

# Effect of multimorbidity on health service utilisation and health care experiences

Elinor Millar MBChB, MPH;<sup>1</sup> James Stanley PhD;<sup>1</sup> Jason Gurney PhD;<sup>1</sup> Jeannine Stairmand DipN MPH;<sup>1</sup> Cheryl Davies DipBus;<sup>2</sup> Kelly Semper PhD;<sup>1</sup> Anthony Dowell MBChB;<sup>3</sup> Ross Lawrenson MBBS, MD, DRCOG, Dip.Comm Health, FP Cert, DHMSA, FAFPHM, FFPH, FRCGP;<sup>4</sup> Dee Mangin MBChB, DPH, FRNZCGP, CCFP;<sup>5</sup> Diana Sarfati MBChB, MPH, PhD, FNZCPHM<sup>1</sup>

<sup>1</sup> Cancer and Chronic Conditions (C3) Research Group, University of Otago, Wellington, New Zealand

<sup>2</sup> Tu Kotahi Asthma Trust, Lower Hutt, New Zealand

<sup>3</sup> Department of Primary Health Care and General Practice, University of Otago, Wellington, New Zealand

<sup>4</sup> University of Waikato, Hamilton, New Zealand

<sup>5</sup> Department of Family Medicine, McMaster University, Ontario, Canada

## ABSTRACT

**INTRODUCTION:** Multimorbidity, the co-existence of two or more long-term conditions, is associated with poor quality of life, high health care costs and contributes to ethnic health inequality in New Zealand (NZ). Health care delivery remains largely focused on management of single diseases, creating major challenges for patients and clinicians.

**AIM:** To understand the experiences of people with multimorbidity in the NZ health care system.

**METHODS:** A questionnaire was sent to 758 people with multimorbidity from two primary health care organisations (PHOs). Outcomes were compared to general population estimates from the NZ Health Survey.

**RESULTS:** Participants ( $n = 234$ , 31% response rate) reported that their general practitioners (GPs) respected their opinions, involved them in decision-making and knew their medical history well. The main barriers to effective care were short GP appointments, availability and affordability of primary and secondary health care, and poor communication between clinicians. Access issues were higher than for the general population.

**DISCUSSION:** Participants generally had very positive opinions of primary care and their GP, but encountered structural issues with the health system that created barriers to effective care. These results support the value of ongoing changes to primary care models, with a focus on patient-centred care to address access and care coordination.

**KEYWORDS:** Multimorbidity; comorbidity; health care utilisation; long term conditions; primary care; secondary care; care coordination; health care access

J PRIM HEALTH CARE  
2018;10(1):44–53.  
doi:10.1071/HC17074  
Published online 29 March 2018

## CORRESPONDENCE TO:

Elinor Millar  
Cancer and Chronic Conditions (C3) Research Group, University of Otago, Wellington, New Zealand  
elinor.millar@gmail.com

## Introduction

New Zealanders' life expectancy has continued to increase over the last 25 years, but not all of the life gained is being lived in good health.<sup>1</sup> Worldwide, as the population ages, more people are living with long-term conditions, and more people are now living with multiple long-term conditions (multimorbidity) than with a single long-term condition.<sup>2</sup> The New Zealand Health Survey (NZHS) estimates that 42% of older New Zealanders (aged  $\geq 65$  years) have

multimorbidity.<sup>3</sup> Multimorbidity is contributing to health inequalities, with higher rates of multimorbidity among Māori and people from deprived areas.<sup>2,4</sup>

The high prevalence of multimorbidity is concerning, as multimorbidity is associated with poor physical functioning and poor mental health outcomes, with quality of life decreasing as the level of multimorbidity increases.<sup>5–7</sup> Multimorbidity is also associated with high health

care utilisation and costs.<sup>6,8</sup> Despite this, health care delivery remains focused on the management of single diseases, creating major challenges for both patients and clinicians.<sup>2,9</sup> People with multimorbidity face many health service challenges including: short consultation times and the requirement to arrange multiple appointments with different health care professionals;<sup>9,10</sup> poorly coordinated care and conflicting information from different health providers;<sup>11–16</sup> and difficulties accessing health care due to financial constraints, transport difficulties or limited understanding of the health care system.<sup>17–20</sup>

New Zealand research is limited, but has found that multimorbidity has a considerable impact on people's lives<sup>19,21</sup> and is challenging for general practitioners (GPs) and practice nurses to manage.<sup>22</sup> This study aims to better understand the health care utilisation and experiences of people with multimorbidity within the New Zealand health system, with a focus on where care is working well and where improvements could be made.

