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Management of type 2 diabetes mellitus in people with severe mental illness: an online cross-sectional survey of healthcare professionals

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ABSTRACT

Objectives

To establish healthcare professionals' (HCPs) views about clinical roles, and the barriers and enablers to delivery of diabetes care for people with severe mental illness (SMI).

Design

Cross-sectional, postal and online survey.

Setting

Trusts within the National Health Service (NHS), mental health and diabetes charities and professional bodies.

Participants

HCPs who care for people with type 2 diabetes mellitus (T2DM) and/or SMI in the UK.

Primary and secondary outcome measures

The barriers, enablers and experiences of delivering T2DM care for people with SMI, informed by the Theoretical Domains Framework (TDF).

Results

Responders were 273 HCPs, primarily mental health nurses (33.7%) and psychiatrists (32.2%). Only 25% of respondents had received training in managing T2DM in people with SMI. Mental health professionals felt responsible for significantly fewer recommended diabetes care standards than physical health professionals (p<0.001). For those seeing diabetes care as part of their role, the significant barriers to its delivery in the multivariate analysis were a lack of knowledge (p=0.003); a need for training in communication and negotiation skills (p=0.04); a lack of optimism about the health of their clients (p=0.04) and their ability to manage T2DM in people with SMI (p=0.003); threat of discipline (p=0.02);

fear of mental health (p=0.01); a lack of service user engagement (p=0.006) and a need for incentives (p=0.04). The significant enablers were an understanding of the need to tailor treatments (p=0.04) and goals (p=0.02) for people with SMI.

Conclusions

This survey indicates that despite current guidelines, diabetes care in mental health settings remains peripheral. Even when diabetes care is perceived as part of a HCP's role, various individual and organisational barriers to delivering recommended T2DM care standards to people with SMI are experienced.

STRENGTHS AND LIMITATIONS OF THIS STUDY

- The survey is informed by the Theoretical Domains Framework, a robust theoretical approach to exploring the barriers and enablers to behaviour change, guided by the MRC Framework for developing complex interventions
- We attempted to recruit participants from a range of sources, including NHS trusts, charities and professional bodies in the UK
- The cross-sectional study design means cause and effect relationships cannot be established
- The survey failed to capture the barriers and enablers to delivering recommended diabetes care to people with SMI by healthcare professionals who did not see this as being part of their clinical role
- Despite the recruitment strategy aiming to target a range of healthcare professionals, GPs, diabetologists and physical health nurses are under-represented

INTRODUCTION

Diabetes affects an estimated 415 million people worldwide and accounts for 12% of international health expenditure.[1] In the UK, 6.2% of adults are estimated to have diabetes and as in other high income countries approximately 90% of these have type 2 diabetes (T2DM).[1] There are a range of important risk factors for the development of T2DM, one of which is diagnosis of a severe mental illness (SMI), which is associated with a 2-3 fold increase in likelihood of developing the condition[2]. This increased risk has been attributed to poor diet, obesity and physical inactivity,[2, 3] the effects of anti-psychotic medications[4] and high rates of smoking.[5] As a consequence, those with T2DM and SMI die significantly younger than people with T2DM without SMI[6] and experience a greater risk of T2DM complications that require specialist treatment.[7]

These significant health inequalities may in part be explained by variations in diabetes care.[8, 9] Evidence suggests that people with SMI can be less likely to receive more novel cost-intensive medications,[10] retinopathy screening;[11, 8] foot examinations;[8] testing of HbA1c,[8, 9] renal checks;[8] and diabetes education.[12] They are also less likely to be hospitalised for diabetes than those with diabetes alone.[12, 9] The reasons for these disparities in care are wide ranging. At an individual level the knowledge and skills of mental health nurses to deliver and support diabetes care has been questioned[13, 14, 15] and previous theory-driven qualitative research that underpins this study[16] found that not knowing how to manage and monitor T2DM and engage and communicate with service users were significant barriers to delivering recommended care. There is also poor awareness, particularly amongst mental health professionals, about national and local guidelines for managing T2DM.[16] Despite hope and optimism being central to facilitating recovery in people with SMI,[17] healthcare professionals have also been found to be despondent about the health of their clients,[16] which could impact on how service users are engaged and how care is delivered.

At an organisational level the lack of integrated mental and physical health care services has been identified as a barrier to delivering care. Care pathways for people with a SMI and diabetes are often complex and fragmented and healthcare professionals value integrated care and easy access to a multidisciplinary team,[16] Despite this, co-location of mental and physical services seems to have had variable impact on the delivery of diabetes care.[18] There also appear to be issues in relation to perceived roles and responsibilities. Whilst some research shows confusion and role ambiguity about the responsibility for monitoring and supporting people with T2DM and SMI,[13] our previous research indicates a clear demarcation between the perceived responsibilities of mental health versus primary care and specialist diabetes services[16]. This is in opposition to current recommendations that promote shared responsibility between mental and physical health care services.[19, 20, 21]

Guided by the Medical Research Council (MRC) recommendations for developing complex interventions,[22] in order to create a theoretically- and evidence-based intervention, this study aimed to explore a full range of potential barriers and enablers to delivering diabetes care to people with SMI and model these relationships. This will allow for selection of key behaviour change techniques and subsequent incorporation of them in an intervention to improve the care delivered to this population. The purpose of this study was therefore to identify the primary barriers and enablers that affect the practice of primary care, specialist mental health and diabetes specialist clinicians in their management of T2DM in people with SMI.

METHODS

Participants

A cross-sectional, online survey was conducted between September 2015 and September 2016. The target population was any healthcare professional involved in the care of people with either T2DM

and/or SMI. Targeted staff emails, containing a link to the survey, were sent to relevant staff groups by 9 NHS Trusts providing mental health services in the UK. GP practices across the UK were approached via 5 Clinical Commissioning Groups. Flyers were distributed at 8 professional healthcare conferences in the UK and Europe. The Royal Colleges of GPs, Psychiatrists and Nursing, along with the Association of British Clinical Diabetologists, shared the survey via social media and/or via their postal and online newsletters, as did the charity Diabetes UK. Staff were informed that a donation of £2 would be made to a diabetes or mental health charity for each completed survey questionnaire. The study was approved by the Wales Research Ethics Committee 7 (ref. 15/WA/0310).

The size of the target population is in excess of 100,000, comprised of UK GPs, specialists in general psychiatry and endocrinology and diabetes mellitus[23] as well as qualified mental health nurses[24] and diabetes specialist nurses.[25]

Sample size estimation

We anticipated that the survey items concerning the level and extent of clinical activity conducted would reveal differences according to professional groupings. Calculation based upon the estimated mean or proportional difference between the 5 professional groups indicated a required sample of 200 for mean differences between independent groups with 80% power and alpha 0.05.

Measures

Demographic factors: Age and gender were collected from participants.

Occupational factors: Data were collected on profession, length of time in current role, length of time qualified, country of practice, and site of practice (in- or outpatient). Participants were asked the proportion of their patient group who had T2DM, SMI and comorbid T2DM and SMI. If they had received training in how to care for people with T2DM and comorbid T2DM and SMI, and if so when

and where this was. Along with the access they had to any clinical guidelines for the management of T2DM.

Barriers and enablers: A 33-item questionnaire (Supplementary file A) was developed to measure the barriers and enablers to delivering diabetes care to people with SMI, based on qualitative work undertaken by the team[16]. Items were generated based on the beliefs reported by healthcare professionals in these interviews, with the most relevant selected through a consensus approach.[16] The Theoretical Domains Framework (TDF) was used to guide this process to ensure that the survey was able to capture a comprehensive range of factors that could act as barriers or enablers to delivering diabetes care. Items covered each of the 14 domains within the TDF (1) knowledge (2) skills (3) intention (4) social professional role & identity (5) social influence (6) goals (7) beliefs about consequences (8) beliefs about capabilities (9) memory, attention & decision processes (10) environmental context & resources (11) behavioural regulation (12) emotion (13) reinforcement (14) optimism. Responses were on a 5-point Likert scale from 1 strongly agree to 5 strongly disagree. All items were reverse scored.

Delivery of diabetes care: As part of the 33-item TDF questionnaire participants were asked if each of the nine key components of diabetes care[26] were part of their role. A sum scores was calculated in order to measure the degree to which diabetes care was part of a person's professional role. If participants responded yes to this question, they were then asked 'Over the past 12 months, given 10 service users with diabetes and SMI, for how many did you deliver that aspect of care?'

Statistical analysis

Data were analysed using IBM SPSS Statistics v.23. Little's Missing Completely at Random (MCAR) test was non-significant (χ^2 = 439.564, df = 484, p = 0.93) and hence data was MCAR. Missing data was managed using multiple imputation methods. Differences between the professional groups were explored using ANOVA. Negative binomial and Poisson regressions were used to assess the predictors of implementing diabetes guidelines in people with SMI. Entry of variables into the

regression analysis was based on significant univariate associations between the predictor and outcome (p = 0.05).

RESULTS

Participants

A total of 386 healthcare professionals consented into the study. Across the entire dataset there was 27.86% missing data, with complete data for 151 participants (39.11%), and 113 participants (29.27%) with more than 50% missing data. Of the 88 individual variables all had some degree of missing data. After excluding participants with more than 50% missing data there was a final sample of 273 (71%).

A majority of the 273 participants were British (n=179, 66%) and female (n=96, 35%) (Table 1). Participants were primarily mental health nurses (n=92, 33.7%) or psychiatrists (n = 88, 32.2%). Most were practicing in England, in a community setting and had been in their current role for on average 9 years (SD = 8.39 years).

Table 1. Participant descriptors

Variable	n	%
Ethnicity		
British	179	66
Any other white	29	11
Irish	10	3.7
Indian	10	3.7
African	9	3.3
Asian	5	1.8
Pakistani	5	1.8
Any other ethnic group	5	1.8
White and black African	4	1.5
Any other mixed	4	1.5
White and Asian	3	1.1
Caribbean	3	1.1
Bangladeshi	2	0.7
Chinese	2	0.7
White and black Caribbean	1	0.4
Any other black	1	0.4

Variable	n	%
Profession		
mental health nurse	92	34
psychiatrist	88	32
general practitioner	24	8.8
diabetes specialist nurse	17	6.2
practice nurse	12	4.4
diabetologist	8	2.2
physical health nurse	8	2.9
other	6	2.9
district or community nurse	5	1.8
occupational therapist	2	0.7
assistant practitioner	2	0.7
social worker or social therapist	2	0.7
endocrinologist	1	0.4
dietician	1	0.4
student	1	0.4
audiologist and speech therapist	1	0.4
healthcare assistant	1	0.4
mental health support worker	1	0.4
podiatrist	1	0.4
Country of practice		
England	236	86
Scotland	4	1.5
Wales	2	0.7
Other	5	1.8
Site		
community	142	52
inpatient	72	26
both	59	22

Care of T2DM

The proportion of respondents' case load with T2DM was primarily either less than 5% or greater than 20% (Table 2). Approximately 60% of the sample specifically managed diabetes in people with SMI, however only 25% had received any training in how to do so. Of those that had, this had been within their service or via CPD, in the past year. There was no significant association between profession and receipt of training (χ^2 (1, n = 273) = 4.72, p = 0.32).

Table 2. Case load and experiences of training

Variable	n	%
Proportion of patients with T2DM		
5% or less	76	27.8
10%	47	17.2
15%	33	12.1

Variable	n	%
20% or more	71	26.0
Have you had specific training in assessing and managing T2DM?		
Yes	147	53.8
No	126	46.2
When was the most recent training in T2DM you received?		
In the last year	65	44.23
1-2 years ago	26	17.69
2-4 years ago	20	13.61
More than 4 years ago	36	24.49
If you have received training for assessing and /or managing T2DM, where was this?		
Degree	49	33.33
Diploma	21	14.29
In-service training	94	63.95
CPD	69	46.94
Postgraduate	2	1.36
Other	15	10.20
Do you have access to clinical guidelines for the management of type 2 diabetes?		
Yes	238	87.2
No	35	12.8
If yes, which guidelines are these?		
National Institute for Health and Care Excellence	12	5.04
Local trust	146	61.34
World Health Organisation	3	1.26
Scottish Intercollegiate Guidelines Network	5	2.10
Trend UK	1	0.42
American Diabetes Association	5	2.10
Research Society for the Study of Diabetes in India	1	0.42
International Diabetes Federation	1	0.42
American Association of Clinical Endocrinologists	2	0.84
European Medicines Agency	1	0.42
Joint British Diabetes Societies	2	0.84
Charity	2	0.84
European Foundation for the Study of Diabetes	1	0.42
Other	8	3.36
Do any of the patients that you provide care for have SMI?		
Yes	258	94.5
No	15	5.5
If yes, what proportion of your patients has SMI?		
5% or less	42	16.28
10%	11	4.26
15%	11	4.26
20% or more	162	62.79
Have you had specific training in assessing and managing SMI?		
Yes	209	76.6
No	64	23.4
When was the most training in SMI you received?		
In the last year	137	65.55
1-2 years ago	19	9.09
2-4 years ago	19	9.09
More than 4 years ago	34	16.27

Variable	n	%
If you have received training for assessing and/or managing SMI, was this:		
Pre-registration	17	8.13
Post-registration	49	23.44
Both	143	68.42
If you have received training for assessing and /or managing SMI, where was this?		
Degree	110	52.63
Diploma	63	30.14
In-service training	158	75.60
CPD	128	61.24
MRCPsych	7	3.35
Other	10	4.78
Do you provide diabetes care for people who have SMI?		
Yes	163	59.7
No	110	40.3
Have you had specific training in assessing and managing diabetes in people with SMI?		
Yes	71	26
No	202	74
When was the most training in assessing and managing diabetes in people with SMI you received?		
In the last year	29	40.85
1-2 years ago	18	25.35
2-4 years ago	12	16.90
More than 4 years ago	12	16.90
If you have received training for assessing and/or managing diabetes in people with SMI, was this:		
Pre-registration	6	8.45
Post-registration	45	63.38
Both	20	28.17
If you have received training for assessing and /or managing T2DM in people with SMI, where was this?		
Degree	10	14.08
Diploma	9	12.68
In-service training	44	61.97
CPD	36	50.70
Other	5	7.04

Barriers and enablers to delivering diabetes care

In order to have sufficient numbers to make comparisons between professions, participants were grouped as either (1) mental health nurses and support workers, (2) psychiatrists, (3) GPs, (3) other nurses (including practice nurses, diabetes specialist nurses, district or community nurses, healthcare assistants, assistant practitioners), (4) allied and other health professions and (5) diabetologists and

