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Research Methods

From chronic conditions to relevance in multimorbidity: a four-step study in family medicine

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Abstract

Background. Chronic conditions and multimorbidity (MM) are major concerns in family medicine (FM).
Objectives. Based on the International Classification of Primary Care, Second Edition (ICPC-2), this study aimed to list (i)the chronic conditions and (ii)those most relevant to MM in FM.
Methods. A panel of FM experts used a four-step process to identify chronic conditions among ICPC-2 items and list chronic conditions most relevant in MM. They also evaluated the importance of eight criteria, previously identified in the literature, for characterizing chronic conditions. Step one involved a focus group of five experts. Steps two, three and four involved 10, 25 and 25 experts, respectively. They rated ICPC-2 items via an online questionnaire using a Likert scale from 1 (never chronic/irrelevant in MM) to 9 (always chronic/always relevant in MM). A median value cut-off was used to evaluate appropriateness of each item and the inter-percentile range adjusted for symmetry to determine the agreement/disagreement between experts. In parallel, in steps two and three, experts rated the importance of eight criteria to characterize chronic conditions, using a Likert scale from 1 (strongly disagree) to 9 (strongly agree).
Results. Of the ICPC-2's 686 items, experts identified 139 chronic conditions, of which 75 were deemed most relevant in the context of MM. Four of the eight criteria were retained as important to define chronic conditions: duration, sequelae, recurrence/pattern and the diagnosis itself.
Conclusion. Using this list of 75 chronic conditions most relevant in the context of MM should enhance the validity of studies of MM in FM.

Key words. Chronic condition, family medicine, ICPC-2, multimorbidity, RAND, Switzerland.

Introduction

Chronic conditions affect individuals of all ages and have been classed as a leading public health concern since the 1920s (1,2). The number of individuals suffering from chronic conditions is high and increasing, for example, the prevalence of chronic diseases doubled between 1985 and 2005 (3), and in 2005 roughly 63 million Americans had more than one chronic condition (4). The health needs of individuals with chronic conditions are high in all age groups, leading to increased use of health care services and high costs. For example, in the USA, the annual health care costs for non-institutionalized people suffering from a chronic condition—including care for both their chronic condition and any acute health problems they may have experienced—averaged USD 3074, compared with USD 817 for people suffering from acute conditions only (2). In 2002, the World Health Organization (WHO) estimated that 87% of deaths in high-income countries were attributable to chronic diseases (5), and the proportion of worldwide deaths caused by chronic conditions is projected to rise from 59% in 2002 to 69% in 2030 (6).

Multimorbidity (MM)—defined as the simultaneous occurrence of several medical conditions in the same person—occurs frequently, and caring patients with MM is one of the main challenges in family medicine (FM) (7,8). Many studies have pointed out a growing proportion of people with MM, attributed to an aging population and the advances in medical care and public health. For example, an estimated 57 million Americans suffered from multiple chronic conditions in 2000, a number expected to rise to 81 million by 2020 (3,9).

Several definitions of chronic conditions and MM exist, and there is no true consensus. Generally, the existing lists were established to address specific needs, i.e. most selections of diseases were made based on the outcome measure of interest (7,9–13) or only encompassed the most prevalent conditions (10,14). In addition, many lists were based on different international classifications (15), such as the International Classification of Diseases (ICD) (15–17) or the Diagnostic and Statistical Manual of Mental Disorders (DSM) (18). Although these classifications are broadly used, they are not specifically adapted to FM and as such not always easy to use in FM. For example, the ICD is a complex and very detailed classification, in which the level of details necessary to decipher one item from another one overruns the level of details obtained in a standard FM consultation; furthermore, in FM, family physicians (FPs) do not always need or have a precise diagnosis. The DSM is also not well adapted as only focused on psychiatric diseases. In contrast, the International Classification of Primary Care, Second Edition (ICPC-2) (19), which classifies patient data, diagnoses and clinical activity in the domain of FM (most recently updated in 2003), is well adapted to the FM context. Moreover, every ICPC-2 code links back to the ICD (20) and it has been approved by many institutions and endorsed by the WHO.