## Methods

### Study population

The study was a cross-sectional survey of people with multimorbidity enrolled with Compass (Wellington region) or Pegasus (Christchurch) Primary Healthcare Organisations (PHOs). Multimorbidity status was identified retrospectively from hospital discharge data using ICD-10 codes (International Statistical Classification of Diseases and Related Health Problems 10th Revision) for 61 long-term conditions from the M3 multimorbidity index (Appendix 1). The M3 index was developed in New Zealand specifically for use with administrative data, and uses a more up-to-date diagnostic list than the Charlson and Elixhauser measures.<sup>23</sup> Multimorbidity was defined as two or more long-term conditions in the 5 years before the data extract date (1 January 2016).

Individuals with multiple mental health conditions but no physical health condition were excluded, as different mental health conditions can be difficult to distinguish using only hospitalisation data. The issues facing patients with solely

### WHAT GAP THIS FILLS

**What is already known:** Multimorbidity is associated with high health care utilisation and health care costs. Health care remains siloed, focusing on single diseases, which creates major challenges for clinicians and people with multimorbidity.

**What this study adds:** It was observed that patients with multimorbidity have overwhelmingly positive opinions of their GP, but experience health system issues – notably short consultation times, barriers to accessing care and issues with care coordination – that compromise optimal management.

mental health issues are different from patients with comorbid mental and physical conditions, and this was considered outside the scope of the project. Data were provided by the Ministry of Health, by linking the National Health Index (NHI) master table, the National Minimum Dataset (NMDS) and the Primary Healthcare Organisation (PHO) dataset.

### Sampling

Sampling was stratified by patient ethnicity (Māori, Pacific and Non-Māori/Non-Pacific) from the NHI record. Sample size was set to achieve a margin of error (half-width of 95% confidence interval) of  $\pm 7\%$  for stratified estimates, which required 200 participants per stratum (600 total). Assuming a 40% response rate gave an initial sampling list of 1500 people.

Initial sampling covered three PHOs. A pilot of recruitment processes identified the need for more intensive researcher involvement in recruitment, and a decision was made to engage with two PHOs to allow researchers to work closely with general practices to maximize response rate. A new random sample was drawn for Compass ( $n = 999$ , stratified by ethnicity), with the original sampling list retained for Pegasus ( $n = 472$ ).

### Recruitment

Participant lists were reviewed by each PHO to check patients were still enrolled. General practices were sent the resulting lists and asked to remove patients they deemed inappropriate

to participate due to acute poor health or severe cognitive impairment. Individual general practices were also able to 'opt-out' of the research.

Patients were sent an invitation letter with the options to participate by paper questionnaire (included with the letter), online or via telephone interview. A research company (Research New Zealand) coordinated data collection, including

conducting telephone interviews using computer-assisted telephone interviews (CATI).

## Measures

The questionnaire included both original questions and questions from existing questionnaires, including: NZHS,<sup>24</sup> Relational and Management Continuity Survey,<sup>25</sup> Patient Centered Hassles Questionnaire<sup>26</sup> and Barriers to Self-Management for Persons with Co-morbidities.<sup>27</sup> The study questionnaire covered five key topics: access to health care, health literacy, social support, financial implications and coordination of care. These topics were chosen based on a literature review and from themes from our earlier qualitative study.<sup>19</sup> Socioeconomic deprivation (NZDep) was measured using NZDep2013, a small area-based index calculated using aggregated census data based on residents' socioeconomic characteristics.<sup>28</sup>

## Data analysis

To account for the stratified sampling, we calculated inverse sampling weights for each participant (by ethnicity and PHO), so that results were weighted to reflect the total population of adults with multimorbidity in the two PHOs.

Analysis was focused on determining how multimorbidity affected health care utilisation and experiences. Descriptive univariate analyses for each question include unweighted frequencies and weighted proportions (with 95% confidence intervals, using PROC SURVEYFREQ (SAS v9.3)). We compared responses, where possible, to general population estimates from the 2015/16 NZHS,<sup>24</sup> with these NZHS estimates directly standardised to the age and sex profile of our own respondents. Data management and analysis were conducted in SAS v9.3 (SAS Institute Inc., Cary, N, USA) and Microsoft Excel (Microsoft Corporation, Redmond, WA, USA).

This study was considered by the University of Otago's Ngāi Tahu Research Consultation Committee and received ethical approval from the Southern Region Ethics Committee (16/STH/16).

