

# Diabetes ascertainment among older Australians residing in long-term care facilities

Yohanes A. Wondimkun MSc<sup>1,2</sup> | Gillian E. Caughey PhD<sup>1,2</sup> |  
Maria C. Inacio PhD<sup>1,2</sup> | Catherine Lang BSc (Hons)<sup>2</sup> | Michelle Hogan MNSc<sup>3</sup> |  
Janet K. Sluggett PhD<sup>1,2</sup>

<sup>1</sup>University of South Australia, UniSA Allied Health and Human Performance, Adelaide, South Australia, Australia

<sup>2</sup>Registry of Senior Australians, South Australian Health and Medical Research Institute, Adelaide, South Australia, Australia

<sup>3</sup>Australian Government Aged Care Quality and Safety Commission, Adelaide, South Australia, Australia

## Correspondence

Yohanes A. Wondimkun, MSc, PhD candidate, UniSA Allied Health and Human Performance, University of South Australia, GPO Box 2471, Adelaide, SA 5001, Australia.

Email: [yohanes.wondimkun@mymail.unisa.edu.au](mailto:yohanes.wondimkun@mymail.unisa.edu.au)

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## INTRODUCTION

Older people with diabetes who reside in long-term care (LTC) facilities are at risk of diabetes-related complications due to potential over or undertreatment resulting in hypoglycemia and hyperglycemia.<sup>1</sup> Accurate ascertainment of type 2 diabetes prevalence in LTC is required to comprehensively examine quality of care, clinical outcomes, and to develop appropriate management and care strategies. Diabetes prevalence can be ascertained from self-report surveys and clinical audits; however, population-based application of these methods is limited. Health and aged care claims data are valuable sources for determining diabetes prevalence due to population-wide coverage, reliability, and completeness.<sup>2</sup> Globally, current estimates of diabetes prevalence in LTC range from 11% to 35%<sup>1,3</sup>; however, population-based studies in Australia are lacking. We examined diabetes prevalence in Australian LTC facilities using a linked national health and aged care data platform<sup>4</sup> and the level of agreement of prevalence estimates between datasets that capture diabetes cases.

## METHODS

A cross-sectional study was conducted using de-identified data from the Registry of Senior Australians (ROSA). Non-Aboriginal and Torres Strait Islander people aged  $\geq 65$  years who first accessed LTC in two Australian states (New South Wales, Victoria) during 2015–2019 were included. Diabetes was ascertained from five data sources: (i) aged care eligibility assessments (which record up to 10 health conditions), (ii) LTC entry assessments (which record the three medical and three mental/behavioral diagnoses most impacting care needs), (iii) pharmaceutical claims for glucose lowering medicines (Anatomical Therapeutic Chemical codes A10\*) up to 10 years before LTC entry, (iv) hospitalization data (using International Classification of Diseases, 10th revision, Australian Modification (ICD-10 AM) codes E100-E149) up to 5 years before LTC entry, and (v) National Death Index (NDI) data up to end of 2019 (ICD-10 AM codes). Descriptive statistics were employed. Agreement between datasets was assessed using percent agreement and Cohen's and Fleiss' kappa coefficients.

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This study obtained ethics approval from the University of South Australia (Protocol ID: 200489), Australian Institute of Health and Welfare (Ref: EO2022/4/1376), the South Australian Department for Health & Wellbeing (Ref: HREC/18/SAH/90), and the New South Wales Population & Health Services (Ref: 2019/ETH12028) Human Research Ethics Committees.

## RESULTS

Of the 175,235 individuals included from 1729 LTC facilities, the median age at LTC entry was 86 years (IQR 80–90) and 105,272 (60.1%) were women. During the follow-up period (up to end of December 2019), the median LTC length of stay was 14 months (IQR 5–28) and 88,553 (50.5%) individuals died. Overall, 49,421 individuals (28.2%, 95%CI 28.0–28.4) were identified as having diabetes by one or more datasets (Table 1). Aged care eligibility assessment data identified the most cases, detecting a diabetes prevalence of 22.5% (95%CI 22.3–22.7). The NDI and LTC entry assessments identified the least number of cases, 6.2% (~14.4% of those who died and had ICD-

10AM codes recorded) and 14.0%, respectively. The ability to identify diabetes cases in pharmaceutical and hospital claims data increased with longer look-back periods. Each dataset identified unique diabetes cases that were not captured elsewhere (ranging from 0.2 to 1.0% of all residents). Agreement across a combination of two or three datasets is shown in Table S1, all with moderate to substantial agreement.