For MM studies, many different lists have been established to address specific needs or mainly focused on the most prevalent chronic conditions (7,9,10). To the best of our knowledge, the only existing list of chronic conditions, methodologically developed, based on the ICPC-2 coding system is that of O'Halloran *et al.* (21). O'Halloran *et al.* (21) carried out a literature review with the aim to identify the characteristics used to define chronic conditions as opposed to acute conditions; the final set of characteristics was applied to the ICPC-2 in order to select the chronic conditions. Although many different lists of chronic conditions exist, we were unable to find any methodologically well-established generic list of chronic conditions most relevant to the context of MM, suitable for use in FM research and based on ICPC-2 (15).

Our aim was thus to establish such a list. We favoured ICPC-2 as this is the classification endorsed by WHO for primary care. We needed to make a selection within the ICPC-2 because using the entire classification to identify chronic conditions is too time-consuming for FPs in the research context. In addition, many of the symptoms and diagnoses in ICPC-2 are not chronic conditions and are not relevant to MM. We also wanted to identify a series of key criteria that could be applied to the items of the ICPC-2 classification to define conditions as chronic as opposed to acute conditions. These criteria could be used in further studies to better define chronicity and to help differentiate between conditions that could be either acute or chronic.

Methods

We conducted a national study on MM in FM by involving Switzerland's five university institutes of FM. We used a four-step process to collect data from FM experts. Step one was a focus group discussion aimed at reducing the number of ICPC-2 items submitted to the experts for a more detailed evaluation in the subsequent steps. In steps two, three and four, FM experts completed online questionnaires to evaluate the chronic aspect of the remaining items of the ICPC-2 classification (step two and step three) and the relevance of the conditions identified as chronic in the context of MM (step four). The methodology was inspired by the RAND (Research and Development) method (22), which was adjusted for feasibility purposes. The RAND method consists in evaluating each item submitted to the experts in terms of 'agreement/disagreement' and 'appropriateness' (17). The agreement/disagreement between the experts is based on the calculation of the inter-percentile range adjusted for symmetry (IPRAS) where a positive IPRAS value indicates a disagreement and a negative value an agreement. The appropriateness for each item is based on the median score of ratings by the participating experts (22).

In step two and step three in parallel to the rating of conditions, the experts were asked to evaluate the importance of a series of criteria to define chronic conditions as opposed to acute conditions.

Identification of chronic conditions

The ICPC-2 consists of 686 items. In order to limit the number of conditions submitted for evaluation in the next steps, the focus group removed items considered irrelevant in the context of chronic diseases or which designated a symptom or condition that was too imprecise. We deemed this selection important as some items refer to conditions that are always acute (e.g. upper airway tract infection R74), and as such are not relevant to chronic conditions.

The focus group was made up of five FPs of the Lausanne University Institute of Family Medicine. All items of the ICPC-2 classification were reviewed one by one. In the absence of a consensus about any particular item, it was kept in the selection to be rated during the subsequent steps.

In step two, the selection of chronic conditions among the ICPC-2 items was refined. The online questionnaire was sent to 10 FPs (two from each of Switzerland's five university institutes of FM). They were asked to rate each condition as 'unequivocally chronic', 'unequivocally non-chronic' or 'in-between'. Conditions that at least 80% of the panel considered to be 'unequivocally chronic' or 'unequivocally non-chronic' were kept for the final list or discarded, respectively, and not submitted for the next step.

In step three, a second online questionnaire included all the conditions identified as 'in-between' in step two. For this step, the number of experts was increased to 25 FPs in order to obtain a more precise evaluation of the items (five from each of Switzerland's five university

institutes of FM, representing practices in both rural and urban settings). They were asked to rate the degree of chronicity of each condition using a Likert scale from 1 (always non-chronic) to 9 (always chronic).

Following the RAND method, we used the median score obtained for each condition after the rating by the experts to determine the appropriateness of each condition. In this case, conditions deemed chronic were considered 'appropriate'. We also calculated the IPRAS to determine whether there was agreement or disagreement between the experts; a positive IPRAS value indicated disagreement and a negative value indicated agreement (22). In the absence of any disagreement, we considered as 'chronic' (i.e. 'appropriate') conditions with a median value of rating between 6 and 9, and as 'non-chronic' (i.e. inappropriate) conditions with a median value of rating between 1 and 4. Conditions with a median value of rating comprised between 4 and 6 were considered as 'uncertain' (Table 1). A final list of chronic conditions was established by combining all the conditions that were considered chronic in steps two and three.

