Understanding the use and impact of allied health services for people with chronic health conditions in Central and Eastern Sydney, Australia: a five-year longitudinal analysis

Margo Linn Barr1, Heidi Welberry2, Elizabeth J. Comino2, Ben F. Harris-Roxas1, Elizabeth Harris1,2, Jane Lloyd1,2, Sarah Whitney3, Claire O’Connor4, John Hall5 and Mark Fort Harris1

1Centre for Primary Health Care and Equity, Faculty of Medicine, University of NSW, Sydney, New South Wales, Australia; 2Health Equity Research and Development Unit, Sydney Local Health District, Sydney, New South Wales, Australia; 3Sydney Local Health District, Camperdown, New South Wales, Australia; 4South Eastern Sydney Local Health District, Sydney, New South Wales, Australia and 5Faculty of Medicine, University of NSW, Sydney, New South Wales, Australia

Abstract

Aim: To describe the characteristics of people in Central and Eastern Sydney (CES), NSW, who had a General Practice Management Plan (GPMP) and claimed for at least one allied health service item claim in the subsequent 12 months. The analysis used the 45 and Up Study questionnaire data linked to the Medicare Benefits Schedule (MBS) to provide a more structured approach to managing patients with chronic conditions and complex care needs. The programme supports general practitioners claiming up to one GPMP and one Team Care Arrangement every year, and the patient additionally claiming for up to five private allied health services visits. Methods: A prospective longitudinal study was conducted. The sample consisted of 5771 participants in CES who had a GPMP within a two-year health service utilisation baseline period (2007–2009). The analysis used the 45 and Up Study questionnaire data linked to the MBS, hospitalisation, death and emergency department data for the period 2006–2014. Findings: Of the eligible participants, 43% (2460) had at least one allied health service item claim in the subsequent 12 months. Allied health services were reported as physiotherapy, podiatry and other allied health services. The highest rates of allied health service use were among participants aged 85 years and over (49%). After controlling for confounding factors, a significant difference was found between having claimed for five or more physiotherapy services and emergency admissions (HR: 0.83; 95% CI: 0.72–0.95) and potentially preventable hospitalisations (HR: 0.79; 95% CI: 0.64–0.96) in the subsequent five years. Use of allied health service items was well targeted towards those with chronic and complex care needs, and use of physiotherapy services was associated with less avoidable hospitalisations.

Background

In Australia, the number of people living with chronic health conditions is increasing. According to the 2017–2018 National Health Survey, 80% of Australians aged over 65 years had one or more chronic conditions (ie, arthritis, asthma, back pain, cancer, cardiovascular disease, chronic obstructive pulmonary disease, diabetes or mental health conditions) (Australian Bureau of Statistics, 2018a). Latest figures estimate that chronic conditions were responsible for around three-quarters of the total non-fatal burden of disease (Australian Institute of Health and Welfare, 2016), and around 9 in every 10 deaths (Australian Bureau of Statistics, 2018b). The Chronic Disease Management (CDM) programme was introduced to the Medicare Benefits Schedule (MBS) to provide a more structured approach to managing patients with chronic conditions and complex care needs. It also recognised the important role allied health professionals play in supporting people with chronic disease to maximise their level of functioning and manage their own care safely and effectively. The programme supports general practitioners (GPs) to claim for up to one General Practice Management Plan (GPMP) for people with a chronic or terminal medical condition. It also supports, for people requiring care from a multidisciplinary team, up to one Team Care Arrangements (TCA) every year (Australian Government Department of Health, 2017). The recommendation is to prepare a new GPMP or TCA every 2 years, with review points at 6, 12 and 18 months (Royal Australian College of General Practitioners,
The patient can additionally claim for up to five services provided by private allied health professionals and practice nurses (from 2007 onwards) within each calendar year. While there may be long-term benefits from careful and thorough care planning (Burt et al., 2014), in the short term it is possible that access to subsidised allied health services may be a major driver in commencing the care planning process for both patients and GPs. Although, as Foster et al. (2008) highlighted, this may be suboptimal because of the limited number of allied health services allowed each year, and because optimal care is only available to those who are able to pay for the additional services required. This was reiterated by Refshauge et al. (2016), who stated ‘the limited number of sessions, shared between the allied health specialties, is unlikely to be adequate to improve health outcomes because of an insufficient dose of treatment’.

While there has been evidence of a rapid uptake of CDM allied health service items over time (Cant & Foster, 2011), and growing evidence of the impact of allied health interventions for diabetes, cardiac and respiratory health (Taylor et al., 2004; Oldridge, 2012; Smith et al., 2012; McCarthy et al., 2015), there has been little evidence to date on the impact of these items on longer term patient outcomes, for example, preventing hospitalisations.