Table 1. Characteristics of study participants (N = 234)

Participant characteristic	n	%†
Age (years)		
0–24	5	2
25–49	30	13
50–64	76	32
65–74	64	27
75+	59	25
Gender		
Female	117	50
Male	117	50
Ethnicity		
Māori	58	25
Pacific	45	19
Non-Māori/Non-Pacific	131	56
Education		
Secondary school qualification	59	25
Polytechnic or Trade Certificate	59	25
Bachelor's degree or higher	36	15
Other	2	1
No qualifications	69	29
Number of long-term conditions		
2	105	45
3	68	29
4	33	14
5+	28	12
NZDep‡ (Quintile)		
1 (least deprived)	55	24
2	52	23
3	42	18
4	54	23
5 (most deprived)	27	12

† Unweighted percentages.

‡ New Zealand measure of socioeconomic deprivation.

## Results

Following general practice opt-out and GPs' exclusions of patients, a total of 758 individuals were invited from 75 general practices. Questionnaires were returned by 234 patients (response rate 31%); 167 from Compass (37% response rate) and 67 from Pegasus (22% response rate). Most participants (219; 93.6%) completed paper questionnaires; eight completed the questionnaire by telephone and seven online. Mean age of participants was 65.2 years, and participants had a median of three long-term conditions (interquartile range: 2–4). Table 1 outlines participant characteristics.

### Health care utilisation

Tables 2 and 3 describe participants' utilisation of primary and secondary health care. All but one of the respondents had a general practice or medical centre they usually went to. Most (88.6%, 95% CI 81.7–95.5) usually saw the same GP, and 87.6% (95% CI 81.6–93.5) felt it 'fairly' or 'very' easy to see their regular GP. Participants had high levels of health care utilisation, with 40% (95% CI 30.5–49.1) having seen their GP six or more times in the last 12 months. Nearly half (48.3%, 95% CI 38.7–58.0) had been admitted to hospital in the last 12 months, and 21% had been admitted two or more times.

Almost two-thirds had seen a specialist in the last 12 months (62%, 95% CI 52.3–70.9). Of those participants who had seen a specialist, 40% (95% CI 27.8–52) had seen three or more different specialists in that period.

### Health care experiences

Table 4 shows the health care experiences of respondents. Participants reported positive interactions with their GP, with 99% (95% CI 97.9–100) reporting that their GP respected their opinions. Almost all (97%, 95% CI 94.4–100) felt their GP made decisions that were best for them, and 98% (95% CI 96.1–99.5) felt their GP involved them in decision-making. Most participants (96%; 95% CI 91.5–99.5) thought their doctor knew their medical history 'quite' or 'very' well. Furthermore, 80% (95% CI 72.6–87.3) reported that they would

ask their GP or Practice Nurse if they wanted information about support services.

However, not all experiences were positive. Approximately one-third of participants (35.3%; 95% CI 25.8–44.8) reported some problem with poor communication between different doctors or clinics, and 15.1% (95% CI 8.4–21.9) reported disagreement between their doctors on diagnoses or best treatment options. One-fifth (20%; 95% CI 12.1–28) felt they had concerns that were ignored or overlooked by their health care providers. Nearly one-third (31%; 95% CI 22.1–39.6) wished they knew more about their health conditions; however, discussion time was already tight in appointments, with one-third (29%; 95%

Table 2. Primary care utilisation by study participants

Question and response options	n	%*	95% CI
Has a usual GP clinic or medical centre (n = 228)			
Yes	227	99.9	(99.8–100.0)
No	1	0.1	(0.0–0.2)
Is usually seen by the same GP (n = 299)			
Yes	179	88.6	(81.7–95.5)
No	20	11.4	(4.5–18.3)
Ease of seeing preferred GP (n = 229)			
Easy	200	88.3	(82.4–94.3)
Not easy	27	11.2	(5.3–17.1)
I do not have a preferred GP	2	0.4	(0.0–1.2)
Ease of seeing preferred nurse (n = 207)			
Easy	135	64.7	(55.2–74.2)
Not easy	10	3.5	(0.2–6.9)
I do not have a preferred nurse	62	31.8	(22.5–41.1)
No. times seen GP in last 12 months (n = 230)			
None	0	0	–
1–2	32	12.9	(7.1–18.6)
3–5	109	47.3	(37.9–56.8)
6+	89	39.8	(30.5–49.1)
No. times spoken to GP in last 12 months (n = 206)			
None	112	59.8	(50.1–69.4)
1–2	56	25.6	(17.0–34.2)
3–5	24	12.1	(5.6–18.6)
6+	14	2.6	(0.9–4.3)

\* Weighted percentage.  
CI (confidence interval); GP (general practitioner).