Relevance of chronic conditions in multimorbidity

In step four, we considered all the chronic conditions identified in steps two and three in order to evaluate their relevance in the context of MM, i.e. the degree to which the condition is of pertinence when thinking about a typical multimorbid patient. A third online questionnaire was sent to the same 25 FPs included in step three. They rated the degree to which the chronic conditions identified in steps two and three were most relevant in MM. This was done using a Likert scale from 1 (no relevance in MM) to 9 (always of relevance in MM). As in step three, median values were used to classify items as relevant in MM or not, and the IPRAS was used to determine the agreement/disagreement between experts.

Evaluation of the criteria for the identification of chronic conditions

In step two, we asked the experts to rate the importance of eight criteria to characterize a chronic condition, using a Likert scale from 1 (strongly disagree) to 9 (strongly agree). These criteria were identified in the literature review conducted by O'Halloran *et al.* (21), and included duration, nature of diagnosis, onset, recurrence/pattern, prognosis, sequelae, severity and prevalence. The criteria with a median rating of 6 or more were selected for re-evaluation in step three. The experts were also asked to choose an appropriate duration from which a condition could be considered as chronic: 3, 6 or 12 months. These durations are often used in the different existing definitions of what constitutes a chronic condition (21,23). Using the results obtained in step three, we selected the most important criteria to define chronic conditions.

Results

Expert panels

All the experts were FPs associated with one of Switzerland's five university institutes of FM. The expert panel consisted: at step one, of five FPs and academics of the Lausanne University Institute of Family Medicine; at step two, of 10 FPs (two from each of Switzerland's five university institutes of FM); and the panel was further increased at steps three and four to 25 FPs (five from each of Switzerland's five university institutes of FM, representing practices in both rural and urban settings). All the experts were practicing FM, some were also FM researchers.

The mean age (SD) of the five participants in the focus group was 52.6 (8.3) years, three were men, and three worked in rural areas. The mean age (SD) of the 10 step two participants was 47.6 (7.2) years, seven were men, and seven worked in urban areas. Finally, the mean age of the 25 step three and step four participants was 46.7 (9.2) years, 15 were men, and 18 worked in urban areas. All 25 experts completed questionnaire in step three, however, only 24 completed it in step four.

List of chronic conditions

The study's methodological flowchart and results are shown in Figure 1.

The step one focus group reached a consensus about 162 items—that were discarded from future evaluation because they were either too vague or irrelevant in the context of the evaluation of chronic conditions—out of the 686 items of the ICPC-2. Excluded items included fear of diseases (e.g. item A25 'Fear of death/dying' or item B26 'Fear of cancer, blood/lymph'); items referring to a broad category of conditions (e.g. item L29 'Symptoms/complaints Musculoskeletal other' and item L99 'Musculoskeletal disease, other'); items that did not refer to medical conditions *per se* (e.g. item F17 'Glasses symptom/complaint' as item F91 'Refractive error' is already included); the entire category of social problems (Z chapter); items labelled 'Limited function/disability' (as these would be included already in other items); items that are medical signs (e.g. R03 'Wheezing'); and items referring to tests (U98 'Abnormal urine test not otherwise specified'). As panel members could not reach a consensus about them, four additional items were kept for subsequent steps. The complete list of items removed is presented in online Supplementary Table S1.

Of the 524 items remaining after step one, the step two panel of experts agreed that 36 items were 'unequivocally chronic' and 64 were 'unequivocally non-chronic'. The complete list of these items is given in online Supplementary Table S2. Of the 424 items remaining after step two, the step three panel of experts agreed that 103 items could be considered chronic and 126 could be considered non-chronic. One hundred and ninety-five items remained 'uncertain' after step three, either because their median score comprised between 4 and 6 or because of a significant disagreement between the experts (Table 2). Table 2 also lists the number of items over which no agreement could be reached according to their IPRAS value.