In contrast to the positive associations found by Vitry et al. (2014) and Caughey et al. (2016), who studied CDM item use among Australian war veterans, Welberry et al. (2019) and Comino et al. (2015) found no evidence that GPMPs or TCAs by themselves were associated with a reduction in unplanned hospital admissions. Welberry et al. (2019) by not being limited to a population of war veterans examined a more heterogeneous population in terms of mix of health status and chronic disease. However, despite controlling for various aspects of health status, it is possible that the heterogeneous nature of the population meant that CDM item use was still confounded with health status, diluting any underlying protective effect of GPMPs or TCAs. A significant limitation of studying CDM item use within war veterans, as occurred within Vitry et al. (2014) and Caughey et al. (2016), is that the health cover provided via the Department of Veterans Affairs (DVA) is different to the cover provided under Medicare, Australia’s universal health insurance scheme. While the DVA scheme subsidises allied health services in various circumstances, Medicare only subsidises allied health via the CDM scheme (Australian Government Department of Health, 2018). For example, a DVA Gold Card holder can access as many allied health services as deemed clinically useful based on referral from their GP or specialist, and a DVA White Card holder may access these services if they are related to a war or service injury. Thus, the motivation and drivers for use of CDM items may be different for DVA clients compared to the general population.

This paper examines in more detail the allied health services claimed for up to 12 months after a GPMP or TGA claim within the Central and Eastern Sydney (CES) area. It aims to identify who is accessing which allied health service, how many services are being accessed and the differences in five-year hospitalisation rates by allied health service claims using record linkage data analysis.

Methods

Study design

The study design was a prospective longitudinal observational study of individuals aged 45 years and over who had at least one claim recorded for a GPMP (Item No. 725) or a TCA (Item No. 723) within a two-year health service utilisation baseline period (approx. 2007–2009). A prospective longitudinal observational study was undertaken in order to evaluate the impact of CDM allied health service claims on subsequent hospitalisations. Ethics approval was obtained from the NSW Population and Health Services Research Ethics Committee (2008/10/108).

Sample

The sample included all CES residents who were recruited to the 45 and Up Study and had at least one GPMP or TGA claim within a two-year baseline period centred on their study recruitment date: approximately 2007–2009 (n = 6426). Participants were excluded from the analysis if they were recruited prior to 2007 due to insufficient data for all MBS variables required (579 participants), if probable data linkage errors were identified (2 participants), if they died within a year of baseline (72 participants) or if missing/out of range data were present on key variables (2 participants) such as recruitment date or age. This resulted in a final sample of 5771.

Data sources and linkage

The research used data from the Sax Institute’s 45 and Up Study, linked by the Sax Institute using a unique identifier to MBS data provided by Department of Human Services for the period 2006–2014. It also used data from the Admitted Patient Data Collection, Emergency Department Data Collection and Death Registry, linked by the NSW Centre for Health Record Linkage using probabilistic techniques (NSW Ministry of Health, 2018).

The 45 and Up Study was based on the population of NSW, Australia. Prospective participants were selected from the Department of Human Services (formerly Medicare Australia) enrolment database using stratified random sampling, specifically stratified by age (less than 80 years and 80 years and over) and region (urban versus rural and remote). The Department of Human Services (formerly Medicare Australia) enrolment database provides near complete coverage of the population (45 and Up Collaborators, 2008). People aged 80 years and over and residents of rural and remote areas were oversampled. A total of 267 153 participants (30 645 within the CES area) joined the 45 and Up Study by completing a baseline questionnaire (between January 2006 and December 2009) and giving signed consent for follow-up and linkage of their information to routine health databases. Where possible, the questionnaire used validated questions (Sax Institute, 2018). About 18% of those invited participated, and participants included about 11% of the NSW population aged 45 years and over.

Measures

Participant characteristics using the 45 and Up Study baseline questionnaire data (Sax Institute, 2018), MBS data (Australian Government Department of Health, 2018) or Admitted Patient Data Collection data (NSW Ministry of Health, 2018) were grouped into four main categories: socio-demographic, health risk factors, health status and health care utilisation. Table 1 provides the definitions of these variables.