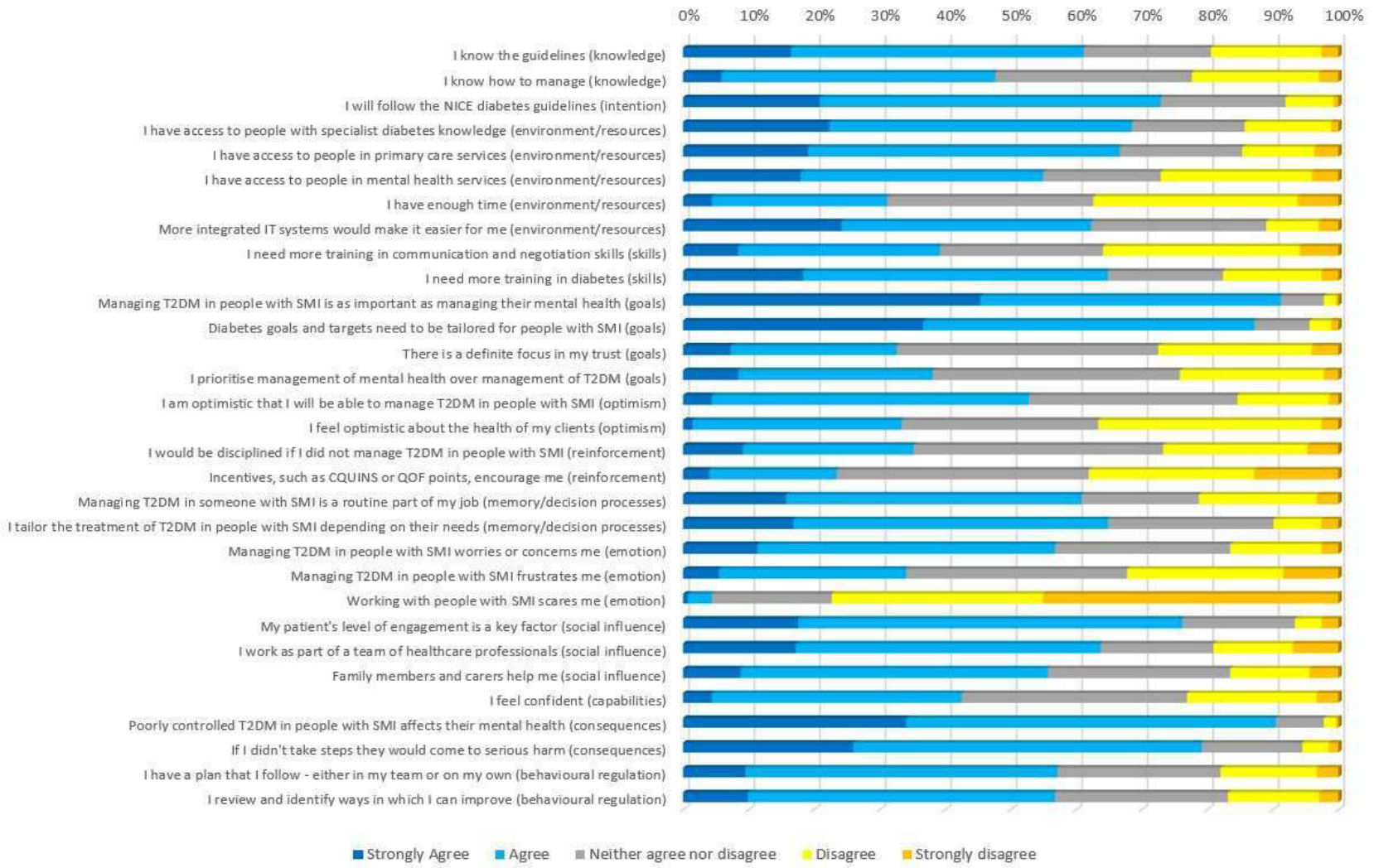

Figure 1. Barriers and enablers to delivery of T2DM care in people with SMI (n = 273)

endocrinologists. Figure 1 displays the responses in relation to each of the 33-items of the TDF questionnaire. Only statistically significant differences between the professions are reported below (see Supplementary file B for all analyses).

Barriers

Individual factors

Only a third of the sample felt confident in their abilities to manage T2DM in people with SMI and only 42% were optimistic about the health of their clients with T2DM. Although 57% felt that managing T2DM in people with SMI was at times worrying or concerning, only a third felt frustrated and only 4% fearful of working with people with SMI. Physical health nurses were however, significantly more scared to work with someone with SMI compared with psychiatrists ($p = 0.002$).

Organisations factors

A third of respondents felt they would be disciplined if they did not manage T2DM in someone with SMI. Mental health nurses and support workers were significantly more likely to believe this than both psychiatrists ($p = 0.002$) and GPs ($p = 0.03$).

Whilst 65% reported that they needed more training in diabetes in order to manage T2DM in people with SMI, a third requested more training to improve their communication and negotiation skills. Allied and other health professionals, along with mental health nurses and support workers, were more likely to agree that they needed more training in diabetes than GPs (MHN: $p = 0.12$; AHP: $p = 0.02$) and diabetologists or endocrinologists (AHP: $p = 0.04$). Physical health nurses were more likely to request training in communication and negotiation skills compared with psychiatrists ($p < 0.001$).

Only a third of the sample felt that there was a definite focus within their organisation on the management of T2DM in people with SMI. GPs were significantly less likely to agree that this was the

case than mental health professionals (MHN: $p < 0.001$; psychiatrists: p = 0.01), physical health nurses ($p = 0.02$) and diabetologist or endocrinologists ($p = 0.03$).

Perceived roles and responsibilities varied significantly between professions and the elements of care. Only a quarter of the sample felt that examining sensation and circulation in the feet; agreeing a personalised HbA1c target and offering regular reviews; and referring to retinopathy screening were part of their role (Table 3). Approximately half felt that providing general education, monitoring cholesterol and kidney function and providing personalised advice about diet and exercise were part of their clinical role, whilst 67% and 83% of participants, respectively, felt that monitoring blood pressure and giving advice about weight management were within their remit. Diabetologists or endocrinologists, GPs and physical health nurses all reported being responsible for significantly more of the 9 diabetes care standards than mental health nurses and support workers ($p < 0.001$), psychiatrists ($p < 0.001$) and allied and other health professions ($p < 0.001$).

Table 3. Healthcare professional perceived role in the management of T2DM in SMI

	This is part of my clinical role n(%)	Average number of service users out of 10, with both type 2 diabetes and SMI that had been…? M(SD)
Given advice about weight management	226(82.78)	5.84(3.28)
Had their BP monitored	184(67.40)	6.75(2.92)
Given general education about T2DM	162(59.34)	5.58(3.12)
Given personalised advice about diet and nutrition	159(58.24)	5.88(3.11)
Had their cholesterol monitored	128(46.87)	6.77(2.80)
Had their kidney function monitored	121(44.32)	7.39(2.44)
Had their feet examined	77(28.21)	5.45(3.29)
Agreed personalised HbA1c target	77(28.21)	6.55(2.85)
Referred to retinopathy screening	68(24.91)	4.92(3.81)

Facilitators

Individual factors

Half of the sample reported that they knew how to manage T2DM in people with SMI, although allied and other health professionals felt significantly less able to manage T2DM in people with SMI than mental health nurses and support workers ($p = 0.03$), GPs ($p = 0.04$) and diabetologists and endocrinologists ($p = 0.003$). Diabetologists and endocrinologists also felt more able than psychiatrists ($p = 0.03$). Whilst 61% knew the local or national guidelines for managing T2DM, 75% reported that the likelihood of following these guidelines were high. Those working primarily within the physical health domain felt significantly more knowledgeable about these guidelines than mental health nurses and support workers ($p \leq 0.001$), psychiatrists ($p < 0.001$) and allied and other health professionals ($p = 0.001$).

For 61% of the sample, care of T2DM had become a routine part of their role, more so for GPs than psychiatrists ($p = 0.009$) and other allied health professionals ($p = 0.009$), and 53% felt optimistic that they would be able to do it in the future. Although 91% believed that managing T2DM in people with SMI is as important as managing their mental health, in practice 38% prioritised the management of mental health over the management of T2DM.

For three quarters of respondents, being able to engage with service users was a key factor in being able to manage T2DM in this population. For 65% this included being able to tailor treatments, along with the service user's goals and targets (87%), depending on the client's needs and abilities. Physical health nurses were more likely to report this than psychiatrists ($p < 0.01$). For half of the sample this was aided by having a plan and reviewing their practise to improve the delivery of future care.

Between 80 and 90% reported that poorly controlled T2DM in people with SMI further affected the service user's mental health and that if they didn't take steps to manage T2DM service users would come to serious harm.

Organisational factors

Less than a quarter of participants felt they were encouraged to manage T2DM in people with SMI by incentives. Both mental health nurses and support workers, and GPs were however more likely to agree that incentives encouraged them compared to psychiatrists (MHN: $p = 0.007$; GP: $p = 0.01$). Overall 60% of the sample had sufficient time to manage this population, mental health nurses and support workers were however more likely to agree that this was the case than GPs ($p = 0.04$). Between half and three quarters of respondents felt they had access to other professionals or worked within multidisciplinary teams who could assist them in caring for someone with T2DM and SMI, this included working with family members or carers. This could be better aided by integrated IT systems for 62% of participants.

Implementation of diabetes care

For those participants who indicated that a diabetes care standard was part of their role (Table 3), on average 5 of every 10 service users with diabetes and SMI were referred on for retinopathy screening; 5-6 were offered diabetes education, advice about weight management, diet and nutrition and had their feet examined; 6-7 had their BP monitored, personalised HbA1c targets agreed and their cholesterol monitored and 7 out of 10 had their kidney function monitored.

Predictors of implementing diabetes care

Table 4 displays the results of regression analysis to predict implementation of the 9 diabetes care standards. The predictors shown in the table are those that were significantly related to the outcomes in univariate analysis.

Table 4. Regressions displaying predictors of diabetes care.

Outcome	Predictors	Hypothesis Test			Exp(β)	95% Wald Confidence Interval for Exp(β)	
		Wald χ2	df	*p*		Lower	Upper
Education	**(Intercept)**	**6.07**	**1.00**	**0.02**	**2.39**	**1.19**	**4.80**
	I know the guidelines	0.38	1.00	0.90	0.99	0.90	1.10
	I know how to manage	**5.51**	**1.00**	**0.04**	**1.15**	**1.02**	**1.30**
	I will follow the NICE diabetes guidelines	1.75	1.00	0.33	1.07	0.96	1.18
	I have access to people with specialist diabetes knowledge	0.48	1.00	0.76	1.02	0.94	1.10
	I need more training in diabetes	1.79	1.00	0.25	0.96	0.89	1.02
	I am optimistic that I will be able to manage T2DM in people with SMI	0.07	1.00	0.88	0.99	0.88	1.11
	Managing T2DM in someone with SMI is a routine part of my job	0.74	1.00	0.52	1.04	0.94	1.16
	I tailor the treatment of T2DM in people with SMI depending on their needs	0.14	1.00	0.95	1.00	0.90	1.11
	Managing T2DM in people with SMI worries or concerns me	1.55	1.00	0.26	0.95	0.88	1.03
	I feel confident	0.62	1.00	0.64	0.96	0.84	1.10
	I review how I manage T2DM in people with SMI, and identify ways in which I can improve	0.24	1.00	0.86	1.01	0.92	1.11
	How many of the 9 diabetes care standard are you responsible for?	**10.52**	**1.00**	**0.00**	**1.06**	**1.02**	**1.10**
Weight	**(Intercept)**	**16.34**	**1.00**	**0.00**	**2.97**	**1.75**	**5.03**
	Profession	**24.18**	**4.00**	**0.00**	-	-	-
	Mental health nurses and support workers	0.55	1.00	0.50	0.91	0.71	1.18
	Psychiatrists	2.86	1.00	0.09	1.24	0.97	1.59
	GP	1.15	1.00	0.33	0.86	0.65	1.14
	Other nurses	0.35	1.00	0.56	1.08	0.84	1.38
	I know the guidelines	3.21	1.00	0.10	1.08	0.99	1.17
	I know how to manage	1.55	1.00	0.24	1.06	0.96	1.17
	I have access to people with specialist diabetes knowledge	1.99	1.00	0.26	0.96	0.90	1.02
	I need more training in diabetes	1.10	1.00	0.34	0.97	0.92	1.03
	I feel confident	0.21	1.00	0.80	1.01	0.92	1.11
	I review how I manage T2DM in people with SMI, and identify ways in which I can improve	1.84	1.00	0.32	1.05	0.97	1.13
	How many of the 9 diabetes care standard are you responsible for?	**7.00**	**1.00**	**0.02**	**1.04**	**1.01**	**1.07**
Diet	**(Intercept)**	**11.62**	**1.00**	**0.01**	**2.07**	**1.36**	**3.16**
	I know the guidelines	0.51	1.00	0.65	1.02	0.94	1.12

Outcome	Predictors	Hypothesis Test			Exp(β)	95% Wald Confidence Interval for Exp(β)	
		Wald χ2	df	*p*		Lower	Upper
	I know how to manage	1.26	1.00	0.41	1.05	0.95	1.16
	I feel optimistic about the health of my clients	**4.69**	**1.00**	**0.04**	**1.08**	**1.01**	**1.17**
	Managing T2DM in someone with SMI is a routine part of my job	0.17	1.00	0.85	1.01	0.92	1.10
	I review how I manage T2DM in people with SMI, and identify ways in which I can improve	3.60	1.00	0.15	1.08	0.99	1.18
	How many of the 9 diabetes care standard are you responsible for?	4.48	1.00	0.06	1.04	1.00	1.07
BP	**(Intercept)**	**7.47**	**1.00**	**0.01**	**2.43**	**1.28**	**4.58**
	I will follow the NICE diabetes guidelines	0.14	1.00	0.79	1.01	0.94	1.09
	I have access to people with specialist diabetes knowledge	0.33	1.00	0.79	1.01	0.94	1.09
	I need more training in diabetes	4.24	1.00	0.05	0.94	0.88	1.00
	I am optimistic that I will be able to manage T2DM in people with SMI	2.97	1.00	0.11	1.09	0.99	1.20
	Managing T2DM in someone with SMI is a routine part of my job	**5.33**	**1.00**	**0.04**	**1.11**	**1.01**	**1.22**
	I tailor the treatment of T2DM in people with SMI depending on their needs	0.51	1.00	0.53	0.97	0.89	1.06
	My patient's level of engagement is a key factor	3.14	1.00	0.09	1.07	0.99	1.16
	I feel confident	3.58	1.00	0.08	0.91	0.83	1.01
	If I didn't take steps to manage T2DM in people with SMI, they would come to serious harm	3.76	1.00	0.11	1.09	1.00	1.18
	I review how I manage T2DM in people with SMI, and identify ways in which I can improve	0.54	1.00	0.60	1.02	0.95	1.11
	How many of the 9 diabetes care standard are you responsible for?	4.36	1.00	0.06	1.03	1.00	1.06
Feet	(Intercept)	0.30	1.00	0.79	0.87	0.29	2.59
	I need more training in communication and negotiation skills	4.98	1.00	0.05	1.11	1.01	1.22
	Diabetes goals and targets need to be tailored for people with SMI	0.92	1.00	0.42	1.08	0.91	1.29
	My patient's level of engagement is a key factor	**8.45**	**1.00**	**0.01**	**1.21**	**1.06**	**1.38**
	How many of the 9 diabetes care standard are you responsible for?	**7.44**	**1.00**	**0.02**	**1.09**	**1.02**	**1.16**
	Profession	9.36	4.00	0.08	-	-	-
	Mental health nurses and support workers	4.69	1.00	0.07	0.70	0.50	0.98
	Psychiatrists	**4.73**	**1.00**	**0.04**	**0.68**	**0.47**	**0.97**
	GP	**5.36**	**1.00**	**0.03**	**0.62**	**0.42**	**0.93**
	Other nurses	1.30	1.00	0.27	0.85	0.64	1.13
Cholesterol	**(Intercept)**	**62.95**	**1.00**	**0.00**	**4.83**	**3.27**	**7.12**
	Working with people with SMI scares me	**6.97**	**1.00**	**0.01**	**0.90**	**0.83**	**0.97**

Outcome	Predictors	Hypothesis Test			Exp(β)	95% Wald Confidence Interval for Exp(β)	
		Wald χ2	df	*p*		Lower	Upper
	My patient's level of engagement is a key factor	**8.68**	**1.00**	**0.00**	**1.14**	**1.05**	**1.25**
HbA1c	**(Intercept)**	**6.57**	**1.00**	**0.01**	**2.42**	**1.23**	**4.77**
	Diabetes goals and targets need to be tailored for people with SMI	1.57	1.00	0.23	1.08	0.96	1.22
	I am optimistic that I will be able to manage T2DM in people with SMI	**9.16**	**1.00**	**0.00**	**1.20**	**1.06**	**1.34**
Retinopathy	(Intercept)	0.34	1.00	0.59	1.79	0.24	13.35
	Diabetes goals and targets need to be tailored for people with SMI	**5.55**	**1.00**	**0.03**	**1.62**	**1.08**	**2.42**
	I would be disciplined if I did not manage T2DM in people with SMI	**6.14**	**1.00**	**0.02**	**0.71**	**0.53**	**0.93**
	Incentives, such as CQUINS or QOF points, encourage me	**4.43**	**1.00**	**0.04**	**0.77**	**0.60**	**0.98**
	Family members and carers help me	2.05	1.00	0.16	1.22	0.93	1.60

Education

The significant independent predictors of the number of people who were given general education about T2DM were knowledge about how to manage T2DM in people with SMI ($p = 0.04$) and the degree to which diabetes care was part of their role ($p < 0.001$).

