JAMDA 14 (2013) 809–816

JAMDA

journal homepage: www.jamda.com

Review

Insulin Use in Long Term Care Settings for Patients With Type 2 Diabetes Mellitus: A Systematic Review of the Literature

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Keywords:
Insulin
nursing homes
geriatrics

A B S T R A C T

Objective: To summarize currently available data about insulin therapy in patients with diabetes mellitus (DM), focusing on patients with type 2 DM (T2DM), in long term care (LTC) settings.
Data Sources: Ovid Medline, EMBASE, Cochrane Library databases, and United Kingdom National Health Service (NHS) Economic Evaluation Database, last accessed on November 12, 2012.
Study Eligibility Criteria: We included studies that reported insulin use in patients with T2DM, and studies with combined samples of patients with type 1 DM or T2DM, that were conducted in LTC settings. Excluded were review articles and studies published before 2000.
Results: We identified 11 articles that met all inclusion and exclusion criteria. Insulin use in patients with DM in LTC settings varied widely, from 2.7% to 58.0%. It is difficult to draw conclusions from these proportions, as many studies did not define whether their populations were exclusively patients with T2DM. Despite recommendations against its use by the American Diabetes Association, the American Geriatrics Society, and the American Medical Directors Association, treatment with sliding-scale insulin (insulin injections adjusted to current blood glucose levels) was prevalent in the LTC setting. Although the recommended target hemoglobin A1c (A1C) for this patient population varies from ≤6.5% to ≤8.0%, higher A1C values (8.0%–8.9%) were associated with better patient outcomes in a study examining insulin treatment in community-dwelling elderly patients enrolled in an outpatient LTC setting. Insulin pen-devices seemed associated with a high incidence of needle-stick injuries in workers in LTC settings but, compared with insulin vials, showed cost advantages for use in very short-term (≤30 days) patients with DM in LTC settings.
Limitations: Paucity of available data; only published studies for which full-text articles could be retrieved and which were identified by our search strategy were included; insufficient detail about patient samples were available in many included studies; and potential biases across studies might be introduced by funding sources or study designs.
Conclusions: Available data about insulin therapy in patients with DM in LTC settings are very scarce and great treatment variability of this patient population seems to prevail in the current clinical practice. Additional, randomized, prospective clinical trials are needed to expand our knowledge and allow clinicians to make informed treatment decisions for patients with DM in LTC settings.

Diabetes mellitus (DM) is prevalent, estimated at 25% to 30% of all patients in long term care (LTC) settings, according to studies conducted in the United States.[1,2] The LTC setting consists of a variety of services and includes medical and nonmedical care for people who have a chronic illness or disability.[3] These LTC services can be provided at home, in the community, in assisted living facilities, or in nursing homes. Several types of LTC facilities exist: home health, independent living, intermediate care, assisted living, skilled nursing, and subacute care. There are 2 distinct LTC resident populations: long-term stay (more than 100 days)[4] residents and short-term stay (less than 100 days) residents. During the first 100 days of a patient's stay, LTC facilities are financially at risk for the pharmaceutical utilization of residents who are admitted from hospitals. This financial risk is often a driving factor for medication

This systematic review was funded by Eli Lilly and Company.
KVB, BC, and RdCC are full-time employees and stockholders of Eli Lilly and Company. AH is a full-time employee of inVentiv Health Clinical, LLC. Eli Lilly and Company contracted inVentiv Health Clinical, LLC, for writing and editorial services.
The authors declare no conflicts of interest.
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http://dx.doi.org/10.1016/j.jamda.2013.08.018

reductions.[5] The financial problems of LTC facilities associated with short-term stay residents have increased in recent years because more admissions to these facilities are coming from acute care facilities discharging very sick patients with extensive medication needs,[5] which frequently include long periods of intravenous antibiotics.[6]

Treatment of Type 2 Diabetes Mellitus in the LTC Setting

The American Medical Directors Association (AMDA) released target treatment recommendations specifically for the population of elderly patients with type 2 diabetes mellitus (T2DM) in an LTC setting.[1] However, implementing treatment strategies for patients in the LTC setting is often more complex than implementing treatment strategies for the general T2DM population (while acknowledging the need for individualized treatment approaches for outpatients with T2DM who also face treatment challenges). Patients in LTC settings are likely to have compromised functional and cognitive status along with significant comorbidities that will affect the therapeutic strategy.[7] A tailored approach is recommended for LTC patients, with hemoglobin A1c (A1C) goals adapted to each patient based on life expectancy, frailty, presence of comorbidities, cognitive impairment, functional disability, resources, and support system.[8,9] In a Consensus Development Conference on Diabetes and Older Adults in 2012, the American Diabetes Association (ADA) developed the following guideline for A1C goals in this patient population: for relatively healthy patients (few coexisting conditions, intact cognitive and functional status) with a longer remaining life expectancy, an A1C goal of lower than 7.5% is recommended; for more complex patients with an intermediate health status (multiple coexisting conditions or mild to moderate cognitive impairment) the A1C goal should be adjusted to lower than 8.0%; and for very complex patients with poor health status (LTC or end-stage chronic illnesses or moderate to severe cognitive impairment) and limited remaining life expectancy, an A1C goal of lower than 8.5% can be acceptable.[9] The position statement on DM management in older people (not focused on patients in LTC settings) by the International Association of Gerontology and Geriatrics, the European Diabetes Working Party for Older People, and the International Task Force of Experts in Diabetes recommends an A1C target range of 7.0% to 7.5%, which may be adjusted to reduce the risk of hypoglycemia in patients with functional dependence, care home residency, dementia, or those who receive end-of-life care.[10]

