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DIABETIC Medicine

LETTER

Education at scale: Improvements in type 1 diabetes self-management following a massive open online course

Dear Editor,

Self-management is key in type 1 diabetes (T1D) care to optimise glycaemic control, reduce diabetes complications and improve quality of life.[1] For people with T1D, long-term self-management can be challenging and require multidisciplinary support. In the United Kingdom, provision of diabetes self-management education (DSME) is typically delivered face-to-face, although significant regional variation exists. Barriers to attendance at DSME are complex and opportunities for re-intervention after initial invitation are often limited.[2] Furthermore, through social distancing and healthcare restructuring, COVID-19 has resulted in a substantial reduction in face-to-face DSME offered.

eLearning is a growing area in T1D care, offering a flexible and low-cost intervention aiming to increase reach through improved accessibility. Massive open online courses (MOOCs) are an example of eLearning where a cohort simultaneously progress through structured educational material. Through discussion boards and livestreams, MOOCs can provide a social space moderated by healthcare professionals for learners to ask questions, share experiences and benefit from peer-support. Additionally, interspersed quizzes can facilitate self-assessment of incremental knowledge gained. MOOCs for DSME have previously been well received in a diverse type 2 diabetes cohort, associated with sustained improvements in self-reported health knowledge and self-management ability.[3,4] We developed and delivered an MOOC in type 1 DSME and herein report user experience and 3-month follow-up.

An MOOC in type 1 DSME was developed and delivered over a 2-day period in 2021. The course was developed by MyWay Digital Health Ltd./NHS Diabetes Programme, accredited by the Quality Institute for Self-Management Education and Training,[5] and advertised widely through social media and email. Content was freely available and consistent with existing structured education topics, featuring multimedia resources and daily social media livestream question and answer sessions. See Appendix S1 for course outline and Figure 1 for user interface. User experience was established among consenting participants via integrated pre-course, post-course and 3-month follow-up surveys. Paired survey responses were analysed using a Wilcoxon signed-rank sum test and user demographics were compared with course-completion status using a chi-squared test.

Course and follow-up completion data are presented in Table 1. Among users who provided pre-course demographic data ($n = 897$), most were people with T1D (51.4%), with family members/carers (26.6%) and healthcare professionals (16.9%) comprising much of the remaining cohort. Among users with T1D, 65.0% were aged 35–64, 68.6% were female, 95% lived in the United Kingdom and 93% identified as white. There was a range of time since diagnosis, and 58% had engaged with structured diabetes education before (87% face-to-face; 35% online). Users with T1D were less likely to complete the MOOC compared to users without T1D ($p < 0.0001$). Age, gender and previous DSME engagement were not associated with course completion status among users with T1D.

Users found the course useful, easy to use and motivating (see Figure 2). In the pre-course, post-course and follow-up survey, users with T1D were asked to self-assess their self-management ability and health knowledge through agreeability to the statements *I manage my diabetes well* and *I know enough about my health*. Comparing pre- and post-course responses, median response improved in the post-course survey from *neutral* to *agree* for both statements ($n = 131$, $p < 0.0001$ for both statements), and this improvement was sustained at 3 months ($n = 50$, $p < 0.003$ for both statements).

56.3% ($n = 36/64$) of course-completers with T1D at follow-up had made a change to the way they managed their diabetes following the course, with 69.2% ($n = 45/65$) agreeing the course improved their self-management confidence and motivation. Furthermore, course-completers with T1D were asked at follow-up if they felt taking part in the course had helped to reduce the frequency and/or