Weight

The significant independent predictors of the number of people who had advice about weight management were the degree to which diabetes care was part of their role ($p = 0.02$) and profession ($p < 0.001$).

Diet and nutrition

Optimism about the health of their clients ($p = 0.04$) was the only independent predictor of the number of people who were advised about diet and nutrition.

Monitoring BP

The degree to which diabetes care was a routine part of their role ($p = 0.04$) was the only independent predictor of the number of people who had their BP monitored.

Examining feet

The degree to which diabetes care was part of their role ($p = 0.02$), the level of engagement from the service user ($p = 0.01$) and profession (psychiatrists $p = 0.04$ and GPs $p = 0.03$ compared with allied and other health professions) were the significant independent predictors of the number of people who had their feet examined.

Agreeing a personalised HbA1c target and provide ongoing review

How optimistic a person was in their ability to manage T2DM in people with SMI ($p < 0.001$) was the only independent predictor of the number of service users with whom HbA1c targets were set and ongoing reviews provided.

Monitoring cholesterol

The level of engagement from the service user ($p < 0.001$) and fear of SMI ($p = 0.01$) were the independent predictors of the number of people who had their cholesterol monitored.

Monitoring kidney function

There were no significant univariate associations between the number of people in whom kidney function was monitored and any of the demographic, occupational or TDF factors.

Referring to retinopathy screening

The belief that goals and targets need to be tailored for people with SMI ($p = 0.02$), that they would be disciplined for not managing T2DM in people with SMI ($p = 0.03$) and the need for incentives to encourage them to manage T2DM in this population ($p = 0.04$) were the significant independent predictors of the number of people referred on for retinopathy screening.

DISCUSSION

We found that delivery of diabetes care for people with SMI is influenced by a range of individual and organisational factors. Although there were clear differences in the extent of involvement, mental health professionals noted active engagement in many of the aspects of diabetes care, as identified elsewhere in the literature.[14, 27, 15] Confirming our qualitative findings[16] however, specialist mental health clinicians reported being responsible for fewer diabetes care standards than primary care and specialist diabetes clinicians. This contests the idea that there is confusion and role ambiguity about the responsibility for monitoring and supporting T2DM in SMI.[13] In fact this

survey indicates clear boundaries, but when diabetes management is perceived to be a greater part of a person's role, more service users are treated according to recommended standards. This clearly reflects conflict between the shared care approach,[21, 20] which promotes mental health professionals broadening their deliverer of to address physical and mental health.[19] This indicates a need for NHS trusts to define roles and responsibilities more clearly. This is particularly relevant given that only a third of the sample felt that there was a definite focus in their trust on the management of T2DM in people with SMI.

Although 54% of respondents had received training in diabetes, only a quarter had been trained in how to manage the condition in people with SMI, and this figure did not differ between the professions. Despite receiving training, those working in mental health settings felt less knowledgeable about the guidelines for T2DM and had a desire for more training in how to manage the condition. This supports the findings of studies conducted in other UK mental health trusts[28, 14, 27, 15, 29] and theory-driven qualitative work that formed the basis of this study.[16] Importantly, this lack of knowledge and skills meant that healthcare professionals treated fewer service users according to recommended diabetes care standards. Evaluations of diabetes training and educational packages for mental health clinicians are limited. Improvements in understanding and knowledge of diabetes have been reported; however, these findings are based on a small scale, single group study consisting of primarily mental health students and hence fail to explore its impact on practice.[30] Any such programme will need to consider the barriers to attending training of this nature, including a lack of management support, staff shortages, the discretionary nature of attending and lack of funding[31] along with the challenges of using psychosocial interventions to change practice.[32, 33, 34]

Being able to communicate and engage with service users was identified as an important facilitator in delivering effective diabetes care. As opposed to those working in mental health settings, primary

care and diabetes specialists felt they needed more training in communication and negotiation skills in order for them to be able to motivate their clients and deliver recommended care. Difficulties motivating service users with diabetes to self-manage has been identified elsewhere in the literature[27, 29, 35] and presents an ongoing challenge for interventions aimed at changing the behaviour of service users with T2DM.[36] Respondents stressed the importance of tailoring diabetes treatment, along with any goals and targets, to the needs and abilities of the service user. Mental health staff report experiencing difficulties engaging service users in their diabetes care, due to limitations in cognitive and executive functioning.[35, 29] Together this highlights the importance of training healthcare professionals to also be able to identity suitable times within the service user's journey when they may need more support in order for them to self-manage effectively. The challenges of communicating and engaging service users in their care, may also be precipitated or be a consequence of the fear some healthcare professionals experience about working with someone with a SMI. This further supports research that shows some clinicians experience discomfort in dealing with people with mental illness leading to physical diagnosis often being missed.[37]

Only a third of the sample were optimistic about the health of their clients with T2DM, and a majority of respondents lacked optimism about their ability to manage T2DM in people with SMI. This led to fewer service users receiving the recommended diabetes care standards. Given the importance of hope and optimism in the process of personal recovery in mental health[17] this could be an important focus for interventions aimed at improving diabetes care and outcomes for service users, with the potential for wider benefits. The powerful position that healthcare professionals hold as hope-inspiring role models[17] can either enhance or diminish the hope of service users.[38, 39] This is particularly important considering that practitioner hope has been found to influence the outcomes of therapy over and above client hope[40] and that cultivating hope in the context of T2DM is also associated with increased adherence.[41]

Similar to the findings of our qualitative work[16] a third of respondents felt that they would be disciplined if they did not manage diabetes in people with SMI and approximately a quarter felt that incentives would encourage them. Despite this, the threat of discipline and need for incentives appeared to have a counterintuitive effect in the multivariate analysis. The greater the threat of discipline and a stronger belief that incentives would encourage them to manage diabetes, the fewer service users received recommended diabetes care. Suggesting that discipline and possibly the discordance between desire and receipt of incentives, was having a paralysing effect on practice. Blame and punishment are felt by healthcare professionals to be part of health service culture, particularly when someone is involved in an error, near miss or incident.[42] This however can lead to disempowerment, disunity and a lack of compassion in the workforce.[43] Rather than allowing people to experiment without fear of reprisal and view errors as learning opportunities,[43] the workforce are fearful of personal accountability, litigation and complaints.[44] Although participants felt that incentives would improve their practice, the multivariate analysis and the evidence for pay-for-performance systems, such as QOF, in changing healthcare professional behaviour is limited and there is insufficient evidence for their impact on patient health outcomes.[45]

Taken together, our findings suggest that a number of strategies could be implemented to improve the care offered to people with diabetes and SMI, and as a consequence address the inequalities experienced by this population. Identification of these barriers and enablers now allows us to identify, using established methods, the behaviour change techniques that should be employed within an intervention to improve diabetes care in people with SMI[46] and move towards the feasibility and piloting of a new approach to delivering care.[22] The study had a number of limitations; as with any online survey there are concerns about the representativeness of the sample.[47] There was a bias in responses towards those who were likely to be more interested in the topic, with significantly more responses from those working within mental health settings. This raises a broader question about whether severe mental illness is a priority or issue for diabetes

specialists. Despite the recruitment strategy aiming to target a range of healthcare professionals GPs, diabetologists and physical health nurses are under-represented. The data from this study focused on predicting delivery of diabetes care to people with SMI by healthcare professionals who stated this was part of their role. It may have however, been the case that elements of diabetes care could have been undertaken by someone even when it was not explicitly part of their role. Our results are also only a snapshot of the experiences and beliefs of healthcare professionals; as the care of diabetes in people with SMI becomes of greater priority and services begin to develop, these views may change.

COMPETING INTERESTS

We have read and understood BMJ policy on declaration of interests and declare the following interests: we have none.

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AUTHOR CONTRIBUTIONS

HM - made a substantial contribution to the conception and design of the study, the data analysis, interpretation of the data, created a first draft of the manuscript, approved the final version and agrees to be accountable for all aspects of the work.

FLG - made a substantial contribution to the conception and design of the study, collection and interpretation of the data, commented on drafts of the manuscript, approved the final version and agrees to be accountable for all aspects of the work.

MH, AS, JC, JJ, CF and KM all made a substantial contribution to the conception and design of the study, interpretation of the data, commented on drafts of the manuscript, approved the final version and agree to be accountable for all aspects of the work.

DATA SHARING

There is no other additional unpublished data to be shared.

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Supplementary File A.

Questionnaire to Measures the Barriers and Enablers to Delivering Diabetes Care in People with SMI (*TDF domain*)

I know the guidelines, national or local, for managing type 2 diabetes (*knowledge*)	Strong Agree	☐
	Agree	☐
	Neither Agree nor Disagree	☐
	Disagree	☐
	Strongly Disagree	☐
I know how to manage type 2 diabetes in people with SMI (*knowledge*)	Strong Agree	☐
	Agree	☐
	Neither Agree nor Disagree	☐
	Disagree	☐
	Strongly Disagree	☐
How likely is it that you will follow the NICE diabetes guidelines for your patients who have type 2 diabetes and SMI? (*intention*)	Very Likely	☐
	Likely	☐
	Neither Likely nor Unlikely	☐
	Unlikely	☐
	Very Unlikely	☐
I have access to people with specialist diabetes knowledge to help me manage type 2 diabetes in people with SMI (*environmental context & resources*)	Strong Agree	☐
	Agree	☐
	Neither Agree nor Disagree	☐
	Disagree	☐
	Strongly Disagree	☐
I have access to people in primary care services for my patients with type 2 diabetes and SMI (*environmental context & resources*)	Strong Agree	☐
	Agree	☐
	Neither Agree nor Disagree	☐
	Disagree	☐
	Strongly Disagree	☐

I have access to people in mental health services for my patients with type 2 diabetes and SMI (*environmental context & resources*)	Strong Agree ☐ Agree ☐ Neither Agree nor Disagree ☐ Disagree ☐ Strongly Disagree ☐
I have enough time to manage type 2 diabetes in people with SMI (*environmental context & resources*)	Strong Agree ☐ Agree ☐ Neither Agree nor Disagree ☐ Disagree ☐ Strongly Disagree ☐
More integrated IT systems would make it easier for me to manage type 2 diabetes in people with SMI (*environmental context & resources*)	Strong Agree ☐ Agree ☐ Neither Agree nor Disagree ☐ Disagree ☐ Strongly Disagree ☐
I need more training in communication and negotiation skills in order to manage type 2 diabetes in people with SMI (*skills*)	Strong Agree ☐ Agree ☐ Neither Agree nor Disagree ☐ Disagree ☐ Strongly Disagree ☐
I need more training in diabetes in order to manage type 2 diabetes in people with SMI (*skills*)	Strong Agree ☐ Agree ☐ Neither Agree nor Disagree ☐ Disagree ☐ Strongly Disagree ☐

Managing patients' type 2 diabetes in people with SMI is as important as managing their mental health (*goal*)	Strong Agree ☐ Agree ☐ Neither Agree nor Disagree ☐ Disagree ☐ Strongly Disagree ☐
Diabetes goals and targets need to be tailored for people with SMI (*goal*)	Strong Agree ☐ Agree ☐ Neither Agree nor Disagree ☐ Disagree ☐ Strongly Disagree ☐
There is a definite focus in my trust on managing type 2 diabetes in people with SMI (*goal*)	Strong Agree ☐ Agree ☐ Neither Agree nor Disagree ☐ Disagree ☐ Strongly Disagree ☐
I prioritise management of mental health over management of type 2 diabetes in people with type 2 diabetes and SMI (*goal*)	Strong Agree ☐ Agree ☐ Neither Agree nor Disagree ☐ Disagree ☐ Strongly Disagree ☐
I am optimistic that I will be able to manage type 2 diabetes in people with SMI (*optimism*)	Strong Agree ☐ Agree ☐ Neither Agree nor Disagree ☐ Disagree ☐ Strongly Disagree ☐

I feel optimistic about the health of my patients with type 2 diabetes and SMI (*optimism*)	Strong Agree ☐ Agree ☐ Neither Agree nor Disagree ☐ Disagree ☐ Strongly Disagree ☐
I would be disciplined if I did not manage type 2 diabetes in people with SMI (*reinforcement*)	Strong Agree ☐ Agree ☐ Neither Agree nor Disagree ☐ Disagree ☐ Strongly Disagree ☐
Incentives, such as CQUINS or QOF points, encourage me to manage type 2 diabetes in people with SMI (*reinforcement*)	Strong Agree ☐ Agree ☐ Neither Agree nor Disagree ☐ Disagree ☐ Strongly Disagree ☐
Managing type 2 diabetes in someone with SMI is a routine part of my job (*memory, attention and decision*)	Strong Agree ☐ Agree ☐ Neither Agree nor Disagree ☐ Disagree ☐ Strongly Disagree ☐
I tailor the treatment of type 2 diabetes in people with SMI depending on their needs (*memory, attention and decision*)	Strong Agree ☐ Agree ☐ Neither Agree nor Disagree ☐ Disagree ☐ Strongly Disagree ☐

Managing type 2 diabetes in people with SMI worries or concerns me (*emotion*)	Strong Agree ☐ Agree ☐ Neither Agree nor Disagree ☐ Disagree ☐ Strongly Disagree ☐
Managing type 2 diabetes in people with SMI frustrates me (*emotion*)	Strong Agree ☐ Agree ☐ Neither Agree nor Disagree ☐ Disagree ☐ Strongly Disagree ☐
Working with people with SMI scares me (*emotion*)	Strong Agree ☐ Agree ☐ Neither Agree nor Disagree ☐ Disagree ☐ Strongly Disagree ☐
My patient's level of engagement is a key factor in how I manage the type 2 diabetes in people with SMI (*social influence*)	Strong Agree ☐ Agree ☐ Neither Agree nor Disagree ☐ Disagree ☐ Strongly Disagree ☐
I work as part of a team of healthcare professionals to help manage type 2 diabetes in people with SMI (*social influence*)	Strong Agree ☐ Agree ☐ Neither Agree nor Disagree ☐ Disagree ☐ Strongly Disagree ☐

