



## Comment on Hypoglycemia and hyperglycemia are risk factors for falls in the hospital population by Berra et al.

Aldo Bonaventura<sup>1,2</sup> · Alessandra Vecchie<sup>1,2</sup> · Salvatore Carbone<sup>1</sup> · Fabrizio Montecucco<sup>3,4</sup> · Antonio Abbate<sup>1</sup>

Received: 25 May 2019 / Accepted: 7 June 2019 / Published online: 22 June 2019  
© Springer-Verlag Italia S.r.l., part of Springer Nature 2019

Dear Editor

We read with interest the paper *Hypoglycemia and hyperglycemia are risk factors for falls in the hospital population* by Berra et al. [1]. In their study, Berra and colleagues showed that glucose values < 70 mg/dL and > 200 mg/dL were significantly associated with falls in hospitalized patients (those admitted to the intensive care unit were not considered) [1].

Hypoglycemia represents a common side effect of sulfonylureas, glinides, and insulin and can expose patients to complications, such as falls, fractures, cardiovascular events (e.g., arrhythmias), and death, particularly among older adults [2].

Berra et al. focused their attention on hypoglycemia and hyperglycemia in hospitalized patients evaluating a very large number of patients ( $n = 57,411$  patients) retrieved by electronic medical records (EMRs). Although allowing to work on a high number of patients, EMRs may miss important elements. For instance, the authors did not consider

glycated hemoglobin of patients, which represents an important tool to assess the glycemic control. Furthermore, the authors did not present data on the different classes of oral glucose-lowering agents used during the hospital stay. For instance, sulfonylureas are the second most commonly prescribed glucose-lowering drugs in the general population with type 2 diabetes mellitus (T2DM) [3] and significantly increase the risk of hypoglycemia and consequently of falls. Such information would have allowed for a better stratification of the patients included in the study and strengthen the message to tailor the therapeutic approach to diabetes also in the hospital setting, where insulin is recommended as the preferred therapeutic choice [4].

Newer agents, such as the sodium–glucose co-transporter (SGLT)-2 inhibitors and the glucagon-like peptide-1 receptor agonists (GLP-1RAs), present a very low risk of hypoglycemia, particularly when used in monotherapy or combination therapy with each other or biguanides. In addition, many agents belonging to these classes (i.e., empagliflozin, canagliflozin, dapagliflozin, liraglutide, semaglutide, and albiglutide) have shown to reduce cardiovascular events in patients with T2DM [5]. Hence, it would have been interesting knowing how many patients were treated with these glucose-lowering agents in the study from Berra et al. [1].

The authors also stated that in the multivariate analysis, glycemia < 70 mg/dL or > 200 mg/dL was associated with a 57% increase in the risk of falls, thus suggesting the clinical relevance of glucose control in the hospital setting. However, we would like to highlight that although the authors seem to suggest that sex, age, emergency room vs. elective admission, glucose-lowering drugs, medicine vs. surgery admission, and Charlson index were significantly associated with falling at the multivariate analysis, Fig. 1a may suggest that only the last two variables reached a statistical significance. Interestingly, if on the one hand the use of insulin was associated with a threefold increase in falls, on the other hand insulin-treated patients showed a greater, although not statistically significant, glycemic control, defined as number

Managed by Massimo Porta.

This comment refers to the article available at <https://doi.org/10.1007/s00592-019-01323-8>.

✉ Aldo Bonaventura  
aldo.bonaventura@vcuhealth.org;  
aldo.bonaventura@edu.unige.it

<sup>1</sup> Division of Cardiology, Department of Internal Medicine, VCU Pauley Heart Center, Virginia Commonwealth University, 1200 East Marshall Street, Richmond 23298, Virginia, USA

<sup>2</sup> First Clinic of Internal Medicine, Department of Internal Medicine, University of Genoa, 6 viale Benedetto XV, 16132 Genoa, Italy

<sup>3</sup> First Clinic of Internal Medicine, Department of Internal Medicine and Centre of Excellence for Biomedical Research (CEBR), University of Genoa, 6 viale Benedetto XV, 16132 Genoa, Italy

<sup>4</sup> IRCCS Ospedale Policlinico San Martino Genova–Italian Cardiovascular Network, 10 Largo Benzi, 16132 Genoa, Italy

of recorded blood glucose values between 70 and 200 mg/dL compared to patients treated with other glucose-lowering drugs. This finding further confirms the usefulness of insulin in the hospital setting when managing hyperglycemia, but also underpins that a more stringent control of blood glucose allows to timely modify the therapy based on circumstances.

In sum, the article by Berra et al. investigated a very important topic for all hospital providers since diabetes is a very commonly encountered disease. In spite of some limitations due to the observational nature of the study, their analysis included a very high number of patients and draw important conclusions to enhance the management of patients with diabetes in the clinical practice. Further prospective randomized controlled studies are clearly warranted to determine the best therapeutic options for hospitalized patients with diabetes.

**Authors' contributions** All authors contribute to the manuscript.

### Compliance with Ethical Standards

**Conflict of interest** All authors declare that they have no conflict of interest.

### References

1. Berra C, De Fazio F, Azzolini E, Albini M, Zangrandi F, Mirani M, Garbossa S, Guardado-Mendoza R, Condorelli G, Folli F (2019) Hypoglycemia and hyperglycemia are risk factors for falls in the hospital population. *Acta Diabetol*. <https://doi.org/10.1007/s00592-019-01323-8>
2. Bonaventura A, Montecucco F, Dallegrì F (2015) Update on strategies limiting iatrogenic hypoglycemia. *Endocr Connect* 4(3):R37–45. <https://doi.org/10.1530/EC-15-0044>
3. Mendez CE, Umpierrez GE (2014) Pharmacotherapy for hyperglycemia in noncritically ill hospitalized patients. *Diabetes Spectr* 27(3):180–188. <https://doi.org/10.2337/diaspect.27.3.180>
4. Beltramello G, Manicardi V, Trevisan R (2013) Trialogue: managing hyperglycaemia in internal medicine: instructions for use. *Acta Diabetol* 50(3):465–473. <https://doi.org/10.1007/s00592-013-0462-1>
5. Bonaventura A, Carbone S, Dixon DL, Abbate A, Montecucco F (2019) Pharmacologic strategies to reduce cardiovascular disease in type 2 diabetes mellitus: focus on SGLT-2 inhibitors and GLP-1 receptor agonists. *J Intern Med*. <https://doi.org/10.1111/joim.12890>

**Publisher's Note** Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.