'Addressing the global challenge of multimorbidity': Call for written evidence questions

Throughout the world, as life expectancy increases, the population incidence of non-communicable diseases is also increasing. Further, communicable diseases, with both their short and long term sequelae, continue to affect millions of people every year. Together, all of these factors mean that multimorbidity has become, and will increasingly be, an international health challenge.

However, currently there is no commonly used framework for defining or more widely understanding multimorbidity. Further, most health related research is currently focused on the prevention and management of disorders in isolation. Consequently, it is difficult to compile a coherent body of research in this area or develop evidence-based strategies for use in healthcare systems. In order to address the challenge of multimorbidity, we must understand the problem better.

Therefore, the Academy of Medical Sciences is undertaking a project to examine these issues in the UK and in several other countries. We have established a Working Group, which aims to:

1. Summarise:
    a. How multimorbidity has been defined within research to date, and how the existing intellectual framework might impact future progress within the field.
    b. The existing evidence on the prevalence, burden and determinants of multimorbidity in populations throughout the world, including in high, middle, and low income countries.
    c. The existing evidence about the most appropriate prevention and treatment strategies among individuals with multimorbidity.
2. Make recommendations about the implications for future medical research, by:
    a. Identifying ways to think about multimorbidity, potentially through an improved intellectual framework or greater consistency in the research methods used.
    b. Identifying the most significant gaps in the existing evidence about multimorbidity and the associated research priorities, which might include prevalence, burden, determinants, prevention, management and healthcare delivery strategies.

The major focus of this project is multimorbidity in adults, but information about multimorbidity in children will also be compiled. The output of the project will be a report that will make recommendations to key UK and international stakeholders. For further information, please visit our website: http://www.acmedsci.ac.uk/policy/policy-projects/multimorbidity/

In addition to the responses to this call for evidence, the project will be informed by workshops, oral evidence sessions, desk-based research, and expert input from the project's Working Group, Chaired by Professor Stephen MacMahon FMedSci, Principal Director, The George Institute for Global Health. Therefore, **please note that you do not need to address all the questions listed unless you wish to do so** – the Academy welcomes your input to any of the questions you feel are relevant to your expertise or experience.

Please also note that selected excerpts from responses to this call may be included in publications arising from the workstream. **Please notify us at the time of submission if you do not wish your name or input to be published.** We are also happy to receive anonymous submissions.

Please try to limit your response to no more than 3,000 words, and return the completed form by Wednesday 30 November to Dr Rachel Brown: Rachel.Brown@acmedsci.ac.uk (**+44 (0)20 3141 3223**).

If you have any questions or would like to respond but are unable to meet this deadline, please do not hesitate to contact Rachel who will be happy to provide more information.

Thank you in advance for your contribution to this project.

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* *Mandatory fields*

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* Is this input submitted as an organisational or individual response? ~~Organisation~~ / Individual

* Are you happy for your response to be published by the Academy? Yes / ~~No~~

***Whilst comorbidity and multimorbidity are specific concepts, at its core is the investigation of at least 2 conditions together**

Definitions

1. **There is no standard definition of 'multimorbidity' – various different definitions are used. Which definitions (or aspects of definitions) do you think are most helpful to efforts to describe and understand multimorbidity?**
   Please provide references for any published research, and highlight any other initiatives related to multimorbidity that the Academy may be interested in.

Over the last 10 years, through **MRC and NIHR-funded programme of work at Keele University (member of the NIHR School of Primary Care Research)**, multimorbidity definitions for the general population have been conceptualised and tested. General practice is where most of the range of multimorbidity is seen and managed, with specialisms often focused on disease-specific care.

The MRC-funded investigations developed the (i) conceptual framework and (ii) tested the framework in a programme of practical studies on **multimorbidity interaction**.

The idea of the framework is that the single disease model of epidemiology can be applied to either multimorbidity or comorbidity by treating disease *combinations* as the numerator "events" of interest for epidemiological study, in order to **(i) measure their occurrence, (ii) determine their interacting consequences and (iii) investigate their causes.**

A crucial component of this basic framework was the concept of **"relative morbidity severity"**. Classical epidemiology treats disease or morbidity as a 'no or yes' phenomenon, and yet an individual morbidity can vary in its severity from person to person. Different morbidities also vary in their severity in relation to each other. When different morbidities occur in the same individual, the severity of the separate morbidities will be an important classifying characteristic of the multimorbidity or comorbidity and contribute to its health consequences on the individual.