It is recommended to individualize blood glucose monitoring based on patient needs and goals.[1] Dietary restrictions for patients in LTC settings generally are not recommended, so that adverse outcomes associated with malnutrition can be avoided.[1,11] Recently published guidelines of the ADA, in conjunction with the American Geriatrics Society (AGS), highlight the importance of monitoring and encouraging fluid intake to diminish the risk of volume depletion and hyperglycemic crises.[9] An additional issue in LTC facilities is frequent staff turnover, which leads to unfamiliarity with vulnerable patient management. Implementing evidence-based policies for glycemic control, use of insulin, and treatment of hypoglycemia can alleviate risks caused by frequent staff turnover.[9]

Given such complexity, it is no surprise that data from several studies suggest that a significant number of residents in LTC settings receive suboptimal diabetes care.[12] Reviews of glycemic targets and treatment strategies for T2DM in LTC settings have identified gaps in both the knowledge of treatment strategies and understanding of how providers modify target goals for A1C.[13] Noted are the need for future research to improve understanding of “optimal glycemic control” and the best way to implement treatment regimens in these challenging treatment environments.[14]

Use of Insulin in the LTC Setting

Although recent reviews have examined the use of insulin to treat elderly patients with DM,[15] little focus has been given to analyzing the existing evidence on the use of insulin in the LTC setting. Many elderly patients with T2DM require, or will eventually require, insulin to achieve or maintain their glycemic goals.[16] However, insulin therapy is often underused in elderly patients.[14]

AMDA recommends a 3-tiered approach to diabetes management in residents of LTC facilities. If possible, metformin therapy should be initiated with lifestyle modification as a first tier.[16] If metformin is contraindicated and fasting glucose levels are significantly elevated, initiation of basal insulin should be considered. In medically unstable residents with blood glucose levels that are consistently higher than 180 mg/dL, more intensive insulin regimens may be indicated as first-line therapy. If metformin and lifestyle modifications fail to achieve adequate blood glucose control, use of additional oral agents or initiation of insulin therapy should be the second tier in the approach to diabetes management. Finally, the third tier should be initiation of intensification of insulin therapy if diet, exercise, and oral agents do not achieve adequate blood glucose control or if oral agents are contraindicated.[16]

Sliding-scale insulin (SSI) treatment is not recommended because of the retrospective treatment of hyperglycemia (patients receive an insulin injection after an elevated blood glucose value has been determined) and lack of efficacy evidence.[1] Despite numerous criticism of the SSI approach, recent research has found the procedure continues to be used.[14] The ADA/AGS guidelines discourage the use of SSI alone for chronic glycemic management in LTC facilities.[9]

Although AMDA does not recommend prolonged use of SSI, the organization does acknowledge that SSI treatment may be useful in residents of LTC settings newly diagnosed with diabetes or in transition phases when new therapies are initiated.[16] However, SSI treatment should be reevaluated within 1 week of initiation and converted to fixed daily insulin doses.[16]

Objective of This Review Article

Although many publications examined the use of insulin and the treatment of diabetes in the elderly, little focus has been given to synthesize the existing evidence around the use of insulin in the LTC population specifically. As such, the purpose of this structured review is to summarize the currently available literature about the use of insulin in the treatment of patients with DM, specifically focusing on patients with T2DM in the LTC setting. The intention of this literature review is to inform future research and serve as a foundation for possible study designs.

Methods

This review follows guidelines proposed by the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) Group.[17] No review protocol was registered for this study. Included were original articles reporting insulin treatment in elderly LTC residents diagnosed with DM, with a focus on T2DM. To find eligible studies, abstracts were screened and selected from accepted scientific databases based on the following inclusion and exclusion criteria.

Inclusion Criteria

1. Study involved the use of insulin (mealtime, basal, or other).
2. Study involved sample of patients with T2DM, or diabetes not otherwise specified (assumed to be combined sample of patients with T1DM and T2DM).