Family members and carers help me manage type 2 diabetes in people with SMI (*social influence*)	Strong Agree	☐
	Agree	☐
	Neither Agree nor Disagree	☐
	Disagree	☐
	Strongly Disagree	☐
I feel confident about managing type 2 diabetes in people with SMI (*beliefs about capabilities*)	Strong Agree	☐
	Agree	☐
	Neither Agree nor Disagree	☐
	Disagree	☐
	Strongly Disagree	☐
Poorly controlled type 2 diabetes in people with SMI affects their mental health (*beliefs about consequences*)	Strong Agree	☐
	Agree	☐
	Neither Agree nor Disagree	☐
	Disagree	☐
	Strongly Disagree	☐
If I didn't take steps to manage type 2 diabetes in people with SMI, they would come to serious harm (*beliefs about consequences*)	Strong Agree	☐
	Agree	☐
	Neither Agree nor Disagree	☐
	Disagree	☐
	Strongly Disagree	☐
I have a plan that I follow - either in my team or on my own - when managing type 2 diabetes in people with SMI (*behavioural regulation*)	Strong Agree	☐
	Agree	☐
	Neither Agree nor Disagree	☐
	Disagree	☐
	Strongly Disagree	☐

I review how I manage type 2 diabetes in people with SMI, and identify ways in which I can improve (*behavioural regulation*)	Strong Agree	☐
	Agree	☐
	Neither Agree nor Disagree	☐
	Disagree	☐
	Strongly Disagree	☐
Is providing general education about type 2 diabetes part of your clinical role? (*social professional role & identity*)	Yes	☐
	No	☐
If yes, over the past 12 months, given 10 patients with both type 2 diabetes and SMI, for how many did you provide general education about diabetes?		
Is giving advice about weight management to patients with both type 2 diabetes and SMI part of your clinical role? (*social professional role & identity*)	Yes	☐
	No	☐
If yes, over the past 12 months, given 10 patients with both type 2 diabetes and SMI, for how many did you advice about weight management*?*		
Is providing personalised advice about diet and nutrition to patients with type 2 diabetes and SMI part of your clinical role? (*social professional role & identity*)	Yes	☐
	No	☐
If yes, over the past 12 months, given 10 patients with both type 2 diabetes and SMI, for how many did you advice about diet and nutrition*?*		
Is monitoring the blood pressure for patients with type 2 diabetes and SMI a part of your role? (*social professional role & identity*)	Yes	☐
	No	☐
If yes, over the past 12 months, given 10 patients with both type 2 diabetes and SMI, for how many did you monitor their BP?		
Is examining the circulation and sensation in the feet of patients with type 2 diabetes and SMI part of your clinical role? (*social professional role & identity*)	Yes	☐
	No	☐
If yes, over the past 12 months, given 10 patients with both type 2 diabetes and SMI, for how many did you examine their feet?		
Is working with patients with type 2 diabetes and SMI to agree a personalised HbA1c target and provide ongoing reviews a part of your clinical role? (*social professional role & identity*)	Yes	☐
	No	☐

If yes, over the past 12 months, given 10 patients with both type 2 diabetes and SMI, for how many did you agree a personalised HbA1c target and provide ongoing reviews?

Is working with patients with type 2 diabetes and SMI to monitor their cholesterol part of your clinical role? (*social professional role & identity*)

Yes ☐

No ☐

If yes, over the past 12 months, given 10 patients with both type 2 diabetes and SMI, for how many did you monitor cholesterol?

Is working with patients with type 2 diabetes and SMI to monitor their kidney function part of your clinical role? (*social professional role & identity*)

Yes ☐

No ☐

If yes, over the past 12 months, given 10 patients with both type 2 diabetes and SMI, for how many did you monitor kidney function?

Is working with patients with type 2 diabetes and SMI to refer to retinopathy screening a part of your clinical role? (*social professional role & identity*)

Yes ☐

No ☐

If yes, over the past 12 months, given 10 patients with both type 2 diabetes and SMI, for how many did you refer to retinopathy screening?

Supplementary File A.

Differences between professions on the barriers and enablers to delivering care

	Mental Health Nurse (n = 124)	Psychiatrist (n=108)	GP (n=29)	Other Nurses (n=60)	Allied Health Professionals (n=37)	Diabetologist or Endocrinologist (n=11)	ANOVA
I know the guidelines	3.31(1.08)	3.11(1.04)	4.13(0.76)	3.95(1.15)	3.10(1.14)	4.54(0.63)	F (5, 50.63) = 24.78, ***p* < 0.001**, ω^2 = 0.23
I know how to manage	3.41(0.98)	3.08(0.94)	3.42(0.91)	3.13(1.06)	2.81(1.17)	3.83(0.87)	F (5, 267) = 4.34, ***p* = 001**, η^2 = 0.08
I will follow the NICE diabetes guidelines	3.80(0.99)	3.67(0.94)	3.85(1.00)	3.85(1.09)	3.38(1.21)	3.73(1.06)	F (5, 267) = 1.46, *p* = 0.21, η^2 = 0.03
I have access to people with specialist diabetes knowledge	3.62(1.07)	3.72(1.09)	3.88(0.82)	3.80(1.10)	3.27(1.12)	3.75(1.25)	F (5, 48.68) = 2.14, *p* = 0.08, ω^2 = 0.02
I have access to people in primary care services	3.61(1.07)	3.68(1.08)	3.82(1.21)	3.27(1.25)	3.39(1.25)	3.42(1.19)	F (5, 267) = 2.18, *p* = 0.06, η^2 = 0.04
I have access to people in mental health services	3.57(1.11)	3.30(1.29)	3.12(1.16)	3.31(1.19)	3.14(1.36)	3.29(1.10)	F (5, 48.04) = 1.43, *p* = 0.23, ω^2 = 0.01
I have enough time	3.10(1.02)	2.74(1.04)	2.48(1.02)	3.07(1.10)	2.84(1.20)	2.59(1.11)	F (5, 267) = 3.12, ***p* = 0.009**, η^2 = 0.009
More integrated IT systems would make it easier for me	3.72(1.05)	3.72(1.18)	3.33(1.06)	3.40(1.02)	3.48(1.34)	3.97(0.95)	F (5, 267) = 2.38, ***p* = 0.04**, η^2 = 0.04
I need more training in communication and negotiation kills	3.07(1.12)	2.75(1.12)	3.05(1.17)	3.33(1.11)	3.20(1.41)	3.64(1.22)	F (5, 46.14) = 5.73, ***p* < 0.001**, ω^2 = 0.08
I need more training in diabetes	3.64(1.10)	3.61(1.13)	3.18(1.04)	3.44(1.09)	3.79(1.28)	3.21(1.36)	F (5, 267) = 4.18, ***p* = 0.001**, η^2 = 0.07

	Mental Health Nurse (n = 124)	Psychiatrist (n=108)	GP (n=29)	Other Nurses (n=60)	Allied Health Professionals (n=37)	Diabetologist or Endocrinologist (n=11)	ANOVA
Managing T2DM in people with SMI is as important as managing their mental health	4.31(0.86)	4.16(0.87)	4.07(0.91)	4.18(0.90)	4.21(1.17)	4.14(1.00)	F (5, 267) = 2.47, ***p* = 0.03**, η^2 = xxx
Diabetes goals and targets need to be tailored for people with SMI	4.06(0.94)	3.86(0.93)	4.17(0.92)	4.21(0.97)	4.09(1.18)	4.62(0.62)	F (5, 267) = 3.57, ***p* = 0.004**,η^2 = 0.06
There is a definite focus in my trust	3.22(1.01)	3.05(1.00)	2.50(0.92)	3.10(1.16)	3.07(1.19)	3.17(1.33)	F (5, 267) = 3.97, ***p* = 0.002**, η^2 = 0.07
I prioritise management of mental health over management of T2DM	2.79(1.02)	2.65(1.09)	2.76(0.80)	3.00(0.91)	2.96(1.18)	3.03(1.06)	F (5, 46.84) = 2.30, *p* = 0.06, ω^2 = 0.02
I am optimistic that I will be able to manage T2DM in people with SMI	3.45(0.91)	3.18(0.98)	3.52(0.80)	3.39(0.93)	3.20(1.07)	3.56(1.08)	F (5, 267) = 2.99, ***p* = 0.01**, η^2 = 0.05
I feel optimistic about the health of my clients	3.02(0.98)	2.82(0.97)	2.78(0.98)	3.04(0.97)	2.75(1.09)	3.06(1.27)	F (5, 267) = 1.82, *p* = 0.11, η^2 = 0.03
I would be disciplined if I did not manage T2DM in people with SMI	3.37(1.11)	2.95(1.08)	2.79(1.00)	3.15(1.12)	3.16(1.26)	3.16(1.05)	F (5, 267) = 3.81, ***p* = 0.002**, η^2 = 0.07
Incentives, such as CQUINS or QOF points, encourage me	2.88(1.12)	2.51(1.11)	3.14(1.00)	2.81(1.20)	2.79(1.16)	2.82(0.90)	F (5, 267) = 3.53, ***p* = 0.004**, η^2 = 0.06
Managing T2DM in someone with SMI is a routine part of my job	3.50(1.14)	3.23(1.11)	3.93(0.90)	3.62(1.22)	3.29(1.35)	3.63(0.80)	F (5, 52.25) = 5.13, ***p* = 0.001**, ω^2 = 0.07
I tailor the treatment of T2DM in people with SMI depending on their needs	3.57(1.06)	3.39(0.98)	3.91(0.92)	3.95(1.10)	3.33(1.21)	4.08(0.84)	F (5, 267) = 5.25, ***p* < 0.001**, η^2 = 0.09
Managing T2DM in people with SMI worries or concerns me	3.38(1.05)	3.54(1.02)	3.27(1.03)	3.32(1.12)	3.32(1.37)	3.19(0.96)	F (5, 267) = 0.70, *p* =0.62, η^2 = 0.01

	Mental Health Nurse (n = 124)	Psychiatrist (n=108)	GP (n=29)	Other Nurses (n=60)	Allied Health Professionals (n=37)	Diabetologist or Endocrinologist (n=11)	ANOVA
Managing T2DM in people with SMI frustrates me	2.84(1.08)	3.07(1.12)	3.26(1.05)	3.06(1.13)	3.13(1.38)	3.00(0.86)	$F(5, 267) = 1.25$, $p = 0.29$, $\eta^2 = 0.02$
Working with people with SMI scares me	1.91(1.04)	1.73(0.96)	1.97(0.98)	2.29(1.10)	2.15(1.20)	2.49(1.03)	$F(5, 267) = 4.08$, $\mathbf{p = 0.001}$, $\eta^2 = 0.07$
My patient's level of engagement is a key factor	3.77(1.04)	3.56(1.04)	3.96(0.73)	3.79(1.12)	3.40(1.32)	4.08(0.75)	$F(5, 50.40) = 3.29$, $\mathbf{p = 0.01}$, $\omega^2 = 0.04$
I work as part of a team of healthcare professionals	3.53(1.15)	3.29(1.25)	3.71(1.24)	3.53(1.17)	3.41(1.35)	3.91(1.09)	$F(5, 267) = 2.02$, $p = 0.08$, $\eta^2 = 0.04$
Family members and carers help me manage T2DM in people with SMI	3.18(1.11)	3.37(1.05)	3.58(0.97)	3.43(1.13)	3.00(1.32)	3.89(0.69)	$F(5, 50.09) = 3.48$, $\mathbf{p = 0.009}$, $\omega^2 = 0.04$
I feel confident in managing T2DM in people with SMI	3.30(1.03)	3.01(1.00)	3.33(0.93)	3.21(1.03)	2.99(1.09)	3.51(0.83)	$F(5, 267) = 2.09$, $p = 0.07$, $\eta^2 = 0.04$
Poorly controlled T2DM in people with SMI affects their mental health	4.08(0.95)	4.13(0.90)	3.81(0.77)	4.02(0.98)	3.74(1.27)	4.28(0.88)	$F(5, 267) = 1.68$, $p = 0.14$, $\eta^2 = 0.03$
If I didn't take steps to manage T2DM in people with SMI, they would come to serious harm	3.79(1.04)	3.91(1.08)	3.85(0.88)	3.86(0.97)	3.77(1.26)	4.02(0.82)	$F(5, 267) = 0.14$, $p = 0.98$, $\eta^2 < 0.001$
I have a plan that I follow - either in my team or on my own	3.39(1.13)	3.37(1.03)	3.39(0.99)	3.41(1.10)	3.33(1.15)	3.67(0.94)	$F(5, 267) = 0.18$, $p = 0.97$, $\eta^2 < 0.001$
I review how I manage T2DM in people with SMI, and identify ways in which I can improve	3.43(1.12)	3.37(1.03)	3.29(0.97)	3.62(1.05)	3.34(1.15)	3.70(0.9)	$F(5, 267) = 1.51$, $p = 0.20$, $\eta^2 = 0.03$
How many of the 9 diabetes care standard are you responsible for?	3.81(2.30)	3.69(2.47)	6.65(2.02)	5.83(2.92)	2.42(3.06)	7.67(1.58)	$F(5, 267) = 14.46$, $\mathbf{p < 0.001}$, $\eta^2 = 0.21$

Responses were 1-5, with a higher score reflecting greater agreement.

STROBE 2007 (v4) Statement—Checklist of items that should be included in reports of *cross-sectional studies*

Section/Topic	Item #	Recommendation	Reported on page #
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	1
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	2
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	5-6
Objectives	3	State specific objectives, including any prespecified hypotheses	6
Methods			
Study design	4	Present key elements of study design early in the paper	6
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	6-7
Participants	6	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants	6-7
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	7-8
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	7-8
Bias	9	Describe any efforts to address potential sources of bias	*n/a*
Study size	10	Explain how the study size was arrived at	7
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	8
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	8
		(*b*) Describe any methods used to examine subgroups and interactions	8
		(*c*) Explain how missing data were addressed	8
		(*d*) If applicable, describe analytical methods taking account of sampling strategy	n/a
		(*e*) Describe any sensitivity analyses	n/a
Results			

Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	9
		(b) Give reasons for non-participation at each stage	n/a
		(c) Consider use of a flow diagram	n/a
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	9-10
		(b) Indicate number of participants with missing data for each variable of interest	9
Outcome data	15*	Report numbers of outcome events or summary measures	10-22
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	10-22
		(*b*) Report category boundaries when continuous variables were categorized	10-22
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	n/a
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	n/a
Discussion			
Key results	18	Summarise key results with reference to study objectives	22
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	25-26
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	22-25
Generalisability	21	Discuss the generalisability (external validity) of the study results	25-26
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	26

*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.

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Management of type 2 diabetes mellitus in people with severe mental illness: an online cross-sectional survey of healthcare professionals

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Management of type 2 diabetes mellitus in people with severe mental illness: an online cross-sectional survey of healthcare professionals

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ABSTRACT

Objectives

To establish healthcare professionals' (HCPs) views about clinical roles, and the barriers and enablers to delivery of diabetes care for people with severe mental illness (SMI).

Design

Cross-sectional, postal and online survey.

Setting

Trusts within the National Health Service (NHS), mental health and diabetes charities and professional bodies.

Participants

HCPs who care for people with type 2 diabetes mellitus (T2DM) and/or SMI in the UK.

Primary and secondary outcome measures

The barriers, enablers and experiences of delivering T2DM care for people with SMI, informed by the Theoretical Domains Framework (TDF).