The exposure measures were claims for allied health service items, separately for the two most common allied health types, physiotherapy and podiatry, and combined for all other allied health (physiotherapy: 10960; podiatry: 10962; other allied health services: 10950, 10951, 10952, 10953, 10954, 10956, 10958, 10964, 10966, 10968, 10970, 10997) in participants who had a GPMP or
| Domain            | Characteristic                 | Data source             | Description                                                                                                                                                                                                 |
|-------------------|-------------------------------|-------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Socio-Demographic | Age group                     | 45 and Up Study Baseline| Self-reported age at baseline                                                                                                                                                                             |
|                   | Gender                        | 45 and Up Study Baseline| Self-reported sex                                                                                                                                                                                             |
|                   | Language other than English   | 45 and Up Study Baseline| Whether a participant speaks a language other than English at home (yes/no)                                                                                                                                   |
|                   | Country of birth              | 45 and Up Study Baseline| Self-reported country of birth categorised as Australia or overseas                                                                                                                                            |
|                   | Highest qualification         | 45 and Up Study Baseline| Self-reported highest level of educational qualification – categorised as less than year 12; year 12; trade/diploma; university or higher                                                                         |
|                   | Household income              | 45 and Up Study Baseline| Self-reported household income category                                                                                                                                                                    |
|                   | Work status                   | 45 and Up Study Baseline| Working status at baseline: not working; working part-time; working full-time                                                                                                                             |
|                   | Housing type                  | 45 and Up Study Baseline| Current housing type grouped as: house; flat/unit; nursing home/residential aged care; other (including mobile home)                                                                                       |
|                   | Private health insurance      | 45 and Up Study Baseline| Private health status at baseline, grouped as: none (no private health, DVA or health care card; private health with extras; private health without extras; DVA only; health care card only |
|                   | Smoking status                | 45 and Up Study Baseline| Smoking status at baseline: non-smoker; ex-smoker; current smoker                                                                                                                                            |
|                   | Adequate physical activity    | 45 and Up Study Baseline| Based on the amount of moderate and vigorous exercise reported: yes (adequate) and no (not adequate). Adequate time and sessions is defined as 150 min (using the sum of walking, moderate activity and vigorous activity – weighted by two) and five sessions of activity per week; no (not adequate) |
|                   | Adequate fruit/vegetable      | 45 and Up Study Baseline| Based on self-reported fruit and vegetable consumption; yes (adequate) – at least five serves of vegetables and two serves of fruit; no (not adequate)                                                           |
|                   | consumption                  |                         |                                                                                                                                                                                                             |
|                   | Weekly alcohol intake         | 45 and Up Study Baseline| Based on self-reported number of standard drinks each week, categorised as zero; low (14 drinks per week); high (>14 drinks per week)                                                                   |
|                   | BMI category                  | 45 and Up Study Baseline| Based on self-reported height and weight. Categorised as underweight (<20); normal weight (20–25); overweight (25–30); obese (>30)                                                                     |
|                   | Treatment for high blood      | 45 and Up Study Baseline| Self-reported as currently taking treatment for high blood pressure (yes/no)                                                                                                                               |
|                   | pressure                     |                         |                                                                                                                                                                                                             |
|                   | Treatment for high cholesterol| 45 and Up Study Baseline| Self-reported as currently taking treatment for high cholesterol (yes/no)                                                                                                                                   |
|                   | Physical functioning          | 45 and Up Study Baseline| Based on the 10 Short Form 36 (SF36) questions and scores of 1 for limited a lot, 2 for yes limited a little and 3 for no, not limited at all. Total scores are categorised as: no limitation (score of 100), minor (90–99), moderate (60–89) and severe (0–59) as well as not available. |
|                   | Psychological distress        | 45 and Up Study Baseline| Based on the Kessler 10 (K10) categories: low (score of 10–15), moderate (16–21), high (22–29) and very high (30–50) as well as not available.                                                               |
|                   | Self-rated good health        | 45 and Up Study Baseline| Based on the SF1 – classified as yes if responded as good, very good or excellent.                                                                                                                         |
|                   | Self-rated good quality of life| 45 and Up Study Baseline| Based on self-rated quality of life question – classified as yes if responded as good; very good or excellent.                                                                                               |
|                   | Number of chronic conditions  | 45 and Up Study Baseline| Based on self-reported diagnoses for up to six chronic diseases. These conditions were classified as: diabetes; cardiovascular disease; depression/anxiety; musculoskeletal (arthritis and osteoarthritis); asthma; and cancer. |
|                   | Needs help for a disability  | 45 and Up Study Baseline| Do you regularly need help with daily tasks because of long-term illness or disability? (yes/no)                                                                                                             |
|                   | Reported a fall in the last 12 months | 45 and Up Study Baseline| Self-reported (yes/no)                                                                                                                                                                                     |
TCA (ie, items 723 or 725) within one year before and after recruit-
ment to the 45 and Up Study (ie, a two-year window that mostly fell
between 2007 and 2009).

