Identifying the need for simplification of type 2 diabetes mellitus treatment in residents of aged-care facilities: a meta-analysis and systematic review of the literature

LOWRI H THOMAS,1 PHILIP MS EVANS,2 ATUL KALHAN2

Abstract
Background: The management of type 2 diabetes mellitus (T2DM) in frail older adults is made challenging by the impact of physical and cognitive decline on self-monitoring of blood glucose (BG), administration of medications, especially injectable therapies, and risk of hypoglycaemia.

Aims and objectives: (1) To revisit the prevalence of hypoglycaemia in adults with T2DM living in aged-care facilities; (2) to evaluate the impact of simplification of T2DM treatment on quality of life (QOL), morbidity and mortality in this population; and (3) to identify higher risk older adults in whom simplification of therapy will be most appropriate.

Methods: MEDLINE was searched using the following concepts: aged-care facilities, T2DM, anti-diabetic therapies, morbidity, mortality and QOL. Results (and additional literature identified by citation checking) were screened and assessed against pre-defined eligibility criteria. Standardised structures for extracting, appraising and reporting the literature were used.

Results: Hypoglycaemia is common in adults with T2DM in aged-care facilities. Glycated haemoglobin (HbA1c) needs to be interpreted cautiously in this cohort, with additional capillary BG monitoring needed to identify individuals at risk of hypo- or hyperglycaemia. Simplification of T2DM treatment can reduce morbidity and mortality in frail older adults.

Conclusion: In residents of aged-care facilities, simplification of T2DM treatment can help deliver optimal individualised patient-centred care and improve QOL.

Key words: type 2 diabetes mellitus, aged-care facilities, frailty, dementia

Introduction
Type 2 diabetes mellitus (T2DM) is a significant global healthcare issue – a challenge intensified by our ageing population.1 By 2030, 5.5 million people in the UK will have T2DM,2 affecting 17% of those aged over 75 years.3

For older adults with T2DM, co-morbidities, polypharmacy and decreased functional reserve equates to greater personal and economic burden of disease: older adults are disproportionately affected by disease complications and hypoglycaemia, which can further impair quality of life (QOL) and accentuate physical and cognitive dependence.4

The global prevalence of T2DM in aged-care facilities (including residential and nursing homes) is estimated at 25–33%.5 Compared with age- and sex-matched controls, residents with T2DM experience accelerated physical and cognitive decline with increased hospital admissions, rapid acquisition of the frail phenotype and reduced life expectancy.6 Paradoxically, intensive glycaemic control, especially hypoglycaemia, is known to contribute to this decline.4

The International Diabetes Federation (IDF) recommends a glycated haemoglobin (HbA1c) of 53–64 mmol/mol in functionally dependent older adults, with lenience to <70 mmol/mol in individuals with frailty or dementia.5 This less intensive glycaemic target aims to balance vascular benefits against the risk of hypoglycaemia in older adults.7 HbA1c represents the average glycaemic control over an 8–12-week period and is not an ideal parameter for evaluating day-to-day fluctuation in blood glucose (BG) levels. Additionally, anaemia, haemoglobinopathies and renal impairment are relatively more common amongst older adults, resulting in a less reliable marker of glycaemic control in this cohort.

Hypoglycaemia is common and under-recognised in residents of aged-care facilities.4 This may reflect the dynamic nature of diabetes: disease and age-related changes to body composition, renal...
REVIEW

and hepatic dysfunction, reduced nutrition and cognitive impairment result in an increased risk of hypoglycaemia and an impaired ability to respond to lower BG levels. A re-evaluation of glycaemic targets and simplification of treatment can mitigate the risks posed by intensive therapeutic regimens. Over the last decade, novel oral glucose-lowering therapies have offered simplified treatments and additional cardiovascular and renovascular benefits. However, long-term data outcomes on their safety and efficacy in frail older adults are still to be robustly established.

Aims and objectives
We aimed to evaluate hypoglycaemia prevalence and HbA1c levels as semi-quantitative evidence of overtreatment in residents of aged-care facilities. In addition, we carried out a retrospective review of the literature to evaluate the impact of simplification of T2DM treatment on morbidity, mortality and QOL in this population. Finally, we suggest a possible approach to identify higher risk older adults in whom simplification of therapy will be most appropriate.