Results

Responders were 273 HCPs, primarily mental health nurses (33.7%) and psychiatrists (32.2%). Only 25% of respondents had received training in managing T2DM in people with SMI. Mental health professionals felt responsible for significantly fewer recommended diabetes care standards than physical health professionals (p<0.001). For those seeing diabetes care as part of their role, the significant barriers to its delivery in the regression analyses were a lack of knowledge (p=0.003); a need for training in communication and negotiation skills (p=0.04); a lack of optimism about the health of their clients (p=0.04) and their ability to manage T2DM in people with SMI (p=0.003); the threat of being disciplined

(*p*=0.02); fear of working with people with a mental health condition (*p*=0.01); a lack of service user engagement (*p*=0.006) and a need for incentives (*p*=0.04). The significant enablers were an understanding of the need to tailor treatments (*p*=0.04) and goals (*p*=0.02) for people with SMI.

Conclusions

This survey indicates that despite current guidelines, diabetes care in mental health settings remains peripheral. Even when diabetes care is perceived as part of a HCP's role, various individual and organisational barriers to delivering recommended T2DM care standards to people with SMI are experienced.

STRENGTHS AND LIMITATIONS OF THIS STUDY

- The survey is informed by the Theoretical Domains Framework, a robust theoretical approach to exploring the barriers and enablers to behaviour change, guided by the MRC Framework for developing complex interventions
- We attempted to recruit participants from a range of sources, including NHS trusts, charities and professional bodies in the UK
- The cross-sectional study design means cause and effect relationships cannot be established
- The survey failed to capture the barriers and enablers to delivering recommended diabetes care to people with SMI by healthcare professionals who did not see this as being part of their clinical role
- Despite the recruitment strategy aiming to target a range of healthcare professionals, GPs, diabetologists and physical health nurses are under-represented

INTRODUCTION

Diabetes affects an estimated 415 million people worldwide and accounts for 12% of international health expenditure.[1] In the UK, 6.2% of adults are estimated to have diabetes and as in other high income countries approximately 90% of these have type 2 diabetes (T2DM).[1] There are a range of important risk factors for the development of T2DM, one of which is diagnosis of a severe mental illness (SMI), which is associated with a 2-3 fold increase in likelihood of developing the condition.[2] This increased risk has been attributed to poor diet, obesity and physical inactivity,[2, 3] the effects of anti-psychotic medications[4] and high rates of smoking.[5] As a consequence, those with T2DM and SMI die significantly younger than people with T2DM without SMI[6] and experience a greater risk of T2DM complications that require specialist treatment.[7]

These significant health inequalities may in part be explained by variations in diabetes care.[8, 9] Evidence suggests that people with SMI can be less likely to receive more novel cost-intensive medications;[10] retinopathy screening;[11, 8] foot examinations;[8] testing of HbA1c,[8, 9] renal checks;[8] and diabetes education.[12] They are also less likely to be hospitalised for diabetes than those with diabetes alone.[12, 9] The reasons for these disparities in care are wide ranging. At an individual level the knowledge and skills of mental health nurses to deliver and support diabetes care has been questioned[13, 14, 15] and previous theory-driven qualitative research that underpins this study[16] found that not knowing how to manage and monitor T2DM and engage and communicate with service users were significant barriers to delivering recommended care. There is also poor awareness, particularly amongst mental health professionals, about national and local guidelines for managing T2DM.[16] Despite hope and optimism being central to facilitating recovery in people with SMI,[17] healthcare professionals have also been found to be despondent about the health of their clients,[16] which could impact on how service users are engaged and how care is delivered.

At an organisational level the lack of integrated mental and physical health care services has been identified as a barrier to delivering care. Care pathways for people with a SMI and diabetes are often complex and fragmented and healthcare professionals value integrated care and easy access to a multidisciplinary team,[16] Despite this, co-location of mental and physical services seems to have had variable impact on the delivery of diabetes care.[18] There also appears to be issues in relation to perceived roles and responsibilities. Whilst some research shows confusion and role ambiguity about the responsibility for monitoring and supporting people with T2DM and SMI,[13] our previous qualitative research indicates a clear demarcation between the perceived responsibilities of mental health versus primary care and specialist diabetes services.[16] Whilst all professional groups felt it was their role to ensure the population were able to access relevant diabetes services, support service users to lead healthier lifestyles and either monitor or help service users to monitor their blood glucose levels, it was those from primary care and specialist diabetes services that felt that starting new or titrating diabetes treatments in people with SMI was their responsibility. Mental health professionals felt that monitoring medication adherence, blood pressure, weight and assisting service users to attend their diabetes appointments were their responsibility. This is in opposition to current recommendations that promote shared responsibility between mental and physical health care services, for at least the first 12 months or until the person's condition has stabilised.[19, 20, 21]

Guided by the Medical Research Council (MRC) recommendations for developing complex interventions,[22] to create a theoretically- and evidence-based intervention, this study aimed to explore a full range of potential barriers and enablers to delivering diabetes care to people with SMI and model these relationships. This will allow for selection of key behaviour change techniques and subsequent incorporation of them in an intervention to improve the care delivered to this population. The purpose of this study was therefore to identify the primary barriers and enablers

that affect the practice of primary care, specialist mental health and diabetes specialist clinicians in their management of T2DM in people with SMI. Using this data the intervention components that could overcome these barriers and enhance the enablers could then be identified.

METHODS

Participants

A cross-sectional, online survey was conducted between September 2015 and September 2016. The target population was any healthcare professional involved in the care of people with either T2DM and/or SMI. Targeted staff emails, containing a link to the survey, were sent to relevant staff groups by 9 NHS Trusts providing mental health services in the UK. GP practices across the UK were approached via 5 Clinical Commissioning Groups. Flyers were distributed at 8 professional healthcare conferences in the UK and Europe. The Royal Colleges of GPs, Psychiatrists and Nursing, along with the Association of British Clinical Diabetologists, shared the survey via social media and/or via their postal and online newsletters, as did the charity Diabetes UK. Staff were informed that a donation of £2 would be made to a diabetes or mental health charity for each completed survey questionnaire. The study was approved by the Wales Research Ethics Committee 7 (ref. 15/WA/0310).

The size of the target population is in excess of 100,000, comprised of UK GPs, specialists in general psychiatry and endocrinology and diabetes mellitus,[23] as well as qualified mental health nurses[24] and diabetes specialist nurses.[25]

Measures

Demographic factors: Age and gender were collected from participants.

Occupational factors: Data were collected on profession, length of time in current role, length of time qualified, country of practice, and site of practice (in- or outpatient). Participants were asked

the proportion of their patient group who had T2DM, SMI, and comorbid T2DM and SMI. If they had received training in how to care for people with T2DM and comorbid T2DM and SMI, and if so when and where this was. Along with the access they had to any clinical guidelines for the management of T2DM.

Barriers and enablers: A 33-item questionnaire (Supplementary file A) was developed to measure the barriers and enablers to delivering diabetes care to people with SMI, based on qualitative work undertaken by the team.[16] Items were generated based on the beliefs reported by healthcare professionals in these interviews, with the most relevant selected through a consensus approach.[16] The Theoretical Domains Framework (TDF)[26] was used to guide this process to ensure that the survey was able to capture a comprehensive range of factors that could act as barriers or enablers to delivering diabetes care. Items covered each of the 14 domains within the TDF (1) knowledge (2) skills (3) intention (4) social professional role & identity (5) social influence (6) goals (7) beliefs about consequences (8) beliefs about capabilities (9) memory, attention & decision processes (10) environmental context & resources (11) behavioural regulation (12) emotion (13) reinforcement (14) optimism. Responses were on a 5-point Likert scale from 1 strongly agree to 5 strongly disagree. All items were reverse scored.

Delivery of diabetes care: As part of the 33-item TDF questionnaire participants were asked if each of the nine key components of diabetes care[27] were part of their role. A sum score was calculated in order to measure the degree to which diabetes care was part of a person's professional role. If participants responded yes to this question, they were then asked 'Over the past 12 months, given 10 service users with diabetes and SMI, for how many did you deliver that aspect of care?'

Sample size estimation

To conduct regression modelling with 38 predictor variables, which included the 33 items of the barrier and enablers questionnaire, gender, age, profession, years in role and years in practice, a

total of 208 participants were required. Calculation was based upon an anticipated medium effect size of 0.15, with 80% power and alpha 0.05.

Analysis

Data were analysed using IBM SPSS Statistics v.23. Differences between the professional groups were explored using ANOVA. Negative binomial and Poisson regressions were used to assess the predictors of the number of people with SMI for which diabetes guidelines were implemented. Entry of variables into the regression analysis was based on significant univariate associations between the predictor and outcome (p = 0.05).

In order to identify the intervention components, otherwise known as behaviour change techniques, which could overcome the identified barriers and enhance the enablers to delivering T2DM to people with SMI, we were informed by matrixes that map theoretical domains of the TDF to the appropriate behaviour change techniques.[28, 29, 30] The experience of the research team, which included clinicians, psychologists and clinician educators, were then used to select the appropriate behaviour change techniques.

RESULTS

Participants

A total of 386 healthcare professionals consented into the study. Across the entire dataset there was 27.86% missing data, with complete data for 151 participants (39.11%), and 113 participants (29.27%) with more than 50% missing data. Of the 88 individual variables all had some degree of missing data. After excluding participants with more than 50% missing data there was a final sample of 273 (71%). Little's Missing Completely at Random (MCAR) test was non-significant (χ^2 = 439.564, df = 484, p = 0.93) and hence data was MCAR. Missing data was therefore managed using multiple imputation methods.

A majority of the 273 participants were British (n=179, 66%) and female (n=96, 35%) (Table 1). Participants were primarily mental health nurses (n=92, 33.7%) or psychiatrists (n = 88, 32.2%). Most were practicing in England, in a community setting and had been in their current role for on average 9 years (SD = 8.39 years).

Table 1. Participant descriptors

Variable	n	%
Ethnicity		
British	179	66
Any other white	29	11
Irish	10	3.7
Indian	10	3.7
African	9	3.3
Asian	5	1.8
Pakistani	5	1.8
Any other ethnic group	5	1.8
White and black African	4	1.5
Any other mixed	4	1.5
White and Asian	3	1.1
Caribbean	3	1.1
Bangladeshi	2	0.7
Chinese	2	0.7
White and black Caribbean	1	0.4
Any other black	1	0.4
Profession		
mental health nurse	92	34
psychiatrist	88	32
general practitioner	24	8.8
diabetes specialist nurse	17	6.2
practice nurse	12	4.4
diabetologist	8	2.2
physical health nurse	8	2.9
other	6	2.9
district or community nurse	5	1.8
occupational therapist	2	0.7
assistant practitioner	2	0.7
social worker or social therapist	2	0.7
endocrinologist	1	0.4
dietician	1	0.4
student	1	0.4
audiologist and speech therapist	1	0.4
healthcare assistant	1	0.4
mental health support worker	1	0.4
podiatrist	1	0.4

Variable	n	%
Country of practice		
England	236	86
Scotland	4	1.5
Wales	2	0.7
Other	5	1.8
Site		
community	142	52
inpatient	72	26
both	59	22

Care of T2DM

The proportion of respondents' case load with T2DM was primarily either less than 5% or greater than 20% (Table 2). Approximately 60% of the sample specifically managed diabetes in people with SMI, however only 25% had received any training in how to do so. Of those that had, this had been within their service or via CPD, in the past year. There was no significant association between profession and receipt of training (χ^2 (1, n = 273) = 4.72, p = 0.32).

Table 2. Case load and experiences of training

Variable	n	%
Proportion of patients with T2DM		
5% or less	76	27.8
10%	47	17.2
15%	33	12.1
20% or more	71	26.0
Have you had specific training in assessing and managing T2DM?		
Yes	147	53.8
No	126	46.2
When was the most recent training in T2DM you received?		
In the last year	65	44.23
1-2 years ago	26	17.69
2-4 years ago	20	13.61
More than 4 years ago	36	24.49
If you have received training for assessing and /or managing T2DM, where was this?		
Degree	49	33.33
Diploma	21	14.29
In-service training	94	63.95
CPD	69	46.94
Postgraduate	2	1.36
Other	15	10.20
Do you have access to clinical guidelines for the management of type 2 diabetes?		
Yes	238	87.2
No	35	12.8
If yes, which guidelines are these?		

Variable	n	%
National Institute for Health and Care Excellence	12	5.04
Local trust	146	61.34
World Health Organisation	3	1.26
Scottish Intercollegiate Guidelines Network	5	2.10
Trend UK	1	0.42
American Diabetes Association	5	2.10
Research Society for the Study of Diabetes in India	1	0.42
International Diabetes Federation	1	0.42
American Association of Clinical Endocrinologists	2	0.84
European Medicines Agency	1	0.42
Joint British Diabetes Societies	2	0.84
Charity	2	0.84
European Foundation for the Study of Diabetes	1	0.42
Other	8	3.36
Do any of the patients that you provide care for have SMI?		
Yes	258	94.5
No	15	5.5
If yes, what proportion of your patients has SMI?		
5% or less	42	16.28
10%	11	4.26
15%	11	4.26
20% or more	162	62.79
Have you had specific training in assessing and managing SMI?		
Yes	209	76.6
No	64	23.4
When was the most training in SMI you received?		
In the last year	137	65.55
1-2 years ago	19	9.09
2-4 years ago	19	9.09
More than 4 years ago	34	16.27
If you have received training for assessing and/or managing SMI, was this:		
Pre-registration	17	8.13
Post-registration	49	23.44
Both	143	68.42
If you have received training for assessing and /or managing SMI, where was this?		
Degree	110	52.63
Diploma	63	30.14
In-service training	158	75.60
CPD	128	61.24
MRCPsych	7	3.35
Other	10	4.78
Do you provide diabetes care for people who have SMI?		
Yes	163	59.7
No	110	40.3
Have you had specific training in assessing and managing diabetes in people with SMI?		
Yes	71	26
No	202	74
When was the most training in assessing and managing diabetes in people with SMI you received?		

Variable	n	%
In the last year	29	40.85
1-2 years ago	18	25.35
2-4 years ago	12	16.90
More than 4 years ago	12	16.90
If you have received training for assessing and/or managing diabetes in people with SMI, was this:		
Pre-registration	6	8.45
Post-registration	45	63.38
Both	20	28.17
If you have received training for assessing and /or managing T2DM in people with SMI, where was this?		
Degree	10	14.08
Diploma	9	12.68
In-service training	44	61.97
CPD	36	50.70
Other	5	7.04

Barriers and enablers to delivering diabetes care

In order to have sufficient numbers to make comparisons between professions, participants were grouped as either (1) mental health nurses and support workers, (2) psychiatrists, (3) GPs, (3) other nurses (including practice nurses, diabetes specialist nurses, district or community nurses, healthcare assistants, assistant practitioners), (4) allied and other health professions and (5) diabetologists and endocrinologists. Figure 1 displays the responses in relation to each of the 33-items of the TDF questionnaire. Only statistically significant differences between the professions are reported below (see Supplementary file B for all analyses).

Barriers

Individual factors

Only a third of the sample felt confident in their abilities to manage T2DM in people with SMI and only 42% were optimistic about the health of their clients with T2DM. Although 57% felt that managing T2DM in people with SMI was at times worrying or concerning, only a third felt frustrated and only 4% fearful of working with people with SMI. Physical health nurses were however, significantly more scared to work with someone with SMI compared with psychiatrists (p = 0.002).

Organisations factors

A third of respondents felt they would be disciplined if they did not manage T2DM in someone with SMI. Mental health nurses and support workers were significantly more likely to believe this than both psychiatrists ($p = 0.002$) and GPs ($p = 0.03$).