Table 3. Secondary and tertiary care utilisation by study participants

Question and response options	n	%*	95% CI
No. of admissions to hospital in last 12 months (n = 223)			
At least once	106	48.3	(38.7–58.0)
Not at all	117	51.7	(42.0–61.3)
No. of visits to after-hours or ED in last 12 months (n = 219)			
At least once	86	34.3	(25.5–43.1)
Not at all	133	65.7	(56.9–74.5)
No. of outpatient appointments in last 12 months (n = 217)			
At least once	133	55.5	(45.7–65.2)
Not at all	84	44.5	(34.8–54.3)
No. of health professionals seen in last 12 months† (n = 227)			
Physiotherapist	58	23.5	(15.6–31.4)
Occupational therapist	23	9.0	(3.9–14.1)
Social worker	24	6.2	(2.6–9.7)
Speech therapist	1	0.4	(0.0–1.1)
Dentist	88	38.4	(29.3–47.6)
Specialist doctor	148	61.6	(52.3–70.9)
None of the above	40	20.4	(12.5–28.3)
No. of specialists seen in last 12 months (n = 141)			
1	46	29.7	(18.5–40.9)
2	43	30.1	(19.2–41.1)
3+	52	40.1	(28–52.3)

\* Weighted percentage.

† Participants could select multiple responses.

CI (confidence interval); ED (emergency department).

CI 20.6–37.5) having too much to discuss in one GP appointment. The most common strategy to deal with this was to prioritise discussion points (93.1%; 95% CI 87.4–98.9), with only a minority booking double appointments (11.3%; 95% CI 0–25.6) or seeing a nurse (9.9%; 95% CI 0.7–13.9).

### Access

Table 5 compares access to health care for our respondents, with general population estimates from the NZHS. Timely access was a prominent issue, with one-in-three (33%; 95% CI 24.1–42.1) unable to see a GP or nurse at their usual general practice within 24 h when unwell, a figure substantially higher than for the general population (NZHS respondents: 16%; 95% CI 12.8–19.1). Half (49.4%; 95% CI 39.7–59.2)

reported a problem with long waits for specialist appointments.

Cost was also a barrier to access, with 19% of respondents (95% CI 11.5–26.5) not visiting a GP because of cost within the last 12 months, and a similar proportion (20.4%; 95% CI 13–27.8) not visiting an after-hours practice because of cost; again, this was considerably higher than the general population (NZHS: no visit to GP due to cost: 9.2%; 95% CI 7.0–11.4; no visit to after-hours due to cost: 4.3%; 95% CI 2.9–5.8).

Approximately one-quarter (27.5%; 95% CI 18.8–36.2) reported some difficulty talking to their doctor between appointments, and only 58% (95% CI 48.6–68.1) felt confident handling unexpected health problems.

### Discussion

This study aimed to better understand the health care experiences of people with multimorbidity in New Zealand. The results highlight impressive strengths of primary care in New Zealand, notably the largely positive experiences participants reported with GPs and the overwhelming feeling that their doctors respected their opinions, involved them in decision-making, and knew their medical history. However, the study also identified issues with the structure of the health care system, which has not evolved to meet the needs of people with multimorbidity.

There are clear capacity barriers to accessing health care for many New Zealanders with multimorbidity. Nearly half of participants reported having to wait a long time for an appointment to see a specialist; the Commonwealth Fund's performance indicators (comparing 11 OECD countries) ranks New Zealand tenth on wait time to see a specialist.<sup>29</sup> While unmet need for primary care is measured in the NZHS, our results reinforce the recent call to also routinely measure, monitor and address unmet need for secondary care.<sup>30</sup>

Respondents also identified greater difficulty accessing GP appointments at short notice than the general population. This is unsurprising given that patients with multimorbidity

have higher health care needs, and hence more need to see their GP at short notice. However, the inability to see their GP when acutely unwell, combined with difficulties in handling unexpected health problems, may be contributing to unplanned emergency department and hospital presentations in this group. This capacity issue was recently illustrated in NZ qualitative work, where a participant was advised to go to the hospital if they required same-day medical assistance.<sup>19</sup> The results also suggest that speaking to GPs by telephone is relatively uncommon. The questionnaire did not ask about other contact methods, such as e-portals or email, which may well have a role in improving care and minimising hospitalisations for people with multimorbidity.<sup>31,32</sup>

Financial barriers to health care access were also common compared to the general population. It is well established that multimorbidity can have significant financial implications for patients and their families, and that financial constraints can act as a barrier to effective management.<sup>33,34</sup> This is especially important given the higher prevalence of multimorbidity in lower-income individuals.<sup>20,35,36</sup> The co-payment funding model in NZ has been identified by GPs as a barrier to effective management of patients with multimorbidity, as it discourages sequential consultations.<sup>22</sup> Despite government initiatives such as CarePlus, and its local variations, which aim to *'improve chronic care management, reduce inequalities, improve primary healthcare teamwork and reduce the cost of services for high-need patients'*,<sup>37</sup> cost remains a barrier for people with multimorbidity.

