Provision of a Comprehensive Medicines Review is Associated with Lower Mortality Risk for Residents of Aged Care Facilities: a Retrospective Cohort Study

**SUPPLEMENTARY DATA**

**Appendix 1: methods section**

1. **Exposure of interest**

The exposure of interest was the first general medical practitioner (GP) Medicare Benefits Schedule (MBS) claim for a residential medication management review (RMMR) (MBS item code 903) within 6-12 months of residential aged care facility (RACF) entry. In keeping with previous studies [1, 2, 3], claims for Home Medicines Reviews (HMRs; MBS item code 900) post-RACF entry (~3.5% of all medicines review claims post-RACF entry) were also considered to represent RMMRs. HMRs are comprehensive medicines reviews that are conducted for community-dwelling individuals by accredited pharmacists in collaboration with the person’s GP. HMRs are also known as Domiciliary Medication Management Reviews (DMMRs). Hence, HMRs could be inadvertently claimed instead of an RMMR due to similarities in MBS item codes and names [1, 2, 3].

1. **Description of index date assignment for unexposed individuals**

All exposed and unexposed persons were matched into one of 160 unique subgroups based on five criteria: age at RACF entry (categorised as 65-74, 75-84, 85-94, ≥95), sex, remoteness of residence (major city/other), number of unique prescriptions for PBS medicines dispensed in the year before RACF entry (1-5, 6-10, 11-15, 16-20, ≥21), and dementia diagnosis (yes/no). The median time from RACF entry to first RMMR was determined for exposed individuals in each of the subgroups and then used as the corresponding index date for unexposed individuals in the same subgroup. The subgroups were only used to assign index dates and individuals were not matched for further analyses.

1. **Detailed description of covariates**

Covariates for all models were: age and year of RACF entry, sex, main language spoken (English, other), country of birth (Australia, other), RACF location (South Australia, Victoria, New South Wales), remoteness of residence (major city, other [4]), RACF provider (not-for-profit, for-profit, government-operated), and number of unique Pharmaceutical Benefits Scheme (PBS) prescriptions dispensed in the year before RACF entry. Comorbidity score was derived using the Australian adaptation of the 46-item Rx-Risk comorbidity measure [5] applied to prescription claims in the six months before RACF entry. Dementia was determined from Rx-Risk, aged care eligibility or entry into care assessments [1]. In the year before the index date, the number of standard GP visits and unplanned hospitalisations (categorised as per Table 1) were determined. Provision of a multidisciplinary care plan (MBS item 731) or a case conference (MBS items 735, 739, 743, 747, 750 or 758) was determined in the six months prior to the index date. Need for palliative or end of life care (yes/no), need for assistance with medicines administration (categories shown in Table 1 of the main paper), and care needs with respect to activities of daily living, behavioural daily living, and complex care needs (each categorised as nil/low, medium, or high) were determined from entry into care assessments [6]. For models where the outcome was a fall-related hospitalisation, covariates included: i) number of unique medicines associated with increased falls risk [7] dispensed in the previous six months and ii) fall-related hospitalisations in the previous year.

**References**

1. Sluggett JK, Bell JS, Lang C, et al. Variation in provision of collaborative medication reviews on entry to long-term care facilities. J Am Med Dir Assoc 2021; 22: 148-55.e1.
2. Sluggett JK, Caughey GE, Air T, et al. Medicines use before and after comprehensive medicines review among residents of long-term care facilities: a retrospective cohort study. BMC Geriatr 2021; in press.
3. Sluggett JK, Bell JS, Lang C, et al. Residential medication management reviews in Australian residential aged care facilities. Med J Aust 2021; 214: 432-3.
4. Australian Bureau of Statistics. *Australian Standard Geographical Classification (ASHC), July 2011*. Canberra: Commonwealth of Australia; 2011.
5. Pratt NL, Kerr M, Barratt JD, et al. The validity of the Rx-Risk Comorbidity Index using medicines mapped to the Anatomical Therapeutic Chemical (ATC) Classification System. BMJ Open 2018; 8: e021122.
6. Australian Government Department of Health and Ageing. *Aged Care Funding Instrument (ACFI) User Guide*. Canberra: Commonwealth of Australia; 2013.
7. Milos V, Bondesson Å, Magnusson M, Jakobsson U, Westerlund T, Midlöv P. Fall risk-increasing drugs and falls: a cross-sectional study among elderly patients in primary care. BMC Geriatr 2014; 14: 40.