Whilst 65% reported that they needed more training in diabetes in order to manage T2DM in people with SMI, a third requested more training to improve their communication and negotiation skills. Allied and other health professionals, along with mental health nurses and support workers, were more likely to agree that they needed more training in diabetes than GPs (MHN: $p = 0.12$; AHP: $p = 0.02$) and diabetologists or endocrinologists (AHP: $p = 0.04$). Physical health nurses were more likely to request training in communication and negotiation skills compared with psychiatrists ($p < 0.001$).

Only a third of the sample felt that there was a definite focus within their organisation on the management of T2DM in people with SMI. GPs were significantly less likely to agree that this was the case than mental health professionals (MHN: $p < 0.001$; psychiatrists: $p = 0.01$), physical health nurses ($p = 0.02$) and diabetologist or endocrinologists ($p = 0.03$).

Perceived roles and responsibilities varied significantly between professions and the elements of care. Only a quarter of the sample felt that examining sensation and circulation in the feet; agreeing a personalised HbA1c target and offering regular reviews; and referring to retinopathy screening were part of their role (Table 3). Approximately half felt that providing general education, monitoring cholesterol and kidney function and providing personalised advice about diet and exercise were part of their clinical role. Whilst 67% and 83% of participants, respectively, felt that monitoring blood pressure and giving advice about weight management were within their remit. Diabetologists or endocrinologists, GPs and physical health nurses all reported being responsible for

significantly more of the 9 diabetes care standards than mental health nurses and support workers ($p < 0.001$), psychiatrists ($p < 0.001$) and allied and other health professions ($p < 0.001$).

Table 3. Healthcare professional perceived role in the management of T2DM in SMI

	This is part of my clinical role n(%)	Average number of service users out of 10, with both type 2 diabetes and SMI that had been…? M(SD)
Given advice about weight management	226(82.78)	5.84(3.28)
Had their BP monitored	184(67.40)	6.75(2.92)
Given general education about T2DM	162(59.34)	5.58(3.12)
Given personalised advice about diet and nutrition	159(58.24)	5.88(3.11)
Had their cholesterol monitored	128(46.87)	6.77(2.80)
Had their kidney function monitored	121(44.32)	7.39(2.44)
Had their feet examined	77(28.21)	5.45(3.29)
Agreed personalised HbA1c target	77(28.21)	6.55(2.85)
Referred to retinopathy screening	68(24.91)	4.92(3.81)

Enablers

Individual factors

Half of the sample reported that they knew how to manage T2DM in people with SMI, although allied and other health professionals felt significantly less able to manage T2DM in people with SMI than mental health nurses and support workers ($p = 0.03$), GPs ($p = 0.04$) and diabetologists and endocrinologists ($p = 0.003$). Diabetologists and endocrinologists also felt more able than psychiatrists ($p = 0.03$). Whilst 61% knew the local or national guidelines for managing T2DM, 75% reported that the likelihood of following these guidelines were high. Those working primarily within the physical health domain felt significantly more knowledgeable about these guidelines than mental health nurses and support workers ($p \leq 0.001$), psychiatrists ($p < 0.001$) and allied and other health professionals ($p = 0.001$).

For 61% of the sample, care of T2DM had become a routine part of their role, more so for GPs than psychiatrists ($p = 0.009$) and other allied health professionals ($p = 0.009$), and 53% felt optimistic that

they would be able to do it in the future. Although 91% believed that managing T2DM in people with SMI is as important as managing their mental health, in practice 38% prioritised the management of mental health over the management of T2DM.

For three quarters of respondents, being able to engage with service users was a key factor in being able to manage T2DM in this population. For 65% this included being able to tailor treatments, along with the service user's goals and targets (87%), depending on the client's needs and abilities. Physical health nurses were more likely to report doing this than psychiatrists ($p < 0.01$). For half of the sample this was aided by having a plan and reviewing their practise to improve the delivery of future care.

Between 80 and 90% reported that poorly controlled T2DM in people with SMI further affected the service user's mental health and that if they didn't take steps to manage T2DM service users would come to serious harm.

Organisational factors

Less than a quarter of participants felt they were encouraged to manage T2DM in people with SMI by incentives. Both mental health nurses and support workers, and GPs were however more likely to agree that incentives encouraged them compared to psychiatrists (MHN: $p = 0.007$; GP: $p = 0.01$). Overall 60% of the sample had sufficient time to manage this population, mental health nurses and support workers were however more likely to agree that this was the case than GPs ($p = 0.04$). Between half and three quarters of respondents felt they had access to other professionals or worked within multidisciplinary teams who could assist them in caring for someone with T2DM and SMI, this included working with family members or carers. This could be better aided by integrated IT systems for 62% of participants.

Implementation of diabetes care

For those participants who indicated that a diabetes care standard was part of their role (Table 3), on average 5 out of every 10 service users with diabetes and SMI were referred on for retinopathy screening; 5-6 were offered diabetes education, advice about weight management, diet and nutrition or had their feet examined; 6-7 had their BP monitored, personalised HbA1c targets agreed or their cholesterol monitored and 7 out of 10 had their kidney function monitored.

Predictors of implementing diabetes care

Table 4 displays the results of Poisson and negative binomial regression analyses to predict implementation of the 9 diabetes care standards. The predictors shown in the table are those that were entered into the regression analyses as they were significantly related to the outcomes in the univariate analysis.

Table 4. Poisson and negative binomial regressions displaying predictors of diabetes care.

Outcome	Predictors	Hypothesis Test			Exp(β)	95% Wald Confidence Interval for Exp(β)	
		Wald χ2	df	*p*		Lower	Upper
Education	**(Intercept)**	**6.07**	**1.00**	**0.02**	**2.39**	**1.19**	**4.80**
	I know the guidelines	0.38	1.00	0.90	0.99	0.90	1.10
	I know how to manage	**5.51**	**1.00**	**0.04**	**1.15**	**1.02**	**1.30**
	I will follow the NICE diabetes guidelines	1.75	1.00	0.33	1.07	0.96	1.18
	I have access to people with specialist diabetes knowledge	0.48	1.00	0.76	1.02	0.94	1.10
	I need more training in diabetes	1.79	1.00	0.25	0.96	0.89	1.02
	I am optimistic that I will be able to manage T2DM in people with SMI	0.07	1.00	0.88	0.99	0.88	1.11
	Managing T2DM in someone with SMI is a routine part of my job	0.74	1.00	0.52	1.04	0.94	1.16
	I tailor the treatment of T2DM in people with SMI depending on their needs	0.14	1.00	0.95	1.00	0.90	1.11
	Managing T2DM in people with SMI worries or concerns me	1.55	1.00	0.26	0.95	0.88	1.03
	I feel confident	0.62	1.00	0.64	0.96	0.84	1.10
	I review how I manage T2DM in people with SMI, and identify ways in which I can improve	0.24	1.00	0.86	1.01	0.92	1.11
	How many of the 9 diabetes care standard are you responsible for?	**10.52**	**1.00**	**0.00**	**1.06**	**1.02**	**1.10**
Weight	**(Intercept)**	**16.34**	**1.00**	**0.00**	**2.97**	**1.75**	**5.03**
	Profession	**24.18**	**4.00**	**0.00**	**-**	**-**	**-**
	Mental health nurses and support workers	0.55	1.00	0.50	0.91	0.71	1.18
	Psychiatrists	2.86	1.00	0.09	1.24	0.97	1.59
	GP	1.15	1.00	0.33	0.86	0.65	1.14
	Other nurses	0.35	1.00	0.56	1.08	0.84	1.38
	I know the guidelines	3.21	1.00	0.10	1.08	0.99	1.17
	I know how to manage	1.55	1.00	0.24	1.06	0.96	1.17
	I have access to people with specialist diabetes knowledge	1.99	1.00	0.26	0.96	0.90	1.02
	I need more training in diabetes	1.10	1.00	0.34	0.97	0.92	1.03
	I feel confident	0.21	1.00	0.80	1.01	0.92	1.11
	I review how I manage T2DM in people with SMI, and identify ways in which I can improve	1.84	1.00	0.32	1.05	0.97	1.13
	How many of the 9 diabetes care standard are you responsible for?	**7.00**	**1.00**	**0.02**	**1.04**	**1.01**	**1.07**
Diet	**(Intercept)**	**11.62**	**1.00**	**0.01**	**2.07**	**1.36**	**3.16**

Outcome	Predictors	Hypothesis Test			Exp(β)	95% Wald Confidence Interval for Exp(β)	
		Wald χ2	df	*p*		Lower	Upper
	I know the guidelines	0.51	1.00	0.65	1.02	0.94	1.12
	I know how to manage	1.26	1.00	0.41	1.05	0.95	1.16
	I feel optimistic about the health of my clients	**4.69**	**1.00**	**0.04**	**1.08**	**1.01**	**1.17**
	Managing T2DM in someone with SMI is a routine part of my job	0.17	1.00	0.85	1.01	0.92	1.10
	I review how I manage T2DM in people with SMI, and identify ways in which I can improve	3.60	1.00	0.15	1.08	0.99	1.18
	How many of the 9 diabetes care standard are you responsible for?	4.48	1.00	0.06	1.04	1.00	1.07
BP	**(Intercept)**	**7.47**	**1.00**	**0.01**	**2.43**	**1.28**	**4.58**
	I will follow the NICE diabetes guidelines	0.14	1.00	0.79	1.01	0.94	1.09
	I have access to people with specialist diabetes knowledge	0.33	1.00	0.79	1.01	0.94	1.09
	I need more training in diabetes	4.24	1.00	0.05	0.94	0.88	1.00
	I am optimistic that I will be able to manage T2DM in people with SMI	2.97	1.00	0.11	1.09	0.99	1.20
	Managing T2DM in someone with SMI is a routine part of my job	**5.33**	**1.00**	**0.04**	**1.11**	**1.01**	**1.22**
	I tailor the treatment of T2DM in people with SMI depending on their needs	0.51	1.00	0.53	0.97	0.89	1.06
	My patient's level of engagement is a key factor	3.14	1.00	0.09	1.07	0.99	1.16
	I feel confident	3.58	1.00	0.08	0.91	0.83	1.01
	If I didn't take steps to manage T2DM in people with SMI, they would come to serious harm	3.76	1.00	0.11	1.09	1.00	1.18
	I review how I manage T2DM in people with SMI, and identify ways in which I can improve	0.54	1.00	0.60	1.02	0.95	1.11
	How many of the 9 diabetes care standard are you responsible for?	4.36	1.00	0.06	1.03	1.00	1.06
Feet	(Intercept)	0.30	1.00	0.79	0.87	0.29	2.59
	I need more training in communication and negotiation skills	4.98	1.00	0.05	1.11	1.01	1.22
	Diabetes goals and targets need to be tailored for people with SMI	0.92	1.00	0.42	1.08	0.91	1.29
	My patient's level of engagement is a key factor	**8.45**	**1.00**	**0.01**	**1.21**	**1.06**	**1.38**
	How many of the 9 diabetes care standard are you responsible for?	**7.44**	**1.00**	**0.02**	**1.09**	**1.02**	**1.16**
	Profession	9.36	4.00	0.08	-	-	-
	Mental health nurses and support workers	4.69	1.00	0.07	0.70	0.50	0.98
	Psychiatrists	**4.73**	**1.00**	**0.04**	**0.68**	**0.47**	**0.97**
	GP	**5.36**	**1.00**	**0.03**	**0.62**	**0.42**	**0.93**
	Other nurses	1.30	1.00	0.27	0.85	0.64	1.13

Outcome	Predictors	Hypothesis Test			Exp(β)	95% Wald Confidence Interval for Exp(β)	
		Wald χ2	df	*p*		Lower	Upper
Cholesterol	**(Intercept)**	**62.95**	**1.00**	**0.00**	**4.83**	**3.27**	**7.12**
	Working with people with SMI scares me	**6.97**	**1.00**	**0.01**	**0.90**	**0.83**	**0.97**
	My patient's level of engagement is a key factor	**8.68**	**1.00**	**0.00**	**1.14**	**1.05**	**1.25**
HbA1c	**(Intercept)**	**6.57**	**1.00**	**0.01**	**2.42**	**1.23**	**4.77**
	Diabetes goals and targets need to be tailored for people with SMI	1.57	1.00	0.23	1.08	0.96	1.22
	I am optimistic that I will be able to manage T2DM in people with SMI	**9.16**	**1.00**	**0.00**	**1.20**	**1.06**	**1.34**
Retinopathy	(Intercept)	0.34	1.00	0.59	1.79	0.24	13.35
	Diabetes goals and targets need to be tailored for people with SMI	**5.55**	**1.00**	**0.03**	**1.62**	**1.08**	**2.42**
	I would be disciplined if I did not manage T2DM in people with SMI	**6.14**	**1.00**	**0.02**	**0.71**	**0.53**	**0.93**
	Incentives, such as CQUINS or QOF points, encourage me	**4.43**	**1.00**	**0.04**	**0.77**	**0.60**	**0.98**
	Family members and carers help me	2.05	1.00	0.16	1.22	0.93	1.60

Education

The significant independent predictors of the number of people who were given general education about T2DM were knowledge about how to manage T2DM in people with SMI ($p = 0.04$) and the degree to which diabetes care was part of their role ($p < 0.001$). For every additional element of diabetes care that was part of a person's role there was a 6% (95% CI, 1.02 to 1.10) increase in the number of people referred to diabetes education ($p = 0.003$). For every point increase in knowledge about managing diabetes there was a 15% (95% CI, 1.02 to 1.30) increase in number of people referred to diabetes education ($p = 0.04$).

Weight

The significant independent predictors of the number of people who had advice about weight management were the degree to which diabetes care was part of their role ($p = 0.02$) and profession ($p < 0.001$). For every additional element of diabetes care that was part of their role there was a 4% (95% CI, 1.01 to 1.07) increase in number of people advised about weight management. Psychiatrists reported advising more people about weight management than both mental health nurses and support workers (MD = 1.78, Std. Error = 0.44) and GPs (MD = 2.06, Std. Error = 0.64).

Diet and nutrition

Optimism about the health of their clients ($p = 0.04$) was the only independent predictor of the number of people who were advised about diet and nutrition. For every point increase in optimism about the health of their clients there was an 8% (95% CI, 1.01 to 1.17) increase in number of people given personalised advice about diet and nutrition.

Monitoring BP

The degree to which diabetes care was a routine part of their role ($p = 0.04$) was the only independent predictor of the number of people who had their BP monitored. For every point

increase in the routine nature of diabetes care in a respondent's role there was an 11% (95% CI, 1.02 to 1.22) increase in number of people given personalised advice about diet and nutrition.

Examining feet

The degree to which diabetes care was part of their role ($p = 0.02$), the level of engagement from the service user ($p = 0.01$) and profession (psychiatrists $p = 0.04$ and GPs $p = 0.03$ compared with allied and other health professions) were the significant independent predictors of the number of people who had their feet examined. For every additional element of diabetes care that was part of their role there was a 9% (95% CI, 1.02 to 1.16) increase in number of people who had their feet checked. For every point increase engagement from the service user there was a 21% (95% CI, 1.06 to 1.38) increase in number of foot checks.

Agreeing a personalised HbA1c target and provide ongoing review

How optimistic a person was in their ability to manage T2DM in people with SMI ($p < 0.001$) was the only independent predictor of the number of service users with whom HbA1c targets were set and ongoing reviews provided. For every point increase in how optimistic a person was in their ability to manage T2DM in people with SMI there was a 20% (95% CI, 1.07 to 1.34) increase in number of service users with whom HbA1c targets were set and ongoing reviews provided.