The outcome measures were emergency admissions (EA) and
potentially preventable hospitalisations (PPH). EA are defined
as emergency department visits that led to a hospital admission.
PPH are defined as admissions to hospital that could have poten-
tially been prevented through the provision of appropriate non-
hospital health services according to the preventable hospitalisa-
tion indicator in the Australian 2012 National Healthcare
Agreement (Australian Institute of Health and Welfare, 2012).
This indicator was composed of admissions for 21 conditions,
broadly categorised as ‘chronic’, ‘acute’ and ‘vaccine-preventable’.
The PPH could include people who were admitted through an
emergency department.

Statistical analyses

The statistical analysis included three components: (i) a descriptive
analysis of the characteristics of participants claiming allied health
services; (ii) logistic regression models to examine which factors
were significantly related independently of the other
factors; and (iii) a time to event linkage analysis using Cox propor-
tional hazard models to examine the relationship between EA and
PPH in the subsequent five years.

The descriptive analysis included information captured at
baseline, either in the baseline 45 and Up Study survey or from
linked health utilisation data within the baseline period (+/− 12
months from date of recruitment to the 45 and Up Study). Descriptive analyses were undertaken to examine the proportion
of people with a GPMP or TCA who had at least one allied health
service claim by each characteristic of interest (socio-
demographic, health risk factor, health status and health service
utilisation).

Logistic regression was then used to examine which factors
were significantly related to having at least one allied health
service claim independently the other factors. All factors were
included in the model.

Time to event linkage analysis, using Cox proportional hazard
models, included information captured at baseline, either in the baseline 45 and Up Study survey or within the baseline period (+/− one year from date of recruitment to the 45 and Up Study), and hospital/emergency department admissions in the five-year period starting from the end of the baseline period (+/− one year from recruitment). The outcome investigated were
PPH and EA. Follow-up commenced at the end of the two-year
baseline period (ie, one year after recruitment to the 45 and Up
Study). Outcomes were censored at first hospitalisation, death or
five years (ie, six years after recruitment to the 45 and Up
Study), whichever occurred first.

Results

Descriptive analysis

Of the 5771 CES residents who had claimed for a GPMP or TCA at
baseline, 43% (2460) claimed for at least one allied health service
within the next 12 months. Figure 1 shows the proportion of CES
residents with a GPMP or TCA at baseline who claimed for allied
health services within 12 months, by type of allied health service
and age group. Older age groups had higher rates for claiming
allied health services within 12 months of GPMP or TCA
preparation (49% for 85 years and over compared to 38% for

https://doi.org/10.1017/S146342361900077x Published online by Cambridge University Press
45–59-year-olds). Claim rates were highest for: participants in nursing homes (55.6%), without extra private health insurance (49.9%), females (48.1%), less than high school education (46.3%), not working (45.4%) and low incomes (45.1%).

There were clear differences in types of services claimed across age groups. Those in the youngest age group, 45–59 years, had higher claim rates for physiotherapy only (15%) or other allied health only (15%) (including but not limited to dietetics, exercise physiology, chiropractic services) compared to podiatry (4%). Those in the oldest age group (85 years and over) had higher claim rates for podiatry only (31%) compared to physiotherapy only (9%) and other allied health only (4%). Participants across all age groups had higher claim rates for any one service type compared to a combination of services (between 4% and 6% of participants claimed for a combination of physiotherapy, podiatry and/or other allied health) and 22.7% of participants claimed all five sessions within one year.

Regression model

This difference in claiming patterns among age groups is clear when viewed in separate logistic models that relate all patient characteristics with whether a participant claimed for each allied health service in the next 12 months (Figure 2). After controlling for all other factors, increasing age was positively related to the use of podiatry, with those aged over 85 years having more than four times the odds of claiming podiatry compared to those 45–59 years of age. Conversely, increasing age was inversely related to claims for both physiotherapy and other allied health, with those aged 85 years and over having only 0.4 the odds of claiming either physiotherapy or other allied health compared to those 45–59 years of age.

Other characteristics associated with higher odds of claiming for allied health services, as shown in Figure 2, included: females compared to males for physiotherapy but not podiatry or other allied health; participants with a trade or diploma compared to a university degree for other allied health but not physiotherapy or podiatry; participants with private health insurance or who held a health care card compared to those who did not for other allied health but not physiotherapy or podiatry; participants who were obese compared to normal weight range for podiatry; participants who were obese or underweight for other allied health but not for physiotherapy; participants with increasingly severe physical limitations for both physiotherapy and podiatry but not for other allied health services; participants with more chronic conditions for podiatry and other allied health but not for physiotherapy; and participants who frequently saw a GP or who had seen a specialist at baseline for physiotherapy but not for podiatry or other allied health services.