Standard appointment durations were also problematic, with participants frequently having too much to discuss in a single appointment, requiring them to prioritise health issues to discuss with their GP. This may be an effective strategy, but can create issues due to discrepancies between how patients, their carers and their GPs prioritise conditions and treatment goals.<sup>38-41</sup> Very few participants reported booking double appointments for longer discussions, which may be partly due to the additional cost.<sup>19</sup> These results support ongoing changes to consultation models for primary care. Current initiatives, such as 'Health Care Home', a model of patient-centred care that

Table 4. Health care experiences of study participants

Question and response options	n	%*	95% CI
Doctor listens to what I have to say (n = 231)			
Well	226	99.0	(98.0–100.0)
Not well	5	1.0	(0.0–2.0)
Doctor respects my opinion (n = 226)			
Well	220	98.9	(97.9–100.0)
Not well	6	1.1	(0.0–2.1)
Doctor involves me in decisions (n = 226)			
Well	218	97.8	(96.1–99.5)
Not well	8	2.2	(0.5–3.9)
Doctor makes decisions that are best for me (n = 227)			
Well	220	97.3	(94.4–100.0)
Not well	7	2.7	(0.0–5.6)
Doctor knows my medical history (n = 222)			
Well	213	95.5	(91.5–99.5)
Not well	9	4.5	(0.5–8.5)
I have too much to discuss in one GP appointment (n = 226)			
Yes	66	29.1	(20.6–37.5)
No	160	70.9	(62.5–79.4)
I manage having too much to discuss in one appointment by† (n = 53)			
Booking a double-appointment	8	11.3	(0.0–25.6)
Prioritising discussion points	44	93.1	(87.4–98.9)
Seeing a nurse	12	9.9	(3.2–16.6)
Other	6	7.3	(0.7–13.9)
I wish I knew more about my conditions (n = 199)			
True	83	30.8	(22.1–39.6)
Neutral	27	12.0	(5.7–18.3)
False	89	57.2	(47.6–66.8)
I can easily handle unexpected health problems (n = 205)			
True	122	58.3	(48.6–68.1)
Neutral	37	15.9	(8.9–23.0)
False	46	25.7	(17.0–34.5)

\* Weighted percentage.

† Participants could select multiple responses.

CI (confidence interval).

enables timely access to unplanned care and proactive care for patients with complex needs, aim to address this, though there is not yet evidence in terms of the effect on patient outcomes.<sup>42</sup>

Coordination of care also appeared problematic, with reports of poor communication and disagreement between clinicians. This is a common theme in the international literature, with

Table 5. Access to health care in the last 12 months for the survey population compared to the New Zealand Health Survey (NZHS)

Question on access to health care	Multimorbidity survey			NZHS*	
	n	%†	95% CI	%†	95% CI
Unable to be seen at usual medical centre within 24 h	72	33.1	(24.1–42.1)	16.0	(12.8–19.1)
Did not visit GP due to cost	49	19.0	(11.5–26.5)	9.2	(7.0–11.4)
Did not visit GP due to transport	18	5.6	(1.5–9.8)	2.9	(1.6–4.3)
Did not visit after-hours care due to cost	60	20.4	(13.0–27.8)	4.3	(2.9–5.8)
Did not visit after-hours care due to transport	20	6.3	(2.1–10.5)	1.0	(0.3–1.6)

\* NZHS estimates age- and sex-standardised to the multimorbidity survey sample.

† Weighted percentage.

