

Glucometer Control Solution Underused by Patients With Diabetes

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Katherine S. O'Neal, PharmD, and Jeremy L. Johnson, PharmD, University of Oklahoma, Tulsa, Oklahoma, USA, presented the results of a study demonstrating that patients, pharmacists, and physicians are often unaware of the importance of control solution use for ensuring glucometer accuracy in individuals with diabetes mellitus (DM) who utilize self-monitoring of blood glucose (SMBG).

SMBG is an essential component of therapy for DM, but the accuracy of blood glucose readings is dependent on the accuracy of the glucometer itself and on the user's technique. Although the US Food and Drug Administration (FDA) uses guidelines from the International Organization for Standardization (ISO) to set accuracy requirements for all meters marketed in the US, many glucometers fail to meet the ISO 2003 accuracy guidelines requiring that 95% of meter test results must be within $\pm 20\%$ of the true blood glucose level [Freckmann G et al. *Diabetes Technol Ther* 2010; ISO 15197 2003]. The recently updated ISO guidelines, which now require 99% of meter results to fall in the range $\pm 15\%$ of the true value, have yet to be adopted by the FDA, and will be even harder to meet [ISO 15197 2013]. Many manufacturers also fail to investigate incorrect glucometer readings due to the lack of control solution use by patients or health care providers [Melker RJ. *Diabetes Care* 2003].

With this in mind, Drs. O'Neal and Johnson conducted a prospective, observational survey-designed study to identify potential barriers to control solution use from the perspectives of the patient, pharmacist, and provider.

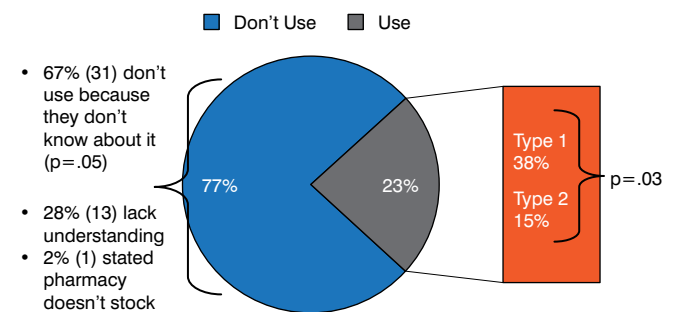
The primary outcomes of the study were to assess the availability of control solution in community pharmacies, determine whether patient demographic factors influenced the use of control solution, and identify whether patient, pharmacist, or prescriber perceptions of control solution use influenced its correct use.

The researchers initially visited 25 pharmacies in Tulsa to determine whether they visibly stocked the control solution. They subsequently conducted telephone interviews with pharmacists from these 25 stores, and with 60 patients (age range, 6 to 94 years; mean, 36 years) who had a diagnosis of type 1 (43%; $n = 26$) or type 2 (57%; $n = 34$) diabetes of ≥ 1 -year duration and who utilized SMBG at least once a week. A web-based survey comprising 32 physicians was also conducted.

During the pharmacy visits, the researchers determined that only 1 of the 25 pharmacies displayed the control solution where it was easily visible. Although all pharmacists were familiar with the control solution, only 61% felt that its use should be part of routine practice, 39% indicated that they stocked the solution, and only 14% always recommended its use.

Although 98% of patients perceived SMBG as an important aspect of achieving glycemic control, only 23% indicated that they used the control solution. Of the remaining 77% who did not use the control solution, 67% were unaware of it, 28% lacked an understanding of it, and 2% indicated that their pharmacy did not stock it. Patients with type 1 DM were significantly more likely to use control solution than those with type 2 DM (38% vs 15%; $p = .03$; Figure 1). However, its use was not influenced by time since diagnosis ($p = .9$), receipt of formal diabetes education ($p = .7$), testing frequency, or the level of diabetes control ($p = .1$).

Figure 1. Control Solution Use by Patients With Diabetes Mellitus



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Whereas 62% of physicians were familiar with the control solution, only 56% always recommended its use. This 56% is based on the number of providers who reported that control solution use should be routine practice. This figure also contains collapsed data from always recommending to recommending in certain situations only.

The results of this study therefore identify opportunities for diabetes educators to inform patients, providers, and pharmacists about the importance of control solution usage. The researchers concluded that there is a statistical difference between type 1 and type 2 DM patients; however, further research should be conducted to determine if this difference is due to the clinic environment or the education received in the different clinics.