Methods
Searching the literature
In April 2020 the MEDLINE database was searched using text word and subject heading functions. The search incorporated the following concept areas: aged-care facilities, T2DM, anti-diabetic therapies, simplification of therapy, morbidity, mortality and QOL. Aged-care facilities include both residential and nursing homes. Appendix 1 (online at www.bjd-abcd.com) details the full search strategy used.

Selecting the literature
Results and additional literature identified through citation checking were screened by title and abstract to exclude literature clearly irrelevant to review. Thereafter, full-text articles were assessed against the following pre-defined eligibility criteria.

**Inclusion criteria:**
- Evaluates T2DM treatment in residents of aged-care facilities
- Observational or interventional study exploring the impact of simplification of T2DM treatment on morbidity, mortality and QOL
- Observational or interventional study exploring approaches to identify higher risk older adults in whom simplification of therapy will be most appropriate

**Exclusion criteria:**
- Non-English literature
- Non-peer reviewed literature
- Literature reviews, guidelines, opinions or editorials

Extracting, appraising and reporting the literature
Data extraction was guided by the Cochrane Collaboration’s template for data extraction. The Critical Appraisal Skills Programme checklists were used to guide appraisal while the write-up of this review was supported by the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) checklist.

Results
The search strategy yielded 88 results. Following screening by title and abstract, 27 records clearly irrelevant to review were excluded. The remaining 61 full-text articles were assessed for eligibility against the criteria detailed above. Of these, 43 records were excluded. These included 15 records not reflective of review focus, 13 literature reviews, guidelines, opinions or editorials, 10 inaccessible records, and 5 non-English studies (see Figure 1). The remaining 18 studies are included in this review.

We identified 18 studies which evaluated the prevalence of hypoglycaemia and the need for simplification in residents with T2DM in aged-care facilities (see Table 1). Based on a retrospective
Table 1: Evaluating the need for simplification of T2DM treatment in residents of aged-care facilities