Time to event linkage analysis

Table 2 provides the results of the model to examine the relationship between numbers of (i) physiotherapy claims, (ii) podiatry claims and (iii) other allied health claims, within 12 months of a GPMP or TCA, and time to first EA and first PPH, adjusting for other covariates.

In the five-year period following recruitment, 2494 CES cohort participants had an EA. As shown in Table 2, after controlling for confounding factors such as socio-demographic, health risk, health status and health care utilisation, a significant difference was found between having five or more physiotherapy claims and no claims (Hazard Ratio 0.79; 95% CI 0.64–0.96), and experiencing a PPH in the subsequent five years. No statistical differences were found for podiatry claims. However, there was a difference between one to two other allied health claims and no claims (HR 0.78; 95% CI 0.65–0.94).

In the five-year period following recruitment, 1264 CES cohort participants had a PPH. As shown in Table 2, after controlling for confounding factors such as socio-demographic, health risk, health status and health care utilisation, a significant difference was found between having five or more physiotherapy visits and no visits (HR 0.79; 95% CI 0.64–0.96), and experiencing a PPH in the subsequent five years. No statistical differences were found for podiatry claims or for other allied health claims.

Discussion

We examined the allied health services claiming patterns among a cohort of CES residents who were being managed under a GPMP or TCA. Claiming patterns varied considerably by type of allied health service, which is consistent with previous findings (Cant and Foster, 2011). For example, claiming physiotherapy was associated with being female and younger, and this was also found by Cant and Foster (2011). The current study had access to a much larger range of participant characteristics and found that claiming for physiotherapy was also associated independently with being a non-smoker, a frequent user of GP services and having more severe physical limitations but fewer of the six self-reported chronic conditions (cancer, diabetes, asthma, arthritis, cardiovascular disease and depression/anxiety). Those claiming for physiotherapy were also more likely to have seen a specialist at baseline – possibly as part of the TCA, although there is no way of determining whether a specialist was formally part of the TCA from the claims data alone.

The profile of those claiming podiatry was quite different. There was a strong association with age, with those aged over 85 years having more than four times the odds of claiming for podiatry compared to those aged 45–59 years. Claiming for podiatry was also associated with having more chronic conditions, being a non-drinker, being obese, having more severe physical limitations and having lower levels of psychological distress. This is consistent with older or obese people with mobility problems, as well as those with chronic conditions such as diabetes, being more likely to have significant need for help with foot care (Menz et al., 2008).
Claiming for other types of allied health services (including dietetics, exercise physiology and chiropractic services) was associated with being a non-smoker, being either obese or underweight, having an increasing number of chronic conditions, having some additional health cover (private or health concession card) compared to none and not being bulk-billed. While it was difficult to examine these items separately due to low numbers, this mixture of characteristics suggests there may be multiple drivers for accessing these types of allied health services that could be consistent with diet-related advice being sought for those with weight issues, but the link with health insurance status suggests there may be some patient-driven motivators that are unknown. Among those with a care plan, claiming for allied health services was not clearly related to socio-demographic disadvantage in terms of income, educational levels, ethnic background, housing type and work status. Further research
Table 2. Relationship between numbers of (i) physiotherapy claims, (ii) podiatry claims and (iii) other allied health claims within 12 months of a General Practice Management Plan/Team Care Arrangement and time to (a) first subsequent emergency admission, and (b) first subsequent potentially preventable hospital admission, adjusting for other covariates