The **practical investigations** have been as follows:

1. Rigorous clinical focus group and consensus methods were used with general practitioners (N=123) to derive and define 188 morbidities **by four dimensions of "relative morbidity severity"**.

a) **Chronicity and threat**: acute; acute-on-chronic; chronic; life-threatening
b) **Time course**: one-off; recurrent; progressive, permanent
c) **Health care use**: Scale to define low; medium; high
d) **Patient impact**: Scale to define low; medium; high

Kadam UT, Jordan K, Croft PR. A comparison of two consensus methods for classifying morbidities in a single professional group showed the same outcomes. J Clin Epidemiol 2006;59(11):1169-73.

2. Testing of consequences of multimorbidity as measured by the **patient impact dimension**

The "relative morbidity severity" classification was **validated against patient impact (self-reported health status)**, and the relationship between age and multimorbidity investigated in **English and Dutch populations (MRC Project Grant)**.

Kadam UT, Croft PR; North Staffordshire GP Consortium Group. Clinical multimorbidity and physical function in older adults: a record and health status linkage study in general practice. Fam Pract 2007;24(5):412-9.

Kadam UT, Schellevis FG, van der Windt DA, de Vet HC, Bouter LM, Croft PR. Morbidity severity classifying routine consultations from English and Dutch general practice indicated physical health status. J Clin Epidemiol 2008;61(4):386-393.

Kadam UT, Schellevis FG, Lewis M, van der Windt DA, de Vet HC, Bouter LM, Croft PR. Does age modify the relationship between morbidity severity and physical health in English and Dutch family practice populations? Qual Life Res 2009r;18(2):209-20.

3. Testing of the **chronicity dimension and interaction**

A separate focus has been on how selection of an **index disease determines the associated multimorbidity and its impact**, taking osteoarthritis (OA) as a common and important disabling condition of ageing (MRC Project Grant).

Key finding: The combined influence of OA and comorbidity on poor health is greater than would be expected from the influence of either OA or the comorbid conditions alone.

Kadam UT, Jordan K, Croft PR. Clinical comorbidity in patients with osteoarthritis: a case-control study of general practice consulters in England and Wales. Ann Rheum Dis 2004;63(4):408-14.

Kadam UT, Croft PR. Clinical comorbidity in osteoarthritis: associations with physical function in older patients in family practice. J Rheumatol 2007;34(9):1899-904.

4. The concept of relative disease severity has been extended to **index Cardiovascular Disease (CVD) population (hypertension, ischaemic heart disease, heart failure) comorbid with OA in a NIHR-funded study**.

Key finding: In cardiovascular populations with differing severity (from hypertension to ischaemic heart disease to heart failure), the co-morbid addition of OA was associated with **incrementally poorer physical health, but such interactions were less than additive**.

Key finding: Chest pain and shortness of breath are common symptoms, and OA increases **the CVD symptom-specific physical limitations additively**.

Prior JA, Rushton CA, Jordan KP, Kadam UT. Comorbidity Cohort (2C) study: cardiovascular disease severity and comorbid osteoarthritis in primary care. BMC Health Serv Res 2012;12:295.

Prior JA, Jordan KP, Kadam UT. Associations between cardiovascular disease severity, osteoarthritis co-morbidity and physical health: a population-based study. Rheumatology (Oxford) 2014;53(10):1794-802.

Rushton CA, Kadam UT. Impact of non-cardiovascular disease comorbidity on cardiovascular disease symptom severity: a population-based study. Int J Cardiol 2014;175(1):154-61.

5. Testing of the **health care use dimension**

Extension of the focus has been on how selection of an **index disease determines the associated multimorbidity and its impact on health care use (drugs, accident & emergency, hospital admissions, cost) and mortality**.