**Appendix 2:** Percentage of individuals experiencing the outcomes of interest and competing risk of death (where applicable) at 12-month follow-up

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| --- | --- | --- | --- | --- |
| **Main outcome of interest** | **Percentage of individuals experiencing the main outcome of interest at 12-month follow-up (95% CI)** | | **Percentage of individuals experiencing the competing risk of death at 12-month follow-up (95% CI)** | |
| **Received RMMR** | **Unexposed (no RMMR)** | **Received RMMR** | **Unexposed (no RMMR)** |
| ***Main analysis*** | | | | |
| ED presentation or unplanned hospitalisation | 42.5 (41.6-43.4) | 43.1 (42.6-43.6) | 11.5 (10.9-12.1) | 12.7 (12.4-13.0) |
| Fall-related ED presentation or hospitalisation | 14.3 (13.7-15.0) | 13.9 (13.6-14.2) | 20.9 (20.2-21.7) | 23.4 (22.9-23.8) |
| Death (all-cause) | 22.2 (21.4-22.9) | 23.3 (22.9-23.7) |  |  |
| ***Sensitivity analysis: cohort restricted to individuals experiencing polypharmacy (i.e., dispensed nine or more unique prescriptions) (n=26936)*** | | | | |
| ED presentation or unplanned hospitalisation | 47.9 (47.2-48.5) | 49.7 (49.3-50.1) | 12.9 (12.5-13.4) | 14.3 (14.1-14.6) |
| Fall-related ED presentation or hospitalisation | 14.7 (14.2-15.2) | 14.8 (14.5-15.1) | 24.8 (24.2-25.4) | 27.7 (27.4-28.1) |
| Death (all-cause) | 25.7 (24.6-26.9) | 27.9 (27.2-28.6) |  |  |
| ***Sensitivity analysis: hospitalisation outcomes (i.e., no ED visits)*** | | | | |
| Unplanned hospitalisation | 30.0 (29.1-30.8) | 30.7 (30.3-31.2) | 14.4 (13.8-15.1) | 15.8 (15.4-16.2) |
| Fall-related hospitalisation | 11.0 (10.5-11.6) | 10.8 (10.5-11.1) | 21.7 (20.9-22.5) | 24.2 (23.7-24.6) |

*ED emergency department, CI confidence interval, RMMR residential medication management review*

**Appendix 3:** Unadjusted and adjusted associations between RMMR provision and outcomes of interest in the sensitivity analyses

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| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Outcome of interest** | **Unadjusted sHR**  **(95% CI)a** | **p-value** | **Adjusted sHR**  **(95% CI)b** | **p-value** | **Unadjusted HR**  **(95% CI)c** | **p-value** | **Adjusted HR**  **(95% CI)d** | **p-value** |
| ***Sensitivity analysis: cohort restricted to individuals experiencing polypharmacy (i.e., dispensed nine or more unique prescriptions)e*** | | | | | | | | | |
| ED presentation or unplanned hospitalisation | 0.96 (0.92-1.00) | 0.07 | 0.99 (0.94-1.03) | 0.56 |  |  |  |  |
| Fall-related ED presentation or hospitalisation | 1.00 (0.93-1.08) | 1.00 | 1.02 (0.93-1.11) | 0.69 |  |  |  |  |
| Death (all-cause) |  |  |  |  | 0.92 (0.87-0.98) | 0.006 | 0.93 (0.88-0.99) | 0.025 |
| ***Sensitivity analysis: hospitalisation outcomes (i.e., no ED visits)f*** | | | | | | | | | |
| Unplanned hospitalisation | 0.97 (0.94-1.01) | 0.13 | 1.00 (0.96-1.04) | 0.89 |  |  |  |  |
| Fall-related hospitalisation | 1.03 (0.96-1.09) | 0.42 | 1.05 (0.99-1.12) | 0.13 |  |  |  |  |

a Estimates from unadjusted competing risk regression model

b Estimates from competing risk regression model, adjusted for covariates described in methods; competing event was death

c Estimates from unadjusted Cox regression model

d Estimates from Cox regression models adjusted for all covariates described in methods

e Complete case analysis conducted for all models; sample size=26936 residents

f Complete case analysis conducted for all models; sample size=57378 individuals

*ED emergency department, CI confidence interval, HR hazard ratio, RMMR residential medication management review; sHR subdistribution hazard ratio.*