| Number of physiotherapy claims within 12 months | Experienced an emergency hospitalisation within five years | Adjusted HR – adjusting for all other socio-demographic, health status, health risk and health utilisation factors | Experienced a potentially preventable hospital admission within five years | Adjusted HR – adjusting for all other socio-demographic, health status, health risk and health utilisation factors |
|-----------------------------------------------|--------------------------------------------------------|-------------------------------------------------------------------------------------------------|--------------------------------------------------------|-------------------------------------------------------------------------------------------------|
| Zero                                          | 2088                                                  | 43.8                                                                                           | 1                                                      | 1063                                                                                           | 22.3                                                                                           | 1 |
| One to two                                    | 79                                                    | 44.9                                                                                           | 0.95 (0.76–1.20)                                        | 36                                                                                           | 20.5                                                                                           | 0.87 (0.62–1.22) |
| Three to four                                 | 99                                                    | 39.6                                                                                           | 0.90 (0.74–1.11)                                        | 55                                                                                           | 22.0                                                                                           | 0.92 (0.70–1.22) |
| Five or more                                  | 228                                                   | 39.4                                                                                           | 0.83 (0.72–0.95)                                        | 110                                                                                          | 19.0                                                                                           | 0.79 (0.64–0.96) |
| Number of podiatry claims within 12 months    |                                                       |                                                                                                 |                                                       |                                                                                               |                                                                                                 |
| Zero                                          | 1,943                                                 | 40.4                                                                                           | 1                                                      | 971                                                                                           | 20.2                                                                                           | 1 |
| One to two                                    | 147                                                   | 50.9                                                                                           | 1.01 (0.85–1.20)                                        | 84                                                                                           | 29.1                                                                                           | 1.21 (0.96–1.51) |
| Three to four                                 | 166                                                   | 61.7                                                                                           | 1.13 (0.96–1.33)                                        | 90                                                                                           | 33.5                                                                                           | 1.22 (0.97–1.52) |
| Five or more                                  | 238                                                   | 58.9                                                                                           | 0.96 (0.84–1.11)                                        | 119                                                                                          | 29.5                                                                                           | 0.96 (0.79–1.17) |
| Number of other allied health claims within 12 months |                                                       |                                                                                                 |                                                       |                                                                                               |                                                                                                 |
| Zero                                          | 2204                                                  | 44.3                                                                                           | 1                                                      | 1098                                                                                          | 22.1                                                                                           | 1 |
| One to two                                    | 125                                                   | 34.5                                                                                           | 0.78 (0.65–0.94)                                        | 77                                                                                           | 21.3                                                                                           | 1.00 (0.79–1.26) |
| Three to four                                 | 66                                                    | 35.3                                                                                           | 0.81 (0.63–1.03)                                        | 35                                                                                           | 18.7                                                                                           | 0.83 (0.59–1.17) |
| Five or more                                  | 99                                                    | 39.9                                                                                           | 0.99 (0.81–1.22)                                        | 54                                                                                           | 21.8                                                                                           | 1.06 (0.81–1.40) |
| TOTAL                                         | 2494                                                  | 43.2                                                                                           | 1                                                      |                                                                                               | 21.9                                                                                           | |

HR = hazard ratio.

*Significantly decreased hazard compared to ref category.

may be required to better understand whether this is a patient or GP barrier in referral.

When considering the relationship between use of allied health services and subsequent EA and PPH, a possible protective effect was found with use of physiotherapy. Those with more claims for physiotherapy (five or more per year) had lower rates of EA and PPH compared to those who did not claim for physiotherapy. Physiotherapy provides a range of beneficial interventions to improve exercise capacity and quality of life and to reduce pain, while still addressing the presenting musculoskeletal, neurological or cardiothoracic conditions. In people with chronic obstructive pulmonary disease, pulmonary rehabilitation has been shown to reduce hospital admission and length of stay as well as improve participant health-related quality of life (McCarthy et al., 2015). However, it is possible that accessing and completing a course of physiotherapy is a signal of some unmeasured aspect of a person’s overall health status. For example, it may reflect an underlying proactive health behaviour which also predisposes a person to lower risk of hospitalisation in addition to their age and number of chronic conditions.

There was no similar significant relationship with PPH or EA for the other types of allied health services, although there was a difference between one to two other allied health claims and no claims for EA which may need further exploration. It is possible that physiotherapy is helping significantly in the management of various conditions and thus preventing complications arising. Given the distinct differences observed in the profile of participants accessing the different types of services, it is a possibility that this is the case, although we attempted to address this by controlling for as many aspects of health status as possible. Also, we have no way of knowing whether the participants required additional allied health services but either went without, accessed them through outpatient clinics or paid for them themselves or via their private health insurance. Skinner et al. (2013), in their meta-analysis, found that having health insurance was generally associated with increased utilisation of allied health services; however, they found that the observed effects varied depending on the patient population, allied health provider and type of insurance product. Further research is required to establish whether the relationship we found is more or less protective when patient (eg, private health claims data) or local health service (eg, non-admitted patient data) funded allied health services are included via record linkage analysis.

Under the ‘Better Access to Mental Health Care Initiative’, which began in 2006, patients with mental health issues are currently eligible to receive up to 10 individual and up to 10 group allied mental health services per calendar year (Australian Government Department of Health, 2019). Evaluations of the programme have shown that the expanded services have had a substantial impact on the health of people with mental health issues (Littlefield, 2017). Prior to 2006, all mental health services were included in the ‘up to five allied health services’ provided for in the TCA. The dose response observed for physiotherapy highlights that there may still be unmet needs, and so establishing
a separate initiative for physiotherapy services which would not impact on other allied health needs may produce better outcomes as is the case for mental health services. Our findings are in line with what Foster et al. (2008) predicted when they stated that ‘five subsidised sessions may not be adequate to facilitate improvement for some people, and will, we believe, often prevent allied health professionals providing care in line with recommended clinical guidelines’. The cost of the additional physiotherapy services could be met by expanding the CDM programme, through a specific initiative as was the case for mental health, or through local health services. Although allowing additional claims under the CDM programme has the potential to substantially increase the cost of this programme, it also has the potential to substantially decrease the need for subsequent hospitalisations and the associated costs.