Key findings: These series of studies showed that not only is chronic disease multimorbidity associated with high levels of drug prescribing, A&E attendance, planned and unplanned hospital admissions but **specific combinations show higher costs**.

Roberts ER, Green D, Kadam UT. Chronic condition comorbidity and multidrug therapy in general practice populations: a cross-sectional linkage study. BMJ Open 2014;4(7):e005429.

Kadam UT, Uttley J, Jones PW, Iqbal Z. Chronic disease multimorbidity transitions across healthcare interfaces and associated costs: a clinical-linkage database study. BMJ Open 2013;3(7).

Rushton CA, Satchithananda DK, Jones PW, Kadam UT. Non-cardiovascular comorbidity, severity and prognosis in non-selected heart failure populations: A systematic review and meta-analysis. Int J Cardiol 2015;196:98-106.

6. **Causal determinants of multimorbidity**

CVD and OA multimorbidity occurs more than can be explained by ageing or chance. So questions answered are whether the risk factors that determine CVD, are also associated with OA outcomes. If

that is true, then statins which are effective for prevention of CVD, should also be effective for prevention of OA.

Key findings: Risk factors for CVD are associated with higher risk of OA-related joint replacement over a 30-year time-period and statins are associated with a significant risk reduction in OA presentation over a 10-year time-period.

Kadam UT, Holmberg A, Blagojevic M, Nilsson PM, Akesson K. Risk factors for cardiovascular disease and future osteoarthritis-related arthroplasty: a population-based cohort study in men and women from Malmö, Sweden. Scand J Rheumatol 2011;40(6):478-85.

Kadam UT, Blagojevic M, Belcher J. Statin use and clinical osteoarthritis in the general population: a longitudinal study. J Gen Intern Med 2013;28(7):943-9.

Current knowledge base

When answering these questions, please consider both national and international populations of high, middle, and low income countries. Please provide examples and case studies to illustrate your arguments where appropriate. Please provide references for any published research.

2. **What are the key data, and what data sources exist, on the prevalence, burden (including costs and impact on health systems) and determinants of multimorbidity? Are there significant gaps in such data and, if so, what are they?**

3. **What are the key data, and what data sources exist, on the prevention of multimorbidity? Are there significant gaps in such data and, if so, what are they?**

4. **What are the key data, and what data sources exist, on the management of multimorbidity? Are there significant gaps in such data; if so, what are they?**
   The term 'management' here could refer to clinical interventions designed to specifically treat patients with multimorbidity as well as strategies for the delivery of healthcare services patients with multimorbidity. The term also refers to a wide range of management approaches that may differ by the specific diseases that co-exist.

5. **What are the key sources of funding for research into multimorbidity? Are there gaps in funding and, if so, where?**

Whilst there are generic funding mechanisms, there needs to be a bridge of funding stream which links disease-focused funding (usually charities) to the multimorbidity of old ageing.

Looking forward

6. What should the definition of 'multimorbidity' be? How would this definition improve research and/or treatment?

Disease-specific 'multimorbidity' definition: Examples of these include e.g. cardio-renal or chronic disease-mental health axis. However research is now needed to specific focus on different disease combinations in national and international populations to understand outcomes. An advantage of this approach is that diagnostic and clinical decisions can be added to existing single disease models of care.

Index-list defined 'multimorbidity' definition: Specified list of conditions or the 'morbidity severity' classification outlined above. *A priori* inclusion of hypothesised links or disease states extends the clinical epidemiology in research terms. The standardisation of approach has the potential to both measure disease interaction as well as burden of disease.

'Multimorbidity burden' definition: Inclusion of any number of conditions, without weighting, may be a simple approach which offers a crude but effective measure of the multimorbidity concept.

7. What are the priorities for research about the prevalence, burden and determinants of multimorbidity?

8. What are the priorities for research about the prevention of multimorbidity?

9. What are the priorities for research about the management (as defined above) of patients with multimorbidity?

10. What should be the strategic response of both national and international research funders and agencies be to multimorbidity?

International and national research programmes should have two key initiatives:

PROGRAMME 1: Causal mechanisms in Multimorbidity
PROGRAMME 2: Clinical Care, Outcomes and Policy for Multimorbidity