CI (confidence interval); GP (general practitioner).

patients, health care professionals and researchers frequently recommending a care coordinator to help manage and prioritise competing demands.<sup>14–16</sup> Care coordination gaps can be improved through good relational continuity and patients having regular discussions with their GP.<sup>11,25</sup> The fact that most participants found it fairly easy to see their preferred GP is therefore a positive outcome. However, limited availability of short-notice appointments means that patients may have to delay medical care or see another GP, which can threaten relational continuity and lead to gaps in care.<sup>43</sup>

In terms of study limitations, the low response rate may indicate that participants satisfied with their health care experiences were more likely to respond,<sup>44</sup> meaning the results might underestimate the problems faced in the health care system. Removal of potential participants by general practices may also have had a similar effect. Financial barriers may have been underestimated, as only 12% of respondents lived in NZDep quintile five (most deprived). Invitation letters were signed by each patient's GP and although the invitation stressed that all responses would be confidential, some may have thought their GP would see their responses and have adjusted their responses accordingly. Similarly, participants who did not like their GP may have declined to participate.

The sampling process also introduced limitations. As the sampling frame included only patients who had been hospitalised in the last 5 years, the eligible sample may have been

'sicker' than the wider population of people with multimorbidity. Achieving a primary-care level definition of multimorbidity may require more focused engagement with a smaller set of general practices. Finally, while the study aimed for equal explanatory power for Māori, Pacific and non-Māori/non-Pacific groups, the overall low response rate precluded analysing the results by ethnic group. Despite these limitations, the study has provided a valuable insight into how the NZ health system works, or in some aspects does not work, for people with multimorbidity.

## Conclusion

People with multimorbidity generally had very positive experiences with their GP, but encountered structural issues with the health system that created barriers to care. The main issues were suboptimal duration of GP appointments, barriers to accessing primary and secondary health care (both due to availability and affordability) and issues with coordination of care and communication between clinicians.

## References

1. Ministry of Health. Health loss in New Zealand 1990–2013: a report from New Zealand Burden of Diseases, Injuries and Risk Factors Study. Wellington: Ministry of Health; 2016.
2. Barnett K, Mercer SW, Norbury M, et al. Epidemiology of multimorbidity and implications for health care, research, and medical education: a cross-sectional study. *Lancet*. 2012;380(9836):37–43. doi:10.1016/S0140-6736(12)60240-2
3. Ministry of Health. Health and Independence Report 2015. The Director-General of Health's Annual Report on the State of Health. Wellington: Ministry of Health; 2015.