Criteria for the definition of chronic conditions

When evaluated at step two, five out of eight criteria obtained a median value ≥6 when the experts were asked about their importance in the definition of chronic conditions (Table 3). Severity,

Table 1. Steps 3 and 4, classification of items according to the appropriateness and the agreement/disagreement

Classification	Appropriateness according to the median value	Agreement/disagreement according to the IPRAS value
Chronic/MM	Appropriate: median [6–9]	Agreement (IPRAS –)
Uncertain	A)median value]4;6[	A)Agreement (IPRAS –)
	B)any median value	B)Disagreement (IPRAS +)
Non-chronic/non-MM	Inappropriate: median [1–4]	Agreement (IPRAS –)

IPRAS, inter-percentile range adjusted for symmetry; MM, multimorbidity.

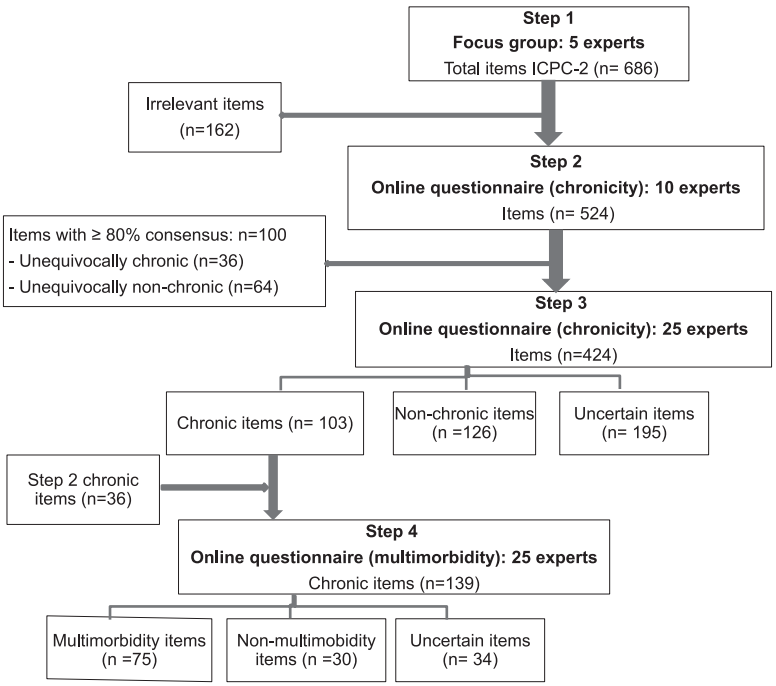

Figure 1. Flowchart describing the process of the four steps to identify chronic conditions most relevant in multimorbidity by family medicine experts, Switzerland 2014.

Table 2. Steps 3 and 4, appropriateness and agreement ratings

Rating	Step 3 (n = 424)	Step 4 (N = 139)
Appropriateness according to median values		
Appropriate (chronic/multimorbid)	103	75
Uncertain	194	34
Inappropriate (non-chronic/non-multimorbid)	127	30
Agreement according to IPRAS value		
Agreement	401	134
Disagreement	23	5

Table 3. Importance of criteria for characterizing chronic conditions: Step 2 and Step 3 median values

Criteria	Median value	
	Step 2	Step 3
Duration	8.5	9[a]
Recurrence/pattern	7.2	8[a]
Diagnostic itself	6.5	7[a]
Sequelae	6.2	8[a]
Prognosis	5.3	5.5
Severity	4.1	5
Onset	3.5	–
Prevalence	1.67	–

[a]Criteria retained (with a median value above 6).

prevalence and onset of the condition were not considered important. When the five remaining criteria were rated during step three, four criteria had a median value ≥6: duration, sequelae, recurrence/pattern and the diagnosis itself (Table 3). The results obtained for each criterion are summarized in Table 3.

Of the list of 139 chronic conditions retained after steps two and three, step four panel experts considered 75 items to be most relevant in the context of MM and 30 items to be irrelevant. Uncertainty remained for 34 items, either because of their median value was between 4 and 6, or because of significant disagreement between the experts (Table 2).

Discussion

Using the ICPC-2, we established a list of 139 chronic conditions, of which 75 were most relevant, i.e. pertinent within the context of MM. This list is the first to have been established based on a consensus of practicing FPs. We also identified four criteria—duration, sequelae, recurrence/pattern and nature of diagnosis—deemed important to define chronic conditions, as opposed to acute conditions. These criteria will be useful in further studies to allow standardized assessments of whether a condition is chronic or acute.