<table>
<thead>
<tr>
<th>Study details</th>
<th>Study overview</th>
<th>Study design</th>
<th>Key results</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Niznik et al, 2020&lt;sup&gt;10&lt;/sup&gt;</td>
<td>To explore predictors for diabetes treatment deintensification</td>
<td>Retrospective cohort study of Veteran nursing home residents with advanced dementia or perceived to be at end of life</td>
<td>40% overtreated; 46% deintensified at 90 days. Predictors for deintensification: end of life, non-metformin OAD. Predictors against deintensification: high HbA&lt;sub&gt;1c&lt;/sub&gt;, insulin, obesity, peripheral arterial disease.</td>
<td>Quantifies overtreatment and poor deintensification; insulin as predictor against deintensification may reflect type 1 or Latent Autoimmune Diabetes of Adulthood (LADA).</td>
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<tr>
<td>Umpierrez et al, 2018&lt;sup&gt;11&lt;/sup&gt;</td>
<td>To explore outcomes of simplifying diabetes treatment with glargine or linagliptin monotherapy</td>
<td>Open-label randomised controlled trial of Aged-care facility residents on OAD or low-dose insulin and HbA&lt;sub&gt;1c&lt;/sub&gt; &gt; 58 mmol/mol</td>
<td>Significantly lower mean daily BG with linagliptin and glargine monotherapy compared with baseline. 34% absolute risk reduction in hypoglycaemia with linagliptin compared with glargine. No significant difference in HbA&lt;sub&gt;1c&lt;/sub&gt; at 6 months between linagliptin and glargine. No significant changes to all-cause hospital admissions in any intervention.</td>
<td>Demonstrates safety and efficacy of linagliptin monotherapy for simplification of diabetes treatment.</td>
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<tr>
<td>McCracken et al, 2017&lt;sup&gt;12&lt;/sup&gt;</td>
<td>To evaluate relationship between polypharmacy and overtreatment</td>
<td>Cross-sectional observational study of Aged-care facility residents</td>
<td>48% met definition for polypharmacy. Those with overtreated diabetes prescribed more antidiabetic treatment than those with higher HbA&lt;sub&gt;1c&lt;/sub&gt;.</td>
<td>Polypharmacy common and contributes to functional decline. No significant relationship between number of prescribed medications and overtreatment.</td>
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<tr>
<td>Retornaz et al, 2017&lt;sup&gt;13&lt;/sup&gt;</td>
<td>To evaluate relationship between HbA&lt;sub&gt;1c&lt;/sub&gt; and hypoglycaemia risk</td>
<td>Cross-sectional observational study of Aged-care facility residents with diabetes</td>
<td>Intensive glycaemic control in 60%. 19% affected by hypoglycaemia. Hypoglycaemia and sub-optimal glycaemic control more common in those taking insulin therapy. No significant correlation between HbA&lt;sub&gt;1c&lt;/sub&gt; and hypoglycaemia.</td>
<td>Identifies insulin therapy as most requiring review and simplification. HbA&lt;sub&gt;1c&lt;/sub&gt; levels not sufficient for hypoglycaemia risk detection. Capillary BG monitoring warranted in nursing home residents.</td>
</tr>
<tr>
<td>Walfridsson et al, 2016&lt;sup&gt;14&lt;/sup&gt;</td>
<td>To investigate clinical characteristics and prevalence of hypoglycaemia</td>
<td>Cross-sectional observational study of Aged-care facility residents with diabetes</td>
<td>Mean HbA&lt;sub&gt;1c&lt;/sub&gt; 56.0 mmol/mol. 43% with HbA&lt;sub&gt;1c&lt;/sub&gt; &lt; 52 mmol/mol. 24% affected by hypoglycaemia.</td>
<td>43% overtreated based on IDF HbA&lt;sub&gt;1c&lt;/sub&gt; targets in this population. Hypoglycaemia common.</td>
</tr>
<tr>
<td>Dharmarajan et al, 2016&lt;sup&gt;15&lt;/sup&gt;</td>
<td>To compare safety and efficacy of BB and SS insulin regimens</td>
<td>Randomised controlled trial of Aged-care facility residents with diabetes</td>
<td>Significantly lower fasting BG in those on BB insulin regimens compared to SS. No significant differences in the incidence of hypoglycaemia.</td>
<td>Simplified insulin regimen improves fasting BG. Three-day data collection period not adequate for observation of hypoglycaemic events. Evidence of safety and efficacy of simplified insulin regimens.</td>
</tr>
<tr>
<td>Bo et al, 2015&lt;sup&gt;16&lt;/sup&gt;</td>
<td>To investigate clinical characteristics and prevalence of hypoglycaemia</td>
<td>Cross-sectional observational study of Aged-care facility residents with diabetes</td>
<td>Cognitive impairment, functional dependence and co-morbidities are common among residents with diabetes. 55% with HbA&lt;sub&gt;1c&lt;/sub&gt; &lt; 53 mmol/mol. 6.6% experience hypoglycaemia.</td>
<td>Individuals who are frail and have dementia are particularly at risk of overtreatment. 55% overtreated based on IDF HbA&lt;sub&gt;1c&lt;/sub&gt; targets in this population.</td>
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Table 1 Evaluating the need for simplification of T2DM treatment in residents of aged-care facilities (continued)