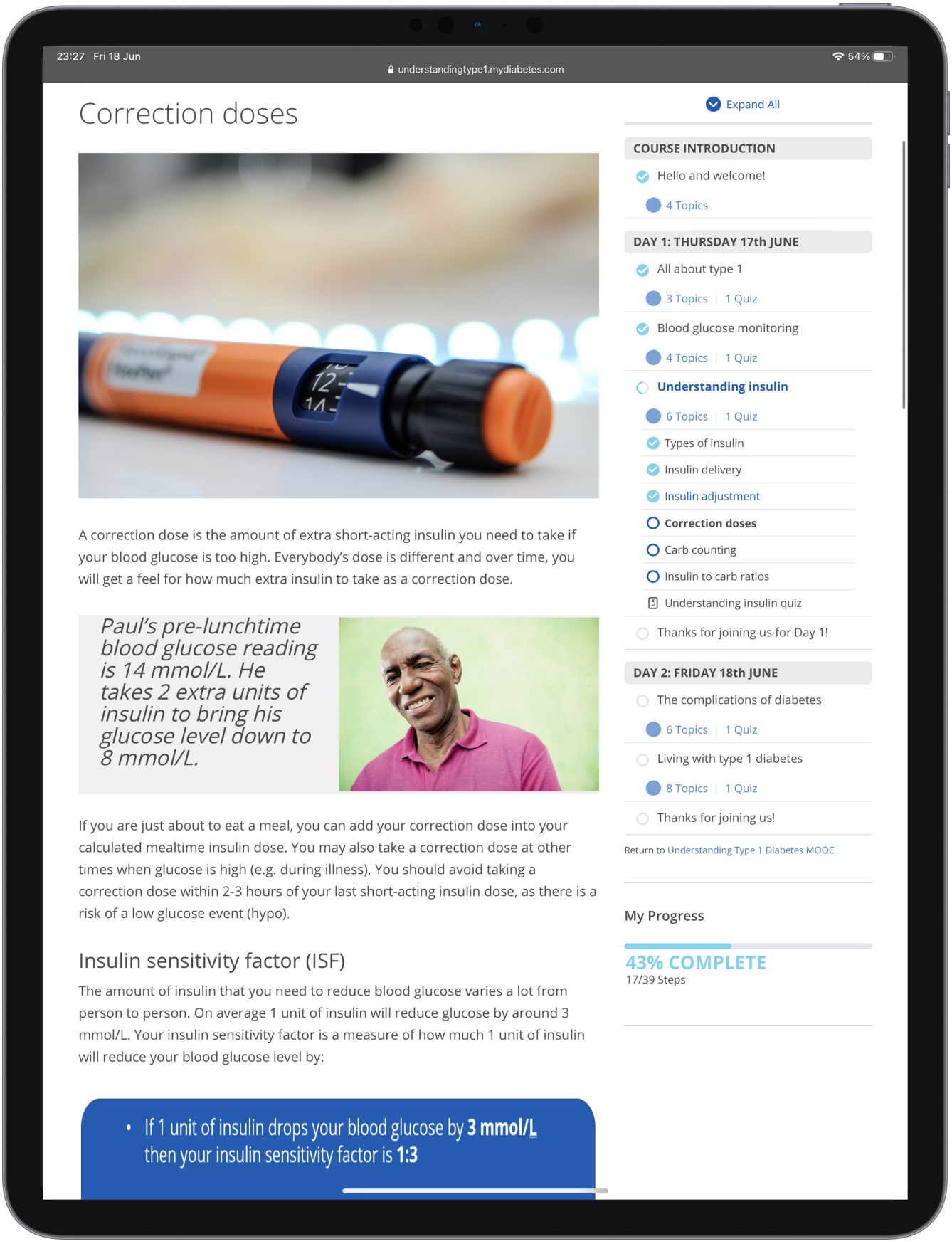

FIGURE 1 Render of screenshot displaying user interface. Right-side menu displays course structure. Mock created using MockUPhone

TABLE 1 Course and follow-up survey completion data

Users who registered for the MOOC (*n*)	1682
Users who started the MOOC (*n*)	1161
Users who completed Day 1 (*n*)	592
Users who completed MOOC (*n*)	551 (47.5% completion rate for course starters)
Users who consented to follow-up (*n*)	991
Users who completed follow-up (*n*)	242 (24.4% response rate)

Note: Abbreviation: MOOC; massive open online course.

