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ORIGINAL ARTICLES

Analysis of the Comparison of Lancing Devices for Self-Monitoring of Blood Glucose Regarding Lancing Pain

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Abstract

Reducing barriers to self-monitoring of blood glucose (SMBG) remains an ongoing goal. One major reported barrier is lancing pain. This analysis was written in response to the article by Kocher and associates in this issue of Journal of Diabetes Science and Technology in which 157 patients with diabetes experienced in the use of SMBG compared high market share blood glucose monitoring systems and lancing devices.

Upon review of their findings, we found that their conclusions—Accu-check systems and lancing devices were preferred—were valid within the limitations of the study. However, we noted some factors that would warrant further study and possibly change the outcome. Information from this and other studies on the topic will be useful as a reference for patients and providers in working towards removing barriers to SMBG.

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Blood glucose checking is an important component of diabetes self-management. The American Diabetes Association (ADA) recommends that people living with type 1 diabetes should check at least four times per day. Individuals living with type 2 diabetes who are taking multiple injections should also check at least four times per day. There are no guidelines for daily testing for those with type 2 diabetes who are on less frequent injections or oral medication or who control their diabetes through diet and exercise. The ADA does state that checking glucose should be frequent enough to achieve glycemic control. Despite the valuable information glucose checking provides, results from a cross-sectional survey of 44,181 adults with type 1 or type 2 diabetes who were part of the Kaiser Permanente Northern California Region revealed alarmingly low rates of self-monitoring of blood glucose (SMBG) and poor compliance with recommended frequency of checking. Only 40% of patients with type 1 diabetes and 33% of patients with type 2 diabetes reported compliance with recommended SMBG frequency (three to four times daily for type 1 diabetes and once daily for type 2 diabetes). Pain has been cited as a major barrier for performing SMBG not only by those living with diabetes but also by providers. Other barriers are supply costs, inconvenience, time factors, and not understanding how to use results. As diabetes educators, we find that the majority of patients perceive insulin injections as less painful than finger sticks. In order to overcome the SMBG barrier of pain perception, it is important to know which lancing devices and lancets are considered less painful. Kocher and colleagues, in the article "Comparison of Lancing Devices for Self-Monitoring of Blood Glucose Regarding Lancing Pain," evaluate the differences in lancing pain among systems as well as

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Abbreviations: (ADA) American Diabetes Association, (SMBG) self-monitoring of blood glucose

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determine devices that were the least painful by means of one study using two experiments.[1]

One hundred fifty-seven patients with diabetes who were experienced in SMBG using a variety of well-known blood glucose measuring systems and were monitoring at least three times per day were randomized in a comparative fashion. Outcomes were measured by a questionnaire and a rating scale.

The testing criteria were well designed with a fair sample of adult participants who evaluated the devices over a period sufficient to judge response, 36 days. Accu-Check was compared against several systems with similar popularity; these were selected by their higher market share, thereby assuming that there was adequate representation of users of these systems.

In order to minimize possible bias and confusion of systems, participants separately rated the blood glucose monitoring system (lancing device and glucose meter) and then the lancing device alone. The protocol for comparison of products was very specific, and participants were given strict guidelines for frequency of monitoring, variation of sites, and number of days each system and device was to be used.

Each Accu-Chek monitoring system has a unique lancing device. The study showed some preference of the Accu-Chek monitoring system but even greater preference for the Accu-Chek lancing devices. The study design may have had some impact on these results (system versus lancing device), as the systems were rated retrospectively while the lancing devices were rated immediately. The authors noted several factors linked to lancing pain: depth of lancet penetration, lancet speed, lancet shape, lancet surface, lancet movement, and skin fixation.

Other data points measured showed no statistical significance in the sociodemographic characteristics of the population studied.

The subjective measurement of rating pain (-3 to +3) was easy for participants to use. These were grouped into three categories: "more painful," "equally painful," and " less painful." The following results were obtained. Accu-Chek systems were rated "virtually pain-free" by 61.5% to 72.9% of subjects in contrast to the competitors' 38.9% to 54.1%. Accu-Chek lancing devices were rate "virtually pain-free" by 85.9% to 90.4% against the competitors' 55.4% to 76.4%.

We wondered about two possible factors that may have influenced outcomes. The study, underwritten by Roche Diagnostics, Inc., maker of Accu-Chek, was performed in two locations, one being Indianapolis, home of Roche, leaving one to wonder if there might be a hint of favoritism toward a local manufacturer and/or employer. Also, their product, Multiclix, has the added unique benefit of "hidden" lancets, and there can be psychological benefit from not viewing a needle.

There is no longer any doubt that controlled diabetes is a necessity and that SMBG is a critical ingredient. Despite evidence-based practice of the benefits of SMBG, providers as well as patients have barriers to glucose checking. Based on study results, Accu-Chek has helped reduce one of the barriers by demonstrating that their lancing devices are perceived as less painful. Information from this particular study can be useful to healthcare providers as a reference when patients request what other people with diabetes consider the least painful method of obtaining a blood sample. It is important to keep in mind that this study was done with several high market share monitoring systems; however, there are many other lower market share systems and devices, and these should not be discounted as providing less painful lances.

Of note, providers should be aware of some considerations as to why patients might choose not to switch to a specific "pain-free" device:

- Cost: We have seen that patients will reuse lancets to lower expenses despite being aware that this dulls the sharpness of the skin pierce.
- Convenience: The question remains as to whether the patient will view the added expense of purchasing a separate lancing device as unnecessary if they are currently satisfied with another monitoring system.

Will patients be swayed by less pain or remain content with their current system?

References:

1. Kocher S, Tshiananga JKT, Koubek R. Comparison of lancing devices for self-monitoring of blood glucose regarding lancing pain. J Diabetes Sci Technol 2009;3(5):1136-43.