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<thead>
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<td>Neumark et al, 2016</td>
<td>To explore clinical characteristics of older people with diabetes living at home (with and without additional care) and in nursing care homes</td>
<td>Type Population Sample size Intervention Outcome; Comparison Cross-sectional observational study Aged ≥80 with diabetes n = 277 Nil HbA1c residing at home, residing in residential care homes, residing in nursing care homes</td>
<td>Lower HbA1c in residents of nursing homes. HbA1c &lt;52 mmol/mol in 48% of nursing homes residents. 35% of those living at home with additional care, and 29% of those living at home independently. Insulin use more prevalent in nursing care homes.</td>
<td>48% overtreated based on IDF HbA1c targets in this population.</td>
</tr>
<tr>
<td>Abatecola et al, 2015</td>
<td>To investigate clinical characteristics and prevalence of hypoglycaemia</td>
<td>Type Population Sample size Intervention Outcome; Comparison Cross-sectional observational study Aged-care facility residents with diabetes n = 2258 Nil Fasting BG, postprandial BG, HbA1c, ADLs; anti-diabetic treatments</td>
<td>Hypoglycaemia observed in 18% of nursing home residents with dementia compared to 8% in residents without dementia. Residents on sulfonylurea therapy had increased odds ratio (8.8, CI 4.2 to 18.2) of severe hypoglycaemia. Rapid and analogue insulin therapy associated with reduced odds ratio (0.333, CI 0.184 to 0.602 and 0.248, CI 0.070 to 0.882 respectively) of severe hypoglycaemia.</td>
<td>Individuals with dementia are particularly at risk of hypoglycaemia. Cautious use of sulfonylurea therapy required. Rapid and analogue insulin therapy relatively safer.</td>
</tr>
<tr>
<td>Andreassen et al, 2014</td>
<td>To investigate clinical characteristics and prevalence of hypoglycaemia</td>
<td>Type Population Sample size Intervention Outcome; Comparison Cross-sectional observational study Aged-care facility residents with diabetes n = 742 Nil HbA1c nil</td>
<td>32% on insulin monotherapy. Mean HbA1c 57 mmol/mol. HbA1c &lt;53 mmol/mol in 46%. 60% identified at risk of hypoglycaemia based on capillary BG measurement.</td>
<td>Insulin therapy common - proportion who are insulin dependent unknown. 46% overtreated based on IDF HbA1c targets in this population. Capillary BG measurement has a broader reach to identify those at risk of developing hypoglycaemia.</td>
</tr>
<tr>
<td>Bouillet et al, 2010</td>
<td>To determine clinical characteristics by antidiabetic therapy</td>
<td>Type Population Sample size Intervention Outcome; Comparison Cross-sectional observational study Aged-care facility residents with diabetes aged ≥65 years n = 100 Nil HbA1c; nil</td>
<td>32% with HbA1c &lt;47.5 mmol/mol.</td>
<td>32% overtreated based on IDF HbA1c targets in this population.</td>
</tr>
<tr>
<td>Sjoblom et al, 2008</td>
<td>To compare safety and efficacy of deintensification of diabetes treatment</td>
<td>Type Population Sample size Intervention Outcome; Comparison Open-label non-randomised controlled trial Aged-care facility residents with diabetes and HbA1c ≤42 mmol/mol n = 98 Cessation of OADs, cessation of insulin &lt;20 units and halving of insulin &gt;20 units HbA1c; hypoglycaemia; baseline</td>
<td>6-month 7 mmol/mol mean HbA1c increase in those undergoing deintensification. 6-month post-intervention mean remained low at 40 mmol/mol. Deintensification caused no significant changes to all-cause hospital admissions or mortality.</td>
<td>Demonstrates safety and efficacy of deintensification of diabetes treatment.</td>
</tr>
<tr>
<td>Meyers et al, 2007</td>
<td>To investigate variability of HbA1c</td>
<td>Type Population Sample size Intervention Outcome; Comparison Cross-sectional observational study Aged-care facility residents with diabetes n = 168 Nil HbA1c; nil</td>
<td>Mean HbA1c 54.1 mmol/mol. Age correlation with HbA1c lowest among the oldest. Higher HbA1c with insulin use. No correlation between HbA1c and self-perceived health and life expectancy.</td>
<td>Suggests the oldest and frailest at increased risk of hypoglycaemia. HbA1c may not have self-perceived impact on quality of life.</td>
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Evaluating the need for simplification of T2DM treatment in residents of aged-care facilities (continued)

**Study overview**

**Key results**

**Study design**

**Comments**

**Part A: Evaluating the need for simplification of T2DM treatment in residents of aged-care facilities**

Management of T2DM in frail older adults poses special challenges as a reduction in functional capacity, development of comorbidities, polypharmacy, cognitive decline and frailty warrants dynamic re-evaluation of glycaemic targets. The vascular benefits of intensive control need to be weighed against risks posed by hypoglycaemia, with focus on simplification of the therapeutic regimen and adaptation of an individualised approach.

Multiple observational and cross-sectional studies have investigated the prevalence of hypoglycaemia and used HbA1c as a marker of glycaemic control. We identified 16 studies (collectively involving 7,869 aged-care residents with T2DM) in which data were collected and compared to evaluate glycaemic control. Among these studies, the mean HbA1c was 51.9 mmol/mol (95% CI 52.0 to 51.8 mmol/mol; Figure 2). However, of the five studies reporting grouped values, HbA1c <53 mmol/mol was seen in 43–55%, with the IDF recommending a target HbA1c of 58 mmol/mol. No difference between HbA1c in those with diabetes in the community or in aged-care facilities. Those in aged-care facilities are more likely to experience general decline: ulcers, necrosis, recurrent infections, peripheral arterial disease.