4. Davis P, Lay-Yee R, Fitzjohn J, et al. Co-morbidity and health outcomes in three Auckland hospitals. *N Z Med J*. 2002;115(1153):211–5.
5. Walker AE. Multiple chronic diseases and quality of life: patterns emerging from a large national sample, Australia. *Chronic Illn*. 2007;3(3):202–18. doi:10.1177/1742395307081504
6. Salisbury C, Johnson L, Purdy S, et al. Epidemiology and impact of multimorbidity in primary care: a retrospective cohort study. *Br J Gen Pract*. 2011;61(582):e12–21. doi:10.3399/bjgp11X548929
7. Fortin M, Bravo G, Hudon C, et al. Relationship between multimorbidity and health-related quality of life of patients in primary care. *Qual Life Res*. 2006;15(1):83–91. doi:10.1007/s11136-005-8661-z
8. Tinetti ME, Fried TR, Boyd CM. Designing health care for the most common chronic condition—multimorbidity. *JAMA*. 2012;307(23):2493–4. doi:10.1001/jama.2012.5265
9. Duguay C, Gallagher F, Fortin M. The experience of adults with multimorbidity: a qualitative study. *J Comorb*. 2014;4(1):11–21. doi:10.15256/joc.2014.4.31
10. Clarke LH, Bennett EV, Korotchenko A. Negotiating vulnerabilities: how older adults with multiple chronic conditions interact with physicians. *Can J Aging*. 2014;33(01):26–37. doi:10.1017/S0714980813000597
11. Adeniji C, Kenning C, Coventry PA, et al. What are the core predictors of ‘hassles’ among patients with multimorbidity in primary care? A cross sectional study. *BMC Health Serv Res*. 2015;15(1):255. doi:10.1186/s12913-015-0927-8
12. Bonney A, Magee C, Pearson R. Cross-sectional survey of older patients’ views regarding multidisciplinary care for chronic conditions in general practice. *Aust J Prim Health*. 2014;20(1):27–33. doi:10.1071/PY12101
13. Schoen C, Osborn R, Squires D, et al. New 2011 survey of patients with complex care needs in eleven countries finds that care is often poorly coordinated. *Health Aff (Millwood)*. 2011;30(12):2437–48. doi:10.1377/hlthaff.2011.0923
14. Bayliss EA, Edwards AE, Steiner JF, et al. Processes of care desired by elderly patients with multimorbidities. *Fam Pract*. 2008;25(4):287–93. doi:10.1093/fampra/cmn040
15. May C, Montori VM, Mair FS. We need minimally disruptive medicine. *BMJ*. 2009;339:b2803. doi:10.1136/bmj.b2803
16. Haggerty JL. Ordering the chaos for patients with multimorbidity. *BMJ*. 2012;345(7876):e5915. doi:10.1136/bmj.e5915
17. Corser W, Dontje K. Self-management perspectives of heavily comorbid primary care adults. *Prof Case Manag*. 2011;16(1):6–15. doi:10.1097/NCM.0b013e3181f508d0
18. de Heer HD, Balcazar HG, Morera OF, et al. Barriers to care and comorbidities along the U.S.-Mexico border. *Public Health Rep*. 2013;128(6):480–8. doi:10.1177/003335491312800607
19. Signal L, Semper K, Stairmand J, et al. A walking stick in one hand and a chainsaw in the other: patients’ perspectives of living with multimorbidity. *N Z Med J*. 2017;130(1455):65
20. Schoenberg NE, Bardach SH, Manchikanti KN, et al. Appalachian residents’ experiences with and management of multiple morbidity. *Qual Health Res*. 2011;21(5):601–11. doi:10.1177/1049732310395779
21. McKinlay E, Graham S, Horrill P. Culturally and linguistically diverse patients’ views of multimorbidity and general practice care. *J Prim Health Care*. 2015;7(3):228–35.
22. Stokes T, Tumilty E, Doolan-Noble F, et al. Multimorbidity, clinical decision making and health care delivery in New Zealand Primary care: a qualitative study. *BMC Fam Pract*. 2017;18(1):51. doi:10.1186/s12875-017-0622-4
23. Stanley J, Sarfati D. The new measuring multimorbidity index predicted mortality better than Charlson and Elixhauser indices among the general population. *J Clin Epidemiol*. 2017;92:99–110. doi:10.1016/j.jclinepi.2017.08.005
24. Ministry of Health. Content Guide 2014/15 New Zealand Health Survey. Wellington: Ministry of Health; 2015.
25. Gulliford M, Cowie L, Morgan M. Relational and management continuity survey in patients with multiple long-term conditions. *J Health Serv Res Policy*. 2011;16(2):67–74. doi:10.1258/jhsrp.2010.010015
26. Parchman ML, Noel PH, Lee S. Primary care attributes, health care system hassles, and chronic illness. *Med Care*. 2005;43(11):1123–9. doi:10.1097/01.mlr.0000182530.52979.29
27. Bayliss EA, Ellis J, Steiner J, et al. Initial validation of an instrument to identify barriers to self-management for persons with co-morbidities. *Chronic Illn*. 2005;1(4):315–20. doi:10.1177/1742395305001004010
28. Salmond CE, Crampton P. Development of New Zealand’s deprivation index (NZDep) and its uptake as a national policy tool. *Can J Public Health*. 2012;103(Suppl 2):S7–11.
29. Davis K, Stremikis K, Squires D, et al. *Mirror, mirror on the Wall, 2014 Update: how the U.S. health care system compares internationally*. New York: Commonwealth Fund; 2014.
30. Bagshaw P, Bagshaw S, Frampton C, et al. Pilot study of methods for assessing unmet secondary health care need in New Zealand. *N Z Med J*. 2017;130(1452):23–38.
31. Sorondo B, Allen A, Fathima S, et al. Patient portal as a tool for enhancing patient experience and improving quality of care in primary care practices. *EGEMS (Wash DC)*. 2017;4(1):1262.
32. Goldzweig CL, Shekelle PG, Towfigh AA, et al. Secure messaging between providers and patients, and patients’ access to their own medical record. Washington DC: Department of Veterans Affairs; 2012.
33. Bayliss EA, Ellis JL, Steiner JF. Barriers to self-management and quality-of-life outcomes in seniors with multimorbidities. *Ann Fam Med*. 2007;5(5):395–402. doi:10.1370/afm.722
34. Mishra SI, Gioia D, Childress S, et al. Adherence to medication regimens among low-income patients with multiple comorbid chronic conditions. *Health Soc Work*. 2011;36(4):249–58. doi:10.1093/hsw/36.4.249
35. Schäfer I, Hansen H, Schon G, et al. The influence of age, gender and socio-economic status on multimorbidity patterns in primary care. First results from the multi-care cohort study. *BMC Health Serv Res*. 2012;12:89. doi:10.1186/1472-6963-12-89
36. Lawson KD, Mercer SW, Wyke S, et al. Double trouble: the impact of multimorbidity and deprivation on preference-weighted health related quality of life a cross sectional analysis of the Scottish Health Survey. *Int J Equity Health*. 2013;12:67. doi:10.1186/1475-9276-12-67
37. Ministry of Health. *Care Plus 2017* [updated 10-03-2017]. Wellington: Ministry of Health; 2017. [cited 2017 July 17]. Available from: <http://www.health.govt.nz/our-work/primary-health-care/primary-health-care-subsidies-and-services/care-plus>.
38. Kuluski K, Gill A, Naganathan G, et al. A qualitative descriptive study on the alignment of care goals between older persons with multi-morbidities, their family