There is no universally accepted list of chronic conditions for FM practice and research. Different lists of chronic conditions exist (9,10) mostly based on other classifications, such as the ICD (15–17). The list based on ICPC-2 developed by O'Halloran *et al.* (21) encompassed 147 conditions. We obtained a list of 139 chronic conditions broadly similar to that of O'Halloran *et al.* (21). Eighty-nine items are common, which suggests that these conditions would always be considered as chronic independently of the context in which they are evaluated. The divergence between the two lists—50 items from our list and 58 items only appearing on list by O'Halloran *et al.* (21)—could be explained primarily by variations in methodology (13) (applying a set of criteria identified through a literature review process versus a consensus process methodology), but could also reflect the difficulty involved in classifying conditions as chronic or non-chronic. This

process is likely to be affected by the experience and judgments of the participating experts. Indeed, in our study, 195 conditions remained classified as uncertain (as to whether they were chronic or not) due to the fact that no consensus could be reached on these items. This reflects the challenge in classifying chronic conditions without the use of a common definition. Nevertheless, we consider the present study's methodology to be strong: the process involved four steps using a large panel of FPs related to academic institutes from different rural and urban areas in the German- and French-speaking parts of Switzerland. To the best of our knowledge, our study is the first to have established a list of chronic conditions most relevant to MM in FM, and this will be useful in future FM research. None of the lists previously used in studies on MM (9,10,24) were as inclusive as the list of 75 items we identified, nor were they developed using similarly structured methodologies. Differences could be explained by the fact that the other lists were developed to address more specific needs, and most selections of diseases have been made based on the outcome measure of interest (10,15).

The four criteria that were retained to define chronic conditions (duration, sequelae, recurrence/pattern and the nature of the diagnosis) are also listed in other studies (21,25). This indicates that they are indeed criteria of importance for the definition of chronic conditions, even if they do not all have an equivalent value. The experts in our study considered duration as the most important criterion, the one that could be used alone to define many chronic conditions. A duration of 12 months was clearly considered to be indicative of chronicity, as with to O'Halloran *et al*. (21). However, there is currently no agreed standard duration used for the definition of chronic conditions (21,25–29). Moreover, for a better identification of chronic conditions, the three other criteria also need to be taken into account.

This study has some limitations. First, its design only included Swiss experts and consequently its results may have been influenced by (and may be limited to) Switzerland's FM context. However, as the country's profile for FM patients—and its overall level of medical education—is similar to those throughout high-income countries, it is likely that the results presented here could also apply beyond the Swiss context. Further research should confirm this and also clarify whether this list can also be applied in low- and middle-income country contexts. Second, we used the ICPC-2 designed for FM, yet it does not include an exhaustive list of chronic conditions, and therefore some were not rated (e.g. chronic kidney failure). This would result in items not present in our list that would have been selected to be in the list of chronic conditions and in the list of chronic conditions pertinent to MM, if they had been in the ICPC-2. However, we estimate the number of such items to be low/restricted. Finally, the study was based on a RAND method but only included a single round of rating per step in the methodology. We did not include a round of formal discussion of the ratings or disagreements between experts as planned in the methodology. This might have helped to decrease the number of uncertain items. This discussion did not take place for feasibility and pragmatic reason as the study included a large panel of experts spread out throughout the entire country, allowing for a diversity of representation. We also used cut-off values different from those given in the RAND methodology in order to make our list of chronic conditions more inclusive and to avoid missing potentially important items in the final list. Our list could thus be considered as somewhat over-inclusive. In contrast, most lists used in other studies are rather under-inclusive because they are defined according to the outcome of interest and are thus missing some conditions that might be of importance (10,30).

We believe that the list of chronic conditions most relevant to MM developed in our study will contribute to improving the quality of research on MM in FM. Despite this benefit, it is important to remember the potential for divergence in the definitions of chronic conditions across studies, and this will not be solved by using this list. Indeed, the list presented here should be validated by other studies in both high-income and low- and middle-income countries and tested in the field in order to confirm its reliability and utility.

Supplementary material

Supplementary material is available at *Family Practice* online.

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Declaration

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