Emphasises general propensity towards frailty in residents of aged-care facilities.

Mean HbA1c 58 mmol/mol. No difference between HbA1c in those with diabetes in the community or in aged-care facilities. Co-morbidities and polypharmacy contribute to disease and age-mediated decline. Insulin therapy common - proportion who are insulin dependent unknown.

Mean HbA1c 56 mmol/mol. Co-morbidities and polypharmacy common. 27% on insulin. Co-morbidities and polypharmacy contribute to disease and age-mediated decline. Insulin therapy common - proportion who are insulin dependent unknown.

**Discussion**

**Part A: Evaluating the need for simplification of T2DM treatment in residents of aged-care facilities**

Management of T2DM in frail older adults poses special challenges as a reduction in functional capacity, development of comorbidities, polypharmacy, cognitive decline and frailty warrants dynamic re-evaluation of glycaemic targets. The vascular benefits of intensive control need to be weighed against risks posed by hypoglycaemia, with focus on simplification of the therapeutic regimen and adaptation of an individualised approach.

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Emphasises general propensity towards frailty in residents of aged-care facilities.

Mean HbA1c 58 mmol/mol. No difference between HbA1c in those with diabetes in the community or in aged-care facilities. Co-morbidities and polypharmacy contribute to disease and age-mediated decline. Insulin therapy common - proportion who are insulin dependent unknown. Hypoglycaemia relatively common. Basal insulin under-utilised.

Mean HbA1c 56 mmol/mol. Co-morbidities and polypharmacy common. 27% on insulin. Co-morbidities and polypharmacy contribute to disease and age-mediated decline. Insulin therapy common - proportion who are insulin dependent unknown.

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Simplification of type 2 diabetes mellitus treatment in aged-care facility residents

Study design

Key results

Study overview

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- 609 Kalhan.qxp_Layout 1  25/03/2021  17:04  Page 6

6.6% to 60%,

prevalence of hypoglycaemia based on these studies ranged from

the prevalence of hypoglycaemia in aged-care facility residents. The

can be especially vulnerable to developing severe hypoglycaemia com-

cared for nutrition and injectable therapy) due to their susceptibility to BG

fluctuation. HbA1c levels can also be falsely high or low due to

anaemia, polycythaemia or renal impairment, which become more

prevalent with ageing. Andreassen et al9 found capillary BG mea-

surements to have a broader reach in identifying older adults at risk

doing deintensification. 6-month post-intervention mean

remained low at 40 mmol/mol. Deintensification caused no

significant changes to all-cause hospital admissions or mortality.

Table 2  Simplification of type 2 diabetes mellitus treatment in aged-care facility residents

<table>
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<tr>
<th>Study details</th>
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</tr>
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</table>
| Umpierrez et al, 201811 | To explore outcomes of simplifying diabetes treatment with glargine or linagliptin monotherapy | Type: Open-label randomised controlled trial  
Aged-care facility residents on OAD or low-dose insulin and HbA1c >58 mmol/mol  
n = 140  
Glargine monotherapy or linagliptin monotherapy  
Mean daily BG, hypoglycaemia, HbA1c, hospital admission, emergency department visits; baseline, glargine monotherapy, linagliptin monotherapy | Significantly lower mean daily BG with linagliptin and glargine monotherapy compared with baseline. 34% absolute risk reduction in hypoglycaemia with linagliptin compared with glargine. No significant difference in HbA1c at 6 months between linagliptin and glargine. No significant changes to all-cause hospital admissions in any intervention. | Demonstrates safety and efficacy of linagliptin monotherapy for deintensification of diabetes treatment. |
| Dharmarajan et al, 201615 | To compare the safety and efficacy of BB and SS insulin regimens | Type: Randomised controlled trial  
Aged-care facility residents with diabetes  
n = 64  
SS insulin regimen, BB insulin regimen  
Fasting BG, hypoglycaemia, hyperglycaemia, adverse events; BB and SS | Significantly lower fasting BG in those on BB insulin regimens compared with SS. No significant differences in the incidence of hypoglycaemia. | Simplified insulin regimen improves fasting BG. Three-day data collection period not adequate for observation of hypoglycaemic events. Evidence of safety and efficacy of simplified insulin regimens. |
| Sjoblom et al, 200821 | To compare the safety and efficacy of deintensification of diabetes treatment | Type: Open-label non-randomised controlled trial  
Aged-care facility residents with diabetes and HbA1c >42 mmol/mol  
n = 98  
Cessation of OADs, cessation of insulin <20 units and halving of insulin >20 units; HbA1c, hypoglycaemia; baseline  
6-month 7 mmol/mol mean HbA1c increase in those undergoing deintensification. 6-month post-intervention mean remained low at 40 mmol/mol. Deintensification caused no significant changes to all-cause hospital admissions or mortality. | 6-month 7 mmol/mol mean HbA1c increase in those undergoing deintensification. 6-month post-intervention mean remained low at 40 mmol/mol. Deintensification caused no significant changes to all-cause hospital admissions or mortality. | Demonstrates safety and efficacy of deintensification of diabetes treatment. |

