‹CLOSER LOOK

MEMORANDUM

What are the barriers to CGM and pump adoption? Diabetes Care paper shows cost, hassle, and devices on body remain huge issues - December 15, 2016

> **Executive Highlights**
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> - Last month, a *Diabetes Care* paper shared fascinating data on the barriers to pump/CGM uptake, including profiles of device users versus nonusers. Drs. Korey Hood, Molly Tanenbaum, and colleagues conducted an online survey of adults in the T1D Exchange (n=1,503).
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> - Most survey respondents (57%-61%) endorsed cost/insurance coverage as a barrier to device use, far and above other barriers. Given the survey population (patients at the best US centers; 75% on a pump, on a CGM, or on both), these are concerning findings.
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> - Several "modifiable" barriers to using pumps and CGMs exist too, including the hassle of wearing devices all the time (endorsed by 47% of respondents), having devices on the body (35%), and the look of devices on the body (26%).
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> - We think this paper has major implications for R&D pipeline priorities for pumps, CGMs, and automated insulin delivery: (i) cost remains critical and is not a solved problem, even in current users at the best US centers; (ii) devices must drive to smaller form factors that are more comfortable and better looking on the body; and (iii) training and education need to identify best practices, manage expectations, and address users' biggest modifiable problems.

Last month, Drs. Korey Hood, Molly Tanenbaum, and colleagues published an important paper in Diabetes Care: "Diabetes Device Use in Adults With Type 1 Diabetes: Barriers to Uptake and Potential Intervention Targets." The online survey of T1D Exchange adults (n=1,503) investigated barriers to pump/CGM uptake and profiled device users versus nonusers. Tables 1 and 2 in the paper highlight the key findings (pasted below). Most importantly, 57%-61% of survey respondents endorsed cost/insurance coverage as a barrier to device use, far and above other barriers examined in the survey. This is concerning for a few reasons: (i) 75% of survey respondents were either on a pump, a CGM, or both - meaning cost is still a problem for current CGM and pump users; and (ii) these are patients at the best US centers and a self-selected group that responded to an online survey - meaning the cost reality for average patients is probably far worse. Cost is characterized as a "non-modifiable" barrier in the paper, as it falls outside the realm of psychosocial intervention - still, it is the most important takeaway here in our view. We thank the Helmsley Charitable Trust for funding this important study.

As expected, several "modifiable" barriers to using pumps and CGMs exist too, including the hassle of wearing devices all the time (endorsed by 47% of respondents), having devices on the body (35%), and the look of devices on the body (26%).

The paper also has some interesting data on CGM and pump users that discontinued use. Former CGM users (n=249) cited cost of supplies as the number one reason for discontinuation (endorsed by 35%), closely followed by too many alarms (32%), not accurate (30%), not liking devices on the body (30%), too much time and effort (29%), etc. It was slightly different for former pump users (n=72), who cited devices on the body first (endorsed by 46%), followed by pain/comfort (44%), the cost of supplies (21%), not trusting the device (21%), etc.

We think this paper has major implications for R&D pipeline priorities for pumps, CGMs, and automated insulin delivery: (i) cost remains critical and is not a solved problem, even in current users at the best US centers; (ii) devices must drive to smaller form factors that are more comfortable and better looking on the body; and (iii) training and education need to identify best practices, manage expectations, and address the

biggest modifiable problems people have. We hope to see more work on psychosocial interventions that can improve early experiences with current devices, especially in young people.

In our view, these data can help explain why FreeStyle Libre has taken off in Europe (it addresses cost and size on the body); why Insulet's Omnipod continues to see 70%-80% of its users from MDI; and why there is so much excitement on social media for Dexcom/Verily's second-gen, bandage-like CGM sensor. This may also suggest that first-gen automated insulin delivery systems may not dramatically expand the market until they attack device form factor and cost in a more significant way (rather than taking current devices and simply connecting them).

As companies develop new products, we hope R&D priorities align with these key barriers.

- **The paper emphasizes that the youngest age group (18-25 years old) had the lowest CGM and pump usage, as well as the highest levels of diabetes distress and A1c.** This is critical group to address with better-designed devices, since they have the most room to benefit clinically and may be receiving the least comprehensive care (e.g., as they transition to adult endocrinologists).

- **The authors note a couple important limitations of the survey:** the sample was 90% non-Hispanic white and adult T1D Exchange participants receive care at diabetes specialty practices and may be more likely to be insured, so the responses may not be representative of the broader type 1 population. The fact that most survey respondents cited cost as a barrier is very concerning to us.

Table 1—Barriers to device use reported by study participants (N = 1,503)

Barrier	% Yes
Nonmodifiable	
Cost of supplies	61.3
Cost of device	57.4
Insurance coverage	57.3
Modifiable	
Hassle of wearing devices all of the time	47.3
Do not like having diabetes devices on my body	34.8
Do not like how diabetes devices look on my body	26
Nervous that the device might not work	20
Do not want to take more time from my day to manage diabetes	17.5
Nervous to rely on technology	17
Worries about what others will think of me	10.5
I do not like diabetes devices because people notice them and ask questions about them	10.4
Too busy to learn how to use a new technology or device	9.2
My diabetes care team has never talked with me about diabetes technology options	4.5
Do not understand what to do with the information or features of the devices	4.5
Not able to get my diabetes care team to write me a prescription	4.4
Not enough support from my family	3.7
Not enough support from my diabetes care team in using devices	2.9
Do not want to have more information about my diabetes	2
My family does not think diabetes devices are important for taking care of my diabetes	0.9

Table 2—Top responses to why did you stop using your CGM, and why did you stop using your insulin pump?

Reason for discontinuing	% Yes
CGM (n = 249)	
Cost of supplies	35.3
There were too many alarms	32.1
It was not accurate	30.1
Do not like diabetes devices on my body	29.7
Wearing a CGM took too much time and effort	28.9
It was uncomfortable or painful	28.1
Too hard to get it to work right	22.1
Cost of device	21.7
Made it hard for me to sleep	20.1
Did not trust it	18.1
Insulin pump (n = 72)	
Do not like diabetes devices on my body	45.8
It was uncomfortable or painful	44.4
Cost of supplies	20.8
Did not trust it	20.8
Too hard to get it to work right	16.7
Cost of device	13.9
Caused other people to ask too many questions about my diabetes	12.5

--by Brian Levine, Adam Brown, and Kelly Close