The major strengths of the current study are the large community-dwelling population that reflects local users of the health system in the CES area of NSW, and the breadth of linked data that allow investigation of a wide range of participant characteristics with health service utilisation patterns Mealing et al. (2010). The main limitations include the absence of clinically detailed data regarding a participant’s health state, and the lack of detail regarding the care plan, including the main purpose and conditions for which it has been put in place. Although informative, the results obtained from the cohort cannot be generalised to the CES population who are aged 45 years and over.

Conclusion

Use of allied health service CDM items in CES was well targeted towards those with chronic and complex care needs. Additionally, use of physiotherapy services was associated with less EA and less PPH. Expansion of the CDM programme so that GPs and patients do not have to choose between allied health services may improve outcomes.

Acknowledgements. This research was completed using data collected through the 45 and Up Study (www.saxinstitute.org.au). The 45 and Up Study is managed by the Sax Institute in collaboration with major partner Cancer Council NSW; and partners: the National Heart Foundation of Australia (NSW Division); NSW Ministry of Health; NSW Government Cancer Council NSW; and partners: the National Heart Foundation of Australia (NSW Division); NSW Ministry of Health; NSW Government Family and Community Services – Ageing, Carers and the Disability Council NSW; and the Australian Red Cross Blood Service. We thank the many thousands of people participating in the 45 and Up Study. We also wish to thank the staff at Centre for Health Record Linkage and all the data custodians for their assistance with data linkage.

Financial Support. This project was jointly funded by the Sydney Local Health District, the South Eastern Sydney Local Health District, and the Central and Eastern Sydney Primary Health Network.

Conflict(s) of Interest. None.

Authors’ Contributions. The project and analysis plan were developed by authors HW, EC, BH-R, EH, JL and MH as MB, JH, SW and COYC joined the team later. The analysis was undertaken by HW. The first draft of the paper was written by MB and HW. All of the other authors (EC, BH-R, EH, JL, MH, JH, SW and COYC) made comments on that draft and any further versions. MH also provided overall guidance and direction. All authors have read and approved the manuscript.

Ethical Standards. The authors assert that all procedures contributing to this work comply with the ethical standards of the relevant national and institutional guidelines on human experimentation (National Health and Medical Research) and with the Helsinki Declaration of 1975, as revised in 2008. Ethical Approval was granted for this research project by the NSW Population and Health Services Research Ethics Committee (Ref # 2016/06/642) and from the University of NSW Human Research Ethics Committee for the 45 and Up Study overall. Written (or Verbal) informed consent was obtained from all subjects/patients. Verbal consent was formally recorded for each participant by the Sax Institute who are the custodians of the 45 and Up Study.

References

45 and Up Study Collaborators (2008) Cohort profile: the 45 and Up Study. International Journal of Epidemiology 37, 941–947.

Australian Bureau of Statistics (2018a) National health survey: first results 2017–18. ABS cat. no. 4364.0.55.001. Canberra: ABS.

Australian Bureau of Statistics (2018b) 3303.0 – Causes of death, Australia, 2017. Canberra: ABS. Retrieved 1 May 2019.

Australian Government Department of Health (2017) History of key MBS primary care initiatives 1999–2013. Retrieved 1 November 2018 from http://www.health.gov.au/internet/main/publishing.nsf/Content/mbsprimarycare-history

Australian Government Department of Health (2018) Chronic Disease Management (formerly Enhanced Primary Care or EPC) — GP services. Retrieved 1 November 2018 from http://www.health.gov.au/internet/main/publishing.nsf/content/mbsprimarycare-chronicdiseasemanagement

Australian Government Department of Health (2019) Better access to psychiatrists, psychologists and general practitioners through the MBS (Better Access) initiative. Retrieved 1 May 2019 from https://www.health.gov.au/internet/main/publishing.nsf/Content/mental-ba-fact-prof

Australian Institute of Health and Welfare (2012) FI 22-selected potentially preventable hospitalisations. Retrieved 1 November 2018 from http://metreo.aihw.gov.au/content/index.phtml?itemid=436887

Australian Institute of Health and Welfare. (2016) Australian burden of disease study: impact and causes of illness and death in Australia 2011 Retrieved 1 November 2018 from Canberra: https://www.aihw.gov.au/getmedia/dd4df925-4cbb-54ff-a587-8370612419/19663.pdf.aspx?inline=true

Burt J, Rick J, Blakeman T, Protheroe J, Roland M and Bower P (2014) Care plans and care planning in long term conditions: a conceptual model. Primary Health Care Research and Development 15, 342–354. doi: 10.1017/S1464326313000327.

