-people-with-long-term-conditions.pdf (Accessed 24 March 2023)
11. Jonathan S, Mei-See M, Bruce G, Stewart WM, Chris S, Peter B. The Foundations Framework for Developing and Reporting New Models of Care for Multimorbidity. The Annals of Family Medicine 2017;**15**:570. https://doi.org/10.1370/afm.2150
12. Wagner EH, Austin BT, Von Korff M. Organizing care for patients with chronic illness. Milbank Q 1996;**74**:511-44.