- physicians and informal caregivers. *BMC Fam Pract*. 2013;14:133. doi:10.1186/1471-2296-14-133
39. Zulman DM, Kerr EA, Hofer TP, et al. Patient-provider concordance in the prioritization of health conditions among hypertensive diabetes patients. *J Gen Intern Med*. 2010;25(5):408–14. doi:10.1007/s11606-009-1232-1
40. Morris RL, Sanders C, Kennedy AP, et al. Shifting priorities in multimorbidity: a longitudinal qualitative study of patient's prioritization of multiple conditions. *Chronic Illn*. 2011;7(2):147–61. doi:10.1177/1742395310393365
41. Sevick MA, Trauth JM, Ling BS, et al. Patients with complex chronic diseases: perspectives on supporting self-management. *J Gen Intern Med*. 2007;22(S3):438–44. doi:10.1007/s11606-007-0316-z
42. Health Care Home Collaborative. Health Care Home 2017. Wellington: CompassHealth. Available from: <http://www.healthcarehome.org.nz/>
43. Cowie L, Morgan M, White P, et al. Experience of continuity of care of patients with multiple long-term conditions in England. *J Health Serv Res Policy*. 2009;14(2):82–7. doi:10.1258/jhsrp.2009.008111
44. Mazor KM, Clauser BE, Field T, et al. A demonstration of the impact of response bias on the results of patient satisfaction surveys. *Health Serv Res*. 2002;37(5):1403–17. doi:10.1111/1475-6773.11194

#### ACKNOWLEDGEMENTS

We would like to thank the participants who took the time to complete the questionnaire, and the PHOs and general practices for their time and support. We would also like to acknowledge the input of our wider Multimorbidity project team. We would like to thank Statistics New Zealand and the Ministry of Health for access to the NZHS data. Access to the NZHS data used in this study was provided by Statistics New Zealand under conditions designed to give effect to the security and confidentiality provisions of the Statistics Act 1975. The opinions presented are those of the authors and do not necessarily represent an official view of Statistics New Zealand or the Ministry of Health. This project was funded by the New Zealand Health Research Council (HRC 14/173). The project design was initiated by the authors, and the funding body has had no involvement into the conduct or reporting of the study.

#### CONFLICTS OF INTEREST

None.

Appendix 1. Conditions included in the M3 multimorbidity index.

Conditions included in the M3 index	
AIDS	Infection Chronic (no other symptoms)
Alcohol abuse	Inner ear disorder
Anaemia deficiency	Intestinal disorder
Angina	Joint or spinal disorder
Anxiety and Behavioural disorders	Liver disease: moderate or severe
Aortic and other aneurysms	Lung cancer
Bone disorders	Lymphomas and leukaemias
Bowel disease inflammatory	Major psychiatric disorder
Breast cancer	Malignant melanoma
Cardiac arrhythmia	Malnutrition nutritional
Cardiac disease other	Mental and behavioural disorders**
Cardiac valve	Mental retardation
Cerebrovascular disease	Metabolic disorder
Chronic pulmonary	Metastatic cancer
Chronic renal	Muscular peripheral nerve disorders
Coagulopathy and other blood disorders	Myocardial infarction
Colorectal cancer	Obesity
Congestive heart failure	Osteoporosis Uncomplicated
Connective tissue disease	Other cancers
Dementia	Other neurological disorders*
Diabetes complicated	Pancreatitis
Diabetes uncomplicated	Paralysis
Drug abuse	Peripheral vascular disease
Endocrine disorder	Prostate cancer
Epilepsy	Pulmonary circulation disorders
Eye problem long term	Sleep disorder
GI ulcer or upper gastrointestinal disease	Tuberculosis
Gynaecological cancers	Upper gastrointestinal cancers
Hepatitis Chronic viral	Urinary tract problem (chronic)
Hypertension uncomplicated	Venous insufficiency
Immune system disorder	

\* Other neurological disorders (excluding epilepsy).

\*\* Mental and behavioural disorders due to brain damage.