Monitoring cholesterol

The level of engagement from the service user ($p < 0.001$) and fear of working with someone with a SMI ($p = 0.01$) were the independent predictors of the number of people who had their cholesterol monitored. For every point increase in the perceived impact of service user engagement there was a 14% (95% CI, 1.05 to 1.25) increase in the number of people whose cholesterol was monitored and for every point increase in fear there was a 10% (95% CI, 0.83 to 0.97) decrease in the in number of cholesterol checks performed.

Monitoring kidney function

There were no significant univariate associations between the number of people in whom kidney function was monitored and any of the demographic, occupational or TDF factors.

Referring to retinopathy screening

The belief that goals and targets need to be tailored for people with SMI ($p = 0.03$), that they would be disciplined for not managing T2DM in people with SMI ($p = 0.02$) and the need for incentives to encourage them to manage T2DM in this population ($p = 0.04$) were the significant independent predictors of the number of people referred on for retinopathy screening. For every point increase in the belief that goals and targets need to be tailored for people with SMI there was a 62% (95% CI, 1.08 to 2.42) increase in number of people who were referred on for retinopathy screening. For every point increase in the belief they would be disciplined for not managing T2DM in people with SMI or that incentives would encourage them to manage T2DM in this population, there was a 29% (95% CI, 0.54 to 0.93) and 23% (95% CI, 0.60 to 0.98) decrease, respectively, in the number of people referred on for retinopathy screening.

Intervention components

Table 5 highlights the TDF domains which were found to be either barriers or enablers to delivering T2DM care to people with SMI, along with the associated behaviour change techniques.[28, 29, 30] The techniques highlighted in column 2 are those intervention components selected as most appropriate for addressing the barrier or enabler identified in the study.

Table 5. Mapping of relevant TDF domains on intervention components

RELEVANT TDF DOMAINS	BEHAVIOUR CHANGE TECHNIQUES
Knowledge	**Information regarding behaviour, outcome** Health consequences

	Biofeedback Antecedents Feedback on the behaviour
Social professional role and identity	**Social process of encouragement, pressure and support**
Optimism	**Verbal persuasion to boost self-efficacy** **Focus on past success**
Social influence	Social process of encouragement, pressure and support **Modelling/demonstration of the behaviour by others** Social comparison Vicarious reinforcement Restructuring the social environment Identification of self as a role model Social reward
Emotion	Stress management Coping skills **Reduce negative emotions** Emotional consequences **Self-assessment of affective consequences** Social support (emotional)
Goals	Goal/target specified: behaviour or outcome Contract Rewards; incentives (Inc. self-evaluation) Graded task, starting with easy tasks **Increasing skills: problem-solving, decision-making, goal-setting** Social process of encouragement, pressure and support Persuasive communication Information regarding behaviour, outcome

	Motivational interviewing Review of outcome goal(s) Review of behaviour goal(s) Action planning (including implementation intentions)
Reinforcement	Threat **Self-reward** Differential reinforcement Incentive Thinning Negative reinforcement Shaping Counter conditioning Discrimination training Material reward Social reward Non-specific reward Response cost **Anticipation of future rewards or removal of punishment** Punishment Extinction Classical conditioning Counter conditioning

DISCUSSION

We found that delivery of diabetes care for people with SMI is influenced by a range of individual and organisational factors. Although there were clear differences in the extent of involvement, mental health professionals noted active engagement in many of the aspects of diabetes care, as

identified elsewhere in the literature.[14, 13, 15] Confirming our qualitative findings[16] however, specialist mental health clinicians reported being responsible for fewer diabetes care standards than primary care and specialist diabetes clinicians. This contests the idea that there is confusion and role ambiguity about the responsibility for monitoring and supporting T2DM in SMI.[13] In fact this survey indicates clear boundaries, but when diabetes management is perceived to be a greater part of a person's role, more service users are treated according to recommended standards. This clearly reflects conflict between the shared care approach,[21, 20] which promotes mental health professionals broadening their deliverer to address physical and mental health.[19] This indicates a need for NHS trusts to define roles and responsibilities more clearly. This is particularly relevant given that only a third of the sample felt that there was a definite focus in their trust on the management of T2DM in people with SMI.

Although 54% of respondents had received training in diabetes, only a quarter had been trained in how to manage the condition in people with SMI, and this figure did not differ between the professions. Despite receiving training, those working in mental health settings felt less knowledgeable about the guidelines for T2DM and had a desire for more training in how to manage the condition. This supports the findings of studies conducted in other UK mental health trusts[31, 14, 13, 15, 32] and theory-driven qualitative work that formed the basis of this study.[16] Importantly, this lack of knowledge and skills meant that healthcare professionals treated fewer service users according to recommended diabetes care standards. Evaluations of diabetes training and educational packages for mental health clinicians are limited. Improvements in understanding and knowledge of diabetes have been reported; however, these findings are based on a small scale, single group study consisting of primarily mental health students and hence fail to explore its impact on practice.[33] Any such programme will need to consider the barriers to attending training of this nature, including a lack of management support, staff shortages, the discretionary nature of

attending and lack of funding[34] along with the challenges of using psychosocial interventions to change practice.[35, 36, 37]

Being able to communicate and engage with service users was identified as an important facilitator in delivering effective diabetes care. As opposed to those working in mental health settings, primary care and diabetes specialists felt they needed more training in communication and negotiation skills in order for them to be able to motivate their clients and deliver recommended care. Difficulties motivating service users with diabetes to self-manage has been identified elsewhere in the literature[13, 32, 38] and presents an ongoing challenge for interventions aimed at changing the behaviour of service users with T2DM.[39] Respondents stressed the importance of tailoring diabetes treatment, along with any goals and targets, to the needs and abilities of the service user. Mental health staff report experiencing difficulties engaging service users in their diabetes care, due to limitations in cognitive and executive functioning.[32, 38] Together this highlights the importance of training healthcare professionals to also be able to identity suitable times within the service user's journey when they may need more support in order for them to self-manage effectively. The challenges of communicating and engaging service users in their care, may also be precipitated or be a consequence of the fear some healthcare professionals experience about working with someone with a SMI. This further supports research that shows some clinicians experience discomfort in dealing with people with mental illness leading to physical diagnoses often being missed.[40]

Only a third of the sample were optimistic about the health of their clients with T2DM, and a majority of respondents lacked optimism about their ability to manage T2DM in people with SMI. This led to fewer service users receiving the recommended diabetes care standards. Given the importance of hope and optimism in the process of personal recovery in mental health[17] this could be an important focus for interventions aimed at improving diabetes care and outcomes for service users, with the potential for wider benefits. The powerful position that healthcare professionals hold

as hope-inspiring role models[17] can either enhance or diminish the hope of service users.[41, 42] This is particularly important considering that practitioner hope has been found to influence the outcomes of therapy over and above client hope[43] and that cultivating hope in the context of T2DM is also associated with increased adherence.[44]

In line with the findings of our qualitative work[16] a third of respondents felt that they would be disciplined if they did not manage diabetes in people with SMI and approximately a quarter felt that incentives would encourage them. Despite this, the threat of being disciplined and need for incentives appeared to have a counterintuitive effect in the regression analyses. The greater the perceived threat of being disciplined and a stronger belief that incentives would encourage them to manage diabetes, the fewer service users received recommended diabetes care. This suggests that perceived threat of being disciplined and possibly the discordance between desire and receipt of incentives, was having a paralysing effect on practice. Blame and punishment are felt by healthcare professionals to be part of health service culture, particularly when someone is involved in an error, near miss or incident.[45] This however can lead to disempowerment, disunity and a lack of compassion in the workforce.[46] Rather than allowing people to experiment without fear of reprisal and view errors as learning opportunities,[46] the workforce are fearful of personal accountability, litigation and complaints.[47] Although participants felt that incentives would improve their practice, this study and the evidence for pay-for-performance systems, such as QOF, in changing healthcare professional behaviour is limited and there is insufficient evidence for their impact on patient health outcomes.[48]

Taken together, our findings suggest that a number of strategies could be implemented to improve the care offered to people with diabetes and SMI, and as a consequence address the inequalities experienced by this population. These techniques include increasing healthcare professionals' knowledge about the guidelines for managing T2DM in people with SMI, increasing awareness of

their role and responsibilities towards this patient group, boosting self-efficacy for addressing the needs of these clients, modelling or demonstrating how healthcare professionals can work with clients who are less engaged in the care of their diabetes, reduce fear of working with people with a SMI, increase skills in being able to tailor goals and targets to the needs of the individual service user and eradicate fear of being disciplined. Identification of these barriers and enablers, and subsequent BCTs now allows us to move towards development, feasibility testing and piloting of a new approach to delivering care.[22]

The study had a number of limitations. The need to adjust p-values in studies using multiple outcome measures has been debated widely in the literature.[49] The number of outcomes measures considered as a family-wise hypothesis has however not been defined and although by not adjusting this may increase the likelihood of a type I error, adjusting would increase the chance of type II errors which are no less important. We therefore acknowledge that some of the findings of this study may have been due to chance. As with any online survey there are concerns about the representativeness of the sample.[50] There was a bias in responses towards those who were likely to be more interested in the topic, with significantly more responses from those working within mental health settings. This raises a broader question about whether SMI is a priority or issue for diabetes specialists. Due to the online recruitment methods it was not possible estimate the response rate. In comparison to the target population this sample represents only 0.3% of the population therefore raising concerns about the generalizability of the findings to the broader population. Despite the recruitment strategy aiming to target a range of healthcare professionals GPs, diabetologists and physical health nurses are under-represented. The data from this study focused on predicting delivery of diabetes care to people with SMI by healthcare professionals who stated this was part of their role. It may have however, been the case that elements of diabetes care could have been undertaken by a professional even when it was not explicitly part of their job. Our results are also only a snapshot of the experiences and beliefs of healthcare professionals; as the

care of diabetes in people with SMI becomes of greater priority and services begin to develop, these views may change.

COMPETING INTERESTS

We have read and understood BMJ policy on declaration of interests and declare the following interests: we have none.

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AUTHOR CONTRIBUTIONS

HM - made a substantial contribution to the conception and design of the study, the data analysis, interpretation of the data, created a first draft of the manuscript, approved the final version and agrees to be accountable for all aspects of the work.

FLG - made a substantial contribution to the conception and design of the study, collection and interpretation of the data, commented on drafts of the manuscript, approved the final version and agrees to be accountable for all aspects of the work.

MH, AS, JC, JJ, CF and KM all made a substantial contribution to the conception and design of the study, interpretation of the data, commented on drafts of the manuscript, approved the final version and agree to be accountable for all aspects of the work.

DATA SHARING

There is no other additional unpublished data to be shared.

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Figure 1. Barriers and enablers to delivery of T2DM care in people with SMI (n = 273)

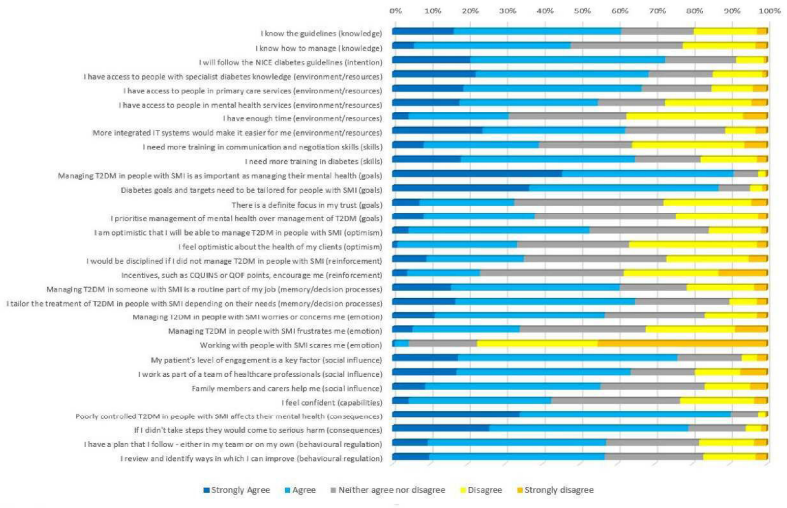

Figure 1.

Figure 1. Barriers and enablers to delivery of T2DM care in people with SMI (n = 273)

297x210mm (300 x 300 DPI)

Supplementary File A.

Questionnaire to Measures the Barriers and Enablers to Delivering Diabetes Care in People with SMI (*TDF domain*)

I know the guidelines, national or local, for managing type 2 diabetes (*knowledge*)	Strong Agree	☐
	Agree	☐
	Neither Agree nor Disagree	☐
	Disagree	☐
	Strongly Disagree	☐
I know how to manage type 2 diabetes in people with SMI (*knowledge*)	Strong Agree	☐
	Agree	☐
	Neither Agree nor Disagree	☐
	Disagree	☐
	Strongly Disagree	☐
How likely is it that you will follow the NICE diabetes guidelines for your patients who have type 2 diabetes and SMI? (*intention*)	Very Likely	☐
	Likely	☐
	Neither Likely nor Unlikely	☐
	Unlikely	☐
	Very Unlikely	☐
I have access to people with specialist diabetes knowledge to help me manage type 2 diabetes in people with SMI (*environmental context & resources*)	Strong Agree	☐
	Agree	☐
	Neither Agree nor Disagree	☐
	Disagree	☐
	Strongly Disagree	☐
I have access to people in primary care services for my patients with type 2 diabetes and SMI (*environmental context & resources*)	Strong Agree	☐
	Agree	☐
	Neither Agree nor Disagree	☐
	Disagree	☐
	Strongly Disagree	☐

I have access to people in mental health services for my patients with type 2 diabetes and SMI (*environmental context & resources*)	Strong Agree ☐ Agree ☐ Neither Agree nor Disagree ☐ Disagree ☐ Strongly Disagree ☐
I have enough time to manage type 2 diabetes in people with SMI (*environmental context & resources*)	Strong Agree ☐ Agree ☐ Neither Agree nor Disagree ☐ Disagree ☐ Strongly Disagree ☐
More integrated IT systems would make it easier for me to manage type 2 diabetes in people with SMI (*environmental context & resources*)	Strong Agree ☐ Agree ☐ Neither Agree nor Disagree ☐ Disagree ☐ Strongly Disagree ☐
I need more training in communication and negotiation skills in order to manage type 2 diabetes in people with SMI (*skills*)	Strong Agree ☐ Agree ☐ Neither Agree nor Disagree ☐ Disagree ☐ Strongly Disagree ☐
I need more training in diabetes in order to manage type 2 diabetes in people with SMI (*skills*)	Strong Agree ☐ Agree ☐ Neither Agree nor Disagree ☐ Disagree ☐ Strongly Disagree ☐

Managing patients' type 2 diabetes in people with SMI is as important as managing their mental health (*goal*)	Strong Agree ☐ Agree ☐ Neither Agree nor Disagree ☐ Disagree ☐ Strongly Disagree ☐
Diabetes goals and targets need to be tailored for people with SMI (*goal*)	Strong Agree ☐ Agree ☐ Neither Agree nor Disagree ☐ Disagree ☐ Strongly Disagree ☐
There is a definite focus in my trust on managing type 2 diabetes in people with SMI (*goal*)	Strong Agree ☐ Agree ☐ Neither Agree nor Disagree ☐ Disagree ☐ Strongly Disagree ☐
I prioritise management of mental health over management of type 2 diabetes in people with type 2 diabetes and SMI (*goal*)	Strong Agree ☐ Agree ☐ Neither Agree nor Disagree ☐ Disagree ☐ Strongly Disagree ☐
I am optimistic that I will be able to manage type 2 diabetes in people with SMI (*optimism*)	Strong Agree ☐ Agree ☐ Neither Agree nor Disagree ☐ Disagree ☐ Strongly Disagree ☐