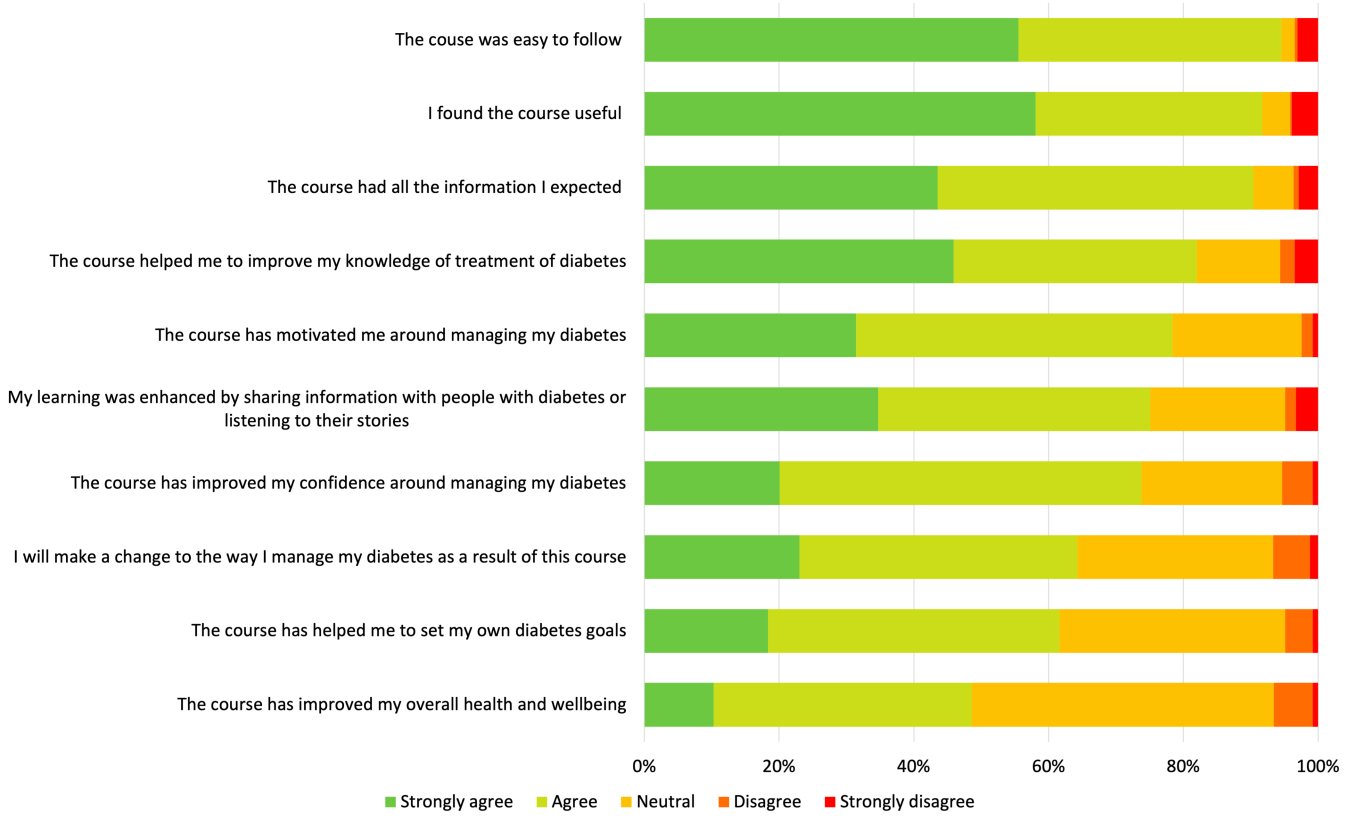

FIGURE 2 Summary of responses ($n = 156$-551) from post-course survey. Conditional logic was applied to display questions relevant to each user

severity of hypoglycaemia, of which 36.9% ($n = 24/65$) felt it did. 86.6% ($n = 194/224$) of respondents at follow-up agreed that they would benefit from taking part in further online DSME.

Users found an MOOC for type 1 DSME useful and motivational, demonstrating positive user experience and a satisfactory retention rate, associated with improvements in self-reported self-management ability and health knowledge sustained at 3 months. eHealth interventions show dropout rates of up to 80%,[6] and some authors suggest expecting a 50% dropout rate among web-based DSME.[7] A goal of the MOOC was to improve accessibility of DSME; given this MOOC was the first episode of structured DSME engagement for 42% of pre-course survey respondents, we feel this was achieved.

As the COVID-19 pandemic endures, remote interventions are of clear value to minimise viral transmission. MOOCs in DSME benefit from the active online diabetes community[8] yet mitigate misinformation risk through real-time healthcare professional moderation. Through their openness, MOOCs broaden the user base to which education is available. DSME traditionally serves mostly to educate the individual with diabetes, however as evidenced by the substantial proportion of course users who did not have diabetes and higher MOOC completion rates among this cohort, a significant and unmet demand for open DSME exists. Furthermore, the rapid pace of technological development in diabetes care necessitates regular DSME to optimise care, something which existing UK-based DSME initiatives seldom provide. However, accessing those who may need DSME most remains a challenge. User demographics show a predominantly white and middle-aged audience with limited international reach.

Self-management is a critical indicator of diabetes outcomes, and MOOCs through their low-cost, high-throughput mechanism have potential for high cost-effectiveness which can be clarified once true impact (e.g., glycaemic control) is quantified. Although not a universal solution, we feel MOOCs represent an important step in providing open and accessible education to empower individuals to improve their diabetes self-management.

CONFLICT OF INTEREST

SCM, KMC, and SGC are employees of MWDH. DJW and SGC are cofounders and shareholders of MWDH.

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