BB, basal bolus; BG, blood glucose; HbA1c, glycated haemoglobin; OAD, oral antidiabetic drug; SS, sliding scale.

53–64 mmol/mol in functionally dependent older adults, with  
leucine to <70 mmol/mol in those frail or living with dementia,9  
this suggests significant overtreatment of this population cohort.

Interestingly, higher HbA1c levels were also associated with an  
increased risk of developing hypoglycaemia,10,13,14 reflecting poor  
glycaemic control at both ends of the HbA1c spectrum. HbA1c is a  
poor marker of glucose variability and needs to be interpreted cau-

tiously in older adults (especially those dependent on carers for nu-

tion and injectable therapy) due to their susceptibility to BG

fluctuation. HbA1c levels can also be falsely high or low due to

anaemia, polycythaemia or renal impairment, which become more

prevalent with ageing. Andreassen et al9 found capillary BG mea-

surements to have a broader reach in identifying older adults at risk

doing hypoglycaemia than HbA1c levels.

We identified 10 observational studies which have reported on

the prevalence of hypoglycaemia in aged-care facility residents. The

prevalence of hypoglycaemia based on these studies ranged from

6.6% to 60%,10,11,13,14,16,18,19,24,26,27 reflecting it to be a common and  
avoidable risk factor associated with increased morbidity in this age

group. Indeed, of the 44 nursing homes approached by Hurley et

al, 19% reported hypoglycaemic events as “frequent” among its

residents.28

Insulin therapy was commonly associated with the greatest

risk of hypoglycaemia compared with other treatment modal-

ities,10,11,13,14,16,24,27 highlighting this therapy as the most in need of

review and simplification. An exception to this was a study by

Abbatecola et al who observed a lower risk of severe hypogly-

caea associated with rapid and analogue insulin (OR 0.333, 95%  
CI 0.184 to 0.602 and OR 0.248, 95% CI 0.070 to 0.882, respec-


tively) compared with sulphonylurea therapy (OR 8.8, 95% CI 4.2 to  
18.2).13 This study also reported residents with dementia (18%) to be  
especially vulnerable to developing severe hypoglycaemia com-

pared with residents without dementia (8%).13 Multiple other stud-

ies have reported an increased risk of sulphonylurea-induced

hypoglycaemia in residents with dementia.16,18

Part B: Simplification of T2DM treatment in residents of  
aged-care facilities

There is limited literature exploring simplification of T2DM treat-

ment in this population. We identified three such studies which  
provide a regimen for simplification of T2DM management in res-

idents of aged-care facilities. These studies showed marked hetero-

geneity in population selection, intervention used for simplification  
and reported outcomes, making direct comparison non-viable. For  
example, Sjoblom et al explored different strategies for simplifica-

tion including switching insulin to oral antidiabetic drugs, cessation  
of insulin <20 units and halving of insulin >20 units.21 Dharmarajan  
et al explored simplifying insulin regimens from sliding scale (SS) to
basal bolus (BB). A study by Umpierrez et al was the only one to compare basal insulin (glargine) with DPP4 inhibitor (linagliptin) monotherapy.11 Of the two studies reporting BG levels, both showed reduced glycaemic variability with simplified treatment. For example, compared with baseline, linagliptin monotherapy resulted in significantly lower mean daily BG.11 A 34% absolute risk reduction in residents affected by hypoglycaemia was also demonstrated when compared with those receiving insulin.11 Similarly, Dharmarajan et al demonstrated significantly lower fasting BG in those on BB insulin regimens compared with SS.15 Here, there were no significant differences in the incidence of hypoglycaemia, although data collection for this occurred over a three-day period only.15