## DISCUSSION

Using five integrated routinely collected health and aged care data sources, we determined that nearly one in three LTC residents (28.2%) were living with diabetes. This is slightly higher than two recent Australian studies, where a prevalence of 24.8% was reported using entry into LTC assessments and nursing records ( $n = 9436$  residents, 68 LTC facilities)<sup>3</sup> and 18.2% from a clinical audit ( $n = 593$  residents, 10 LTC facilities).<sup>5</sup> In the present study, the prevalence of diabetes in NDI data was low because only conditions contributing to death are recorded. Similarly, only three chronic conditions impacting care can be recorded in

**TABLE 1** Diabetes case ascertainment using linked aged care and health administrative data sets ( $N = 175,235$  residents).

Data source	No. of diabetes cases, prevalence (% of total population, 95% CI)	No. of unique diabetes cases identified by this data sources (% , 95% CI)
Aged care eligibility assessment data, <sup>a</sup> $N = 174,324$	38,505 (22.0%, 21.8–22.2)	1699 (1.0%, 0.9–1.0)
Entry into long-term care assessment data, <sup>b</sup> $N = 173,840$	24,602 (14.0%, 13.9–14.2)	482 (0.3%, 0.3–0.3)
Pharmaceutical claims data		
1-year look-back, $N = 172,487$	33,367 (19.0%, 18.9–19.2)	764 (0.4%, 0.4–0.5)
3-year look-back, $N = 173,735$	35,779 (20.4%, 20.2–20.6)	1235 (0.7%, 0.7–0.7)
5-year look-back, $N = 174,056$	37,291 (21.3%, 21.1–21.5)	1730 (1.0%, 0.9–1.0)
10-year look-back, $N = 174,278$	39,414 (22.5%, 22.3–22.7)	2857 (1.6%, 1.6–1.7)
Hospitalization claims data		
1-year look-back, $N = 140,943^c$	22,669 (12.9%, 12.8–13.1)	1334 (0.8%, 0.7–0.8)
3-year look-back, $N = 156,151^d$	30,434 (17.4%, 17.2–17.5)	2116 (1.2%, 1.2–1.3)
5-year look-back, $N = 161,830^e$	33,470 (19.1%, 18.9–19.3)	2514 (1.4%, 1.4–1.5)
National Death Index, $N = 75,698^f$	10,879 (6.2%, 6.1–6.3)	302 (0.2%, 0.2–0.2)
All data sources combined, $N = 175,235^g$	49,421 (28.2%, 28.0–28.4)	NA

Abbreviations: CI, confidence interval; NA, not applicable.

<sup>a</sup>Health conditions recorded from Australian Aged Care Eligibility Assessments Program (ACAP) aimed at evaluating eligibility for accessing government-subsidized aged care services.

<sup>b</sup>Health conditions recorded from Aged Care Funding Instrument (ACFI) to assess level of care needs upon long-term care entry for funding purposes.

<sup>c</sup> $N = 179$  hospitalization diagnoses missing.

<sup>d</sup> $N = 238$  hospitalization diagnoses missing.

<sup>e</sup> $N = 316$  hospitalization diagnoses missing.

<sup>f</sup> $N = 12,855$  cause of death missing.

<sup>g</sup>Diabetes recorded in at least one dataset when all five data sources are combined.

LTC entry assessments, and conditions other than diabetes may be prioritized. Our examination of pharmaceutical claims using a 1-year look-back period found that 19.0% had diabetes, likely reflective that not all residents with diabetes are being actively treated with glucose lowering medicines, potentially leading to an under estimation of diabetes prevalence.

Our analysis is highly generalizable, as it includes all LTC facilities from two of Australia's most populous states that accounts for 58% of LTC residents nationally. Limitations include our inability to validate the cases against clinical records or determine diabetes type or diagnosis date.

In conclusion, there is a high burden of diabetes in Australian LTC facilities with nearly three in ten residents living with diabetes. Our findings suggest that only using one data source often underestimates diabetes prevalence, and therefore screening multiple data sources is recommended to comprehensively ascertain potential cases.

## AUTHOR CONTRIBUTIONS

Yohanes A. Wondimkun, Gillian E. Caughey, Maria C. Inacio, and Janet K. Sluggett conceived the study. All the authors participated in study design. Yohanes A. Wondimkun drafted the study protocol. Catherine Lang prepared the data for analysis. Yohanes A. Wondimkun analyzed the data. All the authors contributed to interpretation of results. Yohanes A. Wondimkun wrote the manuscript. All the authors critically reviewed the manuscript. All the authors read and approved the final manuscript.

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## CONFLICT OF INTEREST STATEMENT

Janet K. Sluggett is a nonexecutive director of Southern Cross Care SA, NT & VIC (aged care provider organization). All other authors declare no conflicts of interest.

## SPONSOR'S ROLE

This study had no sponsor.

## FINANCIAL DISCLOSURE

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## SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

**Table S1.** Agreement across linked aged care and health administrative datasets.

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