Cant RP and Foster MM (2011) Investing in big ideas: utilisation and cost of Medicare Allied Health services in Australia under the Chronic Disease Management initiative in primary care. Australian Health Review 35, 468–474.

Caughey GE, Vitry AI, Ramsay EN, Gilbert AL, Shakib S, Ryan P, Esterman A, McDermott RA and Roughhead EE (2016) Effect of a general practitioner management plan on health outcomes and hospitalisations in older patients with diabetes. International Medical Journal 46, 1430–1436.

Comino EJ, Islam F, Tran DT, Jorm L, Flack J, Jalaludin B, Haas M and Harris MF (2015) Association of processes of primary care and hospitalisation for people with diabetes: a record linkage study. Diabetes Research and Clinical Practice 108, 296–305.

Foster MM, Mitchell G, Haines T, Tweedy S, Cornell P and Fleming J (2008) Does enhanced primary care enhance primary care? Policy-induced dilemmas for allied health professionals. Medical Journal of Australia 188, 29–32. doi: 10.5694/j.1326-5377.2008.tb01501.x.

Littlefield L (2017) Ten Years of Better Access. InPsych 39, 7–10.

McCarthy B, Casey D, Devane D, Murphy K, Murphy E and Lacasse Y (2015) Pulmonary rehabilitation for chronic obstructive pulmonary disease. Cochrane Database of Systematic Reviews. Art. No.: CD003793. doi: 10.1002/14651858.CD003793.pub3.

Mealing NM, Banks E, Jorm LR, Steel DG, Clemens MS and Rogers KD (2010) Investigation of relative risk estimates from studies of the same 20 population with contrasting response rates and designs. BMC Medical Research Methodology 10, 26. doi: 10.1186/1471-2288-10-26.

Menz HB, Gill TK, Taylor AW and Hill CL (2008) Predictors of podiatry utilisation in Australia: the North West Adelaide Health Study. Journal of foot and ankle research 1, 8. doi: 10.1186/1757-1146-1-8.
NSW Ministry of Health (2018) Centre for health record linkage. Retrieved 1 November 2018 from http://www.cherel.org.au/

Oldridge N (2012) Exercise-based cardiac rehabilitation in patients with coronary heart disease: meta-analysis outcomes revisited. Future Cardiology 8, 729–751. doi: 10.2217/fca.12.34.

Refshauge K, Dennis S and Vassallo A (2016) Chronic conditions and allied health: the untapped potential in the Australian healthcare system. The Health Advocate 35, 26–27.

Royal Australian College of General Practitioners (2018) Improving chronic disease management in your general practice. Retrieved 1 November 2018 from https://www.racgp.org.au/your-practice/ehealth/additional-resources/ehealth-webinars/chronic/

Sax Institute (2018) Baseline 45 and up study questionnaires. Retrieved 1 November 2018 from https://www.saxinstitute.org.au/our-work/45-up-study/questionnaires/

Skinner EH, Foster M, Mitchell G, Haynes M, O’Flaherty M and Haines TP (2013) Effect of health insurance on the utilisation of allied health services by people with chronic disease: a systematic review and meta-analysis. Australian Journal of Primary Health 20, 9–19. doi: 10.1071/PY13092.

Smith SM, Soubhi H, Fortin M, Hudon C and O’Dowd T (2012) Managing patients with multimorbidity: systematic review of interventions in primary care and community settings. British Medical Journal 345, e5205. doi: 10.1136/bmj.e5205.

Taylor R, Brown A, Ebrahim S, Joliffe J, Noorani H, Rees K, Skidmore B, Stone JA, Thompson DR and Oldridge N (2004) Exercise-based rehabilitation for patients with coronary heart disease: systematic review and meta-analysis of randomized controlled trials. American Journal of Medicine 116, 682–692. doi: 10.1016/j.amjmed.2004.01.009.

Vitry AI, Nguyen TA, Ramsay EN, Caughey GE, Gilbert AL, Shakib S, Ryan P, Esterman A, McDermott RA and Roughead EE (2014) General practitioner management plans delaying time to next potentially preventable hospitalisation for patients with heart failure. International Medical Journal 44, 1117–1123. doi: 10.1111/imj.12512.

Welberry H, Barr ML, Comino EJ, Harris-Roxas BF, Harris E, Dutton S, Donnelly D, Jackson T and Harris NF (2019) Do general practice management and/or team care arrangements reduce avoidable hospitalisations in Central and Eastern Sydney, Australia? BioMed Central Central Health Services Research.