Two of the studies used HbA1c to report the impact of simplification on glycaemic control. Although Sjoblom et al reported a 7 mmol/mol mean HbA1c increase, the 6-month post-intervention mean remained low at 40 mmol/mol.21 When compared with insulin therapy, linagliptin showed no significant difference in HbA1c at 6 months.11 In addition, simplification caused no significant changes to all-cause hospital admissions11,21 or mortality.21

Our systematic review of the literature provides further evidence to support a well-formed consensus: residents with T2DM in aged-care facilities are often subject to intensive glycaemic control and hypoglycaemia. In older adults with T2DM, intensive glycaemic control, especially hypoglycaemia, contributes to accelerated physical and cognitive decline, hospital admissions, frailty and reduced life expectancy.4 Although limited by scarcity of randomised controlled trials, this review suggests that simplification of T2DM treatment can effectively reduce hypoglycaemia risk without compromising glycaemic control in this population.11,15,21 Additionally, simplification may also benefit QOL by reducing tablet, injection and BG monitoring burden for both residents and carers.29

Part C: Identification of residents most likely to benefit from simplification of T2DM treatment

Identifying aged-care facility residents most likely to benefit from simplification of therapy has not received much focus. Evaluating glycaemic control in this cohort is challenging as factors such as cognitive impairment, frailty, reduced functional reserve and depression may make self-monitoring of BG and reporting of osmotic symptoms difficult.

HbA1c measurement remains a relatively insensitive tool to screen those at risk of developing hypoglycaemia.10,13,14 Capillary BG monitoring should supplement HbA1c monitoring in identifying
Key messages

- Hypoglycaemia is a common and preventable cause of increased morbidity and mortality in residents of aged-care facilities.
- Capillary blood glucose monitoring should supplement HbA1c monitoring in evaluating glycaemic control in frail adults.
- Continuous glucose monitoring in older adults deemed at high risk of hypoglycaemia offers a novel and pragmatic approach with potential to improve quality of life.
- Simplification of type 2 diabetes therapy should be considered in most residents of aged-care facilities, especially in the presence of frailty and dementia.

Older adults most vulnerable to develop hypoglycaemia. Short- or medium-term continuous glucose monitoring in aged-care facility residents deemed at high risk of hypoglycaemia offers a pragmatic approach and a far more comprehensive reflection of glycaemic control. The number of antidiabetic prescriptions has not been observed to show correlation with hypoglycaemia risk. Care is needed to avoid cessation of insulin in those with type 1 diabetes mellitus or Latent Autoimmune Diabetes of Adulthood (LADA). As such, further work is needed to explore whether an insulinopenic phenotype suggested by history, low or low-normal body mass index, previous diabetic ketoacidosis, presence of anti-GAD or anti-islet cell antibodies or strong personal history of autoimmunity conditions correctly identifies those with insulin dependency. Similarly, preserved urinary C-peptide:creatinine can give biochemical reassurance of residual pancreatic β cell function and confidence to simplify diabetic treatment.

Selecting a safe and individualised regimen for simplification remains integral in delivering biological, not chronological, patient-centred care – a principal central to all discussions in this review.

Conclusions

In summary, simplification of treatment should be considered in most residents with T2DM living in aged-care facilities, especially in the presence of dementia and frailty. Treatment regimens need to be individualised with simplification of the insulin regimen and/or switching to oral glucose-lowering medications wherever possible. At the time of writing this review, the COVID-19 pandemic reminds us that keeping our older adults with diabetes safe, reducing their dependence on caregivers for administration of tablets, injections and BG monitoring, is far more important now than it has been ever before.

Conflict of interest None.

Funding None.

References


Appendix 1. Full MEDLINE search

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