I feel optimistic about the health of my patients with type 2 diabetes and SMI (*optimism*)	Strong Agree ☐ Agree ☐ Neither Agree nor Disagree ☐ Disagree ☐ Strongly Disagree ☐
I would be disciplined if I did not manage type 2 diabetes in people with SMI (*reinforcement*)	Strong Agree ☐ Agree ☐ Neither Agree nor Disagree ☐ Disagree ☐ Strongly Disagree ☐
Incentives, such as CQUINS or QOF points, encourage me to manage type 2 diabetes in people with SMI (*reinforcement*)	Strong Agree ☐ Agree ☐ Neither Agree nor Disagree ☐ Disagree ☐ Strongly Disagree ☐
Managing type 2 diabetes in someone with SMI is a routine part of my job (*memory, attention and decision*)	Strong Agree ☐ Agree ☐ Neither Agree nor Disagree ☐ Disagree ☐ Strongly Disagree ☐
I tailor the treatment of type 2 diabetes in people with SMI depending on their needs (*memory, attention and decision*)	Strong Agree ☐ Agree ☐ Neither Agree nor Disagree ☐ Disagree ☐ Strongly Disagree ☐

Managing type 2 diabetes in people with SMI worries or concerns me (*emotion*)	Strong Agree ☐ Agree ☐ Neither Agree nor Disagree ☐ Disagree ☐ Strongly Disagree ☐
Managing type 2 diabetes in people with SMI frustrates me (*emotion*)	Strong Agree ☐ Agree ☐ Neither Agree nor Disagree ☐ Disagree ☐ Strongly Disagree ☐
Working with people with SMI scares me (*emotion*)	Strong Agree ☐ Agree ☐ Neither Agree nor Disagree ☐ Disagree ☐ Strongly Disagree ☐
My patient's level of engagement is a key factor in how I manage the type 2 diabetes in people with SMI (*social influence*)	Strong Agree ☐ Agree ☐ Neither Agree nor Disagree ☐ Disagree ☐ Strongly Disagree ☐
I work as part of a team of healthcare professionals to help manage type 2 diabetes in people with SMI (*social influence*)	Strong Agree ☐ Agree ☐ Neither Agree nor Disagree ☐ Disagree ☐ Strongly Disagree ☐

Family members and carers help me manage type 2 diabetes in people with SMI (*social influence*)	Strong Agree ☐ Agree ☐ Neither Agree nor Disagree ☐ Disagree ☐ Strongly Disagree ☐
I feel confident about managing type 2 diabetes in people with SMI (*beliefs about capabilities*)	Strong Agree ☐ Agree ☐ Neither Agree nor Disagree ☐ Disagree ☐ Strongly Disagree ☐
Poorly controlled type 2 diabetes in people with SMI affects their mental health (*beliefs about consequences*)	Strong Agree ☐ Agree ☐ Neither Agree nor Disagree ☐ Disagree ☐ Strongly Disagree ☐
If I didn't take steps to manage type 2 diabetes in people with SMI, they would come to serious harm (*beliefs about consequences*)	Strong Agree ☐ Agree ☐ Neither Agree nor Disagree ☐ Disagree ☐ Strongly Disagree ☐
I have a plan that I follow - either in my team or on my own - when managing type 2 diabetes in people with SMI (*behavioural regulation*)	Strong Agree ☐ Agree ☐ Neither Agree nor Disagree ☐ Disagree ☐ Strongly Disagree ☐

I review how I manage type 2 diabetes in people with SMI, and identify ways in which I can improve (*behavioural regulation*)	Strong Agree	☐
	Agree	☐
	Neither Agree nor Disagree	☐
	Disagree	☐
	Strongly Disagree	☐
Is providing general education about type 2 diabetes part of your clinical role? (*social professional role & identity*)	Yes	☐
	No	☐
If yes, over the past 12 months, given 10 patients with both type 2 diabetes and SMI, for how many did you provide general education about diabetes?		
Is giving advice about weight management to patients with both type 2 diabetes and SMI part of your clinical role? (*social professional role & identity*)	Yes	☐
	No	☐
If yes, over the past 12 months, given 10 patients with both type 2 diabetes and SMI, for how many did you advice about weight management*?*		
Is providing personalised advice about diet and nutrition to patients with type 2 diabetes and SMI part of your clinical role? (*social professional role & identity*)	Yes	☐
	No	☐
If yes, over the past 12 months, given 10 patients with both type 2 diabetes and SMI, for how many did you advice about diet and nutrition*?*		
Is monitoring the blood pressure for patients with type 2 diabetes and SMI a part of your role? (*social professional role & identity*)	Yes	☐
	No	☐
If yes, over the past 12 months, given 10 patients with both type 2 diabetes and SMI, for how many did you monitor their BP?		
Is examining the circulation and sensation in the feet of patients with type 2 diabetes and SMI part of your clinical role? (*social professional role & identity*)	Yes	☐
	No	☐
If yes, over the past 12 months, given 10 patients with both type 2 diabetes and SMI, for how many did you examine their feet?		
Is working with patients with type 2 diabetes and SMI to agree a personalised HbA1c target and provide ongoing reviews a part of your clinical role? (*social professional role & identity*)	Yes	☐
	No	☐

If yes, over the past 12 months, given 10 patients with both type 2 diabetes and SMI, for how many did you agree a personalised HbA1c target and provide ongoing reviews?

Is working with patients with type 2 diabetes and SMI to monitor their cholesterol part of your clinical role? (*social professional role & identity*)

Yes ☐

No ☐

If yes, over the past 12 months, given 10 patients with both type 2 diabetes and SMI, for how many did you monitor cholesterol?

Is working with patients with type 2 diabetes and SMI to monitor their kidney function part of your clinical role? (*social professional role & identity*)

Yes ☐

No ☐

If yes, over the past 12 months, given 10 patients with both type 2 diabetes and SMI, for how many did you monitor kidney function?

Is working with patients with type 2 diabetes and SMI to refer to retinopathy screening a part of your clinical role? (*social professional role & identity*)

Yes ☐

No ☐

If yes, over the past 12 months, given 10 patients with both type 2 diabetes and SMI, for how many did you refer to retinopathy screening?

Supplementary File B.

Differences between professions on the barriers and enablers to delivering care

	Mental Health Nurse (n = 124)	Psychiatrist (n=108)	GP (n=29)	Other Nurses (n=60)	Allied Health Professionals (n=37)	Diabetologist or Endocrinologist (n=11)	ANOVA
I know the guidelines	3.31(1.08)	3.11(1.04)	4.13(0.76)	3.95(1.15)	3.10(1.14)	4.54(0.63)	F (5, 50.63) = 24.78, **$p < 0.001$**, ω^2 = 0.23
I know how to manage	3.41(0.98)	3.08(0.94)	3.42(0.91)	3.13(1.06)	2.81(1.17)	3.83(0.87)	F (5, 267) = 4.34, **$p = 001$**, η^2 = 0.08
I will follow the NICE diabetes guidelines	3.80(0.99)	3.67(0.94)	3.85(1.00)	3.85(1.09)	3.38(1.21)	3.73(1.06)	F (5, 267) = 1.46, p = 0.21, η^2 = 0.03
I have access to people with specialist diabetes knowledge	3.62(1.07)	3.72(1.09)	3.88(0.82)	3.80(1.10)	3.27(1.12)	3.75(1.25)	F (5, 48.68) = 2.14, p = 0.08, ω^2 = 0.02
I have access to people in primary care services	3.61(1.07)	3.68(1.08)	3.82(1.21)	3.27(1.25)	3.39(1.25)	3.42(1.19)	F (5, 267) = 2.18, p = 0.06, η^2 = 0.04
I have access to people in mental health services	3.57(1.11)	3.30(1.29)	3.12(1.16)	3.31(1.19)	3.14(1.36)	3.29(1.10)	F (5, 48.04) = 1.43, p = 0.23, ω^2 = 0.01
I have enough time	3.10(1.02)	2.74(1.04)	2.48(1.02)	3.07(1.10)	2.84(1.20)	2.59(1.11)	F (5, 267) = 3.12, **$p = 0.009$**, η^2 = 0.009
More integrated IT systems would make it easier for me	3.72(1.05)	3.72(1.18)	3.33(1.06)	3.40(1.02)	3.48(1.34)	3.97(0.95)	F (5, 267) = 2.38, **$p = 0.04$**, η^2 = 0.04
I need more training in communication and negotiation kills	3.07(1.12)	2.75(1.12)	3.05(1.17)	3.33(1.11)	3.20(1.41)	3.64(1.22)	F (5, 46.14) = 5.73, **$p < 0.001$**, ω^2 = 0.08
I need more training in diabetes	3.64(1.10)	3.61(1.13)	3.18(1.04)	3.44(1.09)	3.79(1.28)	3.21(1.36)	F (5, 267) = 4.18, **$p = 0.001$**, η^2 = 0.07
Managing T2DM in people with SMI is as important as	4.31(0.86)	4.16(0.87)	4.07(0.91)	4.18(0.90)	4.21(1.17)	4.14(1.00)	F (5, 267) = 2.47, **$p = 0.03$**, η^2 = xxx

	Mental Health Nurse (n = 124)	Psychiatrist (n=108)	GP (n=29)	Other Nurses (n=60)	Allied Health Professionals (n=37)	Diabetologist or Endocrinologist (n=11)	ANOVA
managing their mental health							
Diabetes goals and targets need to be tailored for people with SMI	4.06(0.94)	3.86(0.93)	4.17(0.92)	4.21(0.97)	4.09(1.18)	4.62(0.62)	F (5, 267) = 3.57, $p = 0.004$,η^2 = 0.06
There is a definite focus in my trust	3.22(1.01)	3.05(1.00)	2.50(0.92)	3.10(1.16)	3.07(1.19)	3.17(1.33)	F (5, 267) = 3.97, $p = 0.002$, η^2 = 0.07
I prioritise management of mental health over management of T2DM	2.79(1.02)	2.65(1.09)	2.76(0.80)	3.00(0.91)	2.96(1.18)	3.03(1.06)	F (5, 46.84) = 2.30, p = 0.06, ω^2 = 0.02
I am optimistic that I will be able to manage T2DM in people with SMI	3.45(0.91)	3.18(0.98)	3.52(0.80)	3.39(0.93)	3.20(1.07)	3.56(1.08)	F (5, 267) = 2.99, $p = 0.01$, η^2 = 0.05
I feel optimistic about the health of my clients	3.02(0.98)	2.82(0.97)	2.78(0.98)	3.04(0.97)	2.75(1.09)	3.06(1.27)	F (5, 267) = 1.82, p = 0.11, η^2 = 0.03
I would be disciplined if I did not manage T2DM in people with SMI	3.37(1.11)	2.95(1.08)	2.79(1.00)	3.15(1.12)	3.16(1.26)	3.16(1.05)	F (5, 267) = 3.81, $p = 0.002$, η^2 = 0.07
Incentives, such as CQUINS or QOF points, encourage me	2.88(1.12)	2.51(1.11)	3.14(1.00)	2.81(1.20)	2.79(1.16)	2.82(0.90)	F (5, 267) = 3.53, $p = 0.004$, η^2 = 0.06
Managing T2DM in someone with SMI is a routine part of my job	3.50(1.14)	3.23(1.11)	3.93(0.90)	3.62(1.22)	3.29(1.35)	3.63(0.80)	F (5, 52.25) = 5.13, $p = 0.001$, ω^2 = 0.07
I tailor the treatment of T2DM in people with SMI depending on their needs	3.57(1.06)	3.39(0.98)	3.91(0.92)	3.95(1.10)	3.33(1.21)	4.08(0.84)	F (5, 267) = 5.25, $p < 0.001$, η^2 = 0.09
Managing T2DM in people with SMI worries or concerns me	3.38(1.05)	3.54(1.02)	3.27(1.03)	3.32(1.12)	3.32(1.37)	3.19(0.96)	F (5, 267) = 0.70, p =0.62, η^2 = 0.01
Managing T2DM in people with SMI frustrates me	2.84(1.08)	3.07(1.12)	3.26(1.05)	3.06(1.13)	3.13(1.38)	3.00(0.86)	F (5, 267) = 1.25, p = 0.29, η^2 = 0.02

	Mental Health Nurse (n = 124)	Psychiatrist (n=108)	GP (n=29)	Other Nurses (n=60)	Allied Health Professionals (n=37)	Diabetologist or Endocrinologist (n=11)	ANOVA
Working with people with SMI scares me	1.91(1.04)	1.73(0.96)	1.97(0.98)	2.29(1.10)	2.15(1.20)	2.49(1.03)	$F (5, 267) = 4.08$, $\boldsymbol{p = 0.001}$, $\eta^2 = 0.07$
My patient's level of engagement is a key factor	3.77(1.04)	3.56(1.04)	3.96(0.73)	3.79(1.12)	3.40(1.32)	4.08(0.75)	$F (5, 50.40) = 3.29$, $\boldsymbol{p = 0.01}$, $\omega^2 = 0.04$
I work as part of a team of healthcare professionals	3.53(1.15)	3.29(1.25)	3.71(1.24)	3.53(1.17)	3.41(1.35)	3.91(1.09)	$F (5, 267) = 2.02$, $p = 0.08$, $\eta^2 = 0.04$
Family members and carers help me manage T2DM in people with SMI	3.18(1.11)	3.37(1.05)	3.58(0.97)	3.43(1.13)	3.00(1.32)	3.89(0.69)	$F (5, 50.09) = 3.48$, $\boldsymbol{p = 0.009}$, $\omega^2 = 0.04$
I feel confident in managing T2DM in people with SMI	3.30(1.03)	3.01(1.00)	3.33(0.93)	3.21(1.03)	2.99(1.09)	3.51(0.83)	$F (5, 267) = 2.09$, $p = 0.07$, $\eta^2 = 0.04$
Poorly controlled T2DM in people with SMI affects their mental health	4.08(0.95)	4.13(0.90)	3.81(0.77)	4.02(0.98)	3.74(1.27)	4.28(0.88)	$F (5, 267) = 1.68$, $p = 0.14$, $\eta^2 = 0.03$
If I didn't take steps to manage T2DM in people with SMI, they would come to serious harm	3.79(1.04)	3.91(1.08)	3.85(0.88)	3.86(0.97)	3.77(1.26)	4.02(0.82)	$F (5, 267) = 0.14$, $p = 0.98$, $\eta^2 < 0.001$
I have a plan that I follow - either in my team or on my own	3.39(1.13)	3.37(1.03)	3.39(0.99)	3.41(1.10)	3.33(1.15)	3.67(0.94)	$F (5, 267) = 0.18$, $p = 0.97$, $\eta^2 < 0.001$
I review how I manage T2DM in people with SMI, and identify ways in which I can improve	3.43(1.12)	3.37(1.03)	3.29(0.97)	3.62(1.05)	3.34(1.15)	3.70(0.9)	$F (5, 267) = 1.51$, $p = 0.20$, $\eta^2 = 0.03$
How many of the 9 diabetes care standard are you responsible for?	3.81(2.30)	3.69(2.47)	6.65(2.02)	5.83(2.92)	2.42(3.06)	7.67(1.58)	$F (5, 267) = 14.46$, $\boldsymbol{p < 0.001}$, $\eta^2 = 0.21$

Responses were 1-5, with a higher score reflecting greater agreement.

STROBE 2007 (v4) Statement—Checklist of items that should be included in reports of *cross-sectional studies*

Section/Topic	Item #	Recommendation	Reported on page #
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	1
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	2
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	5-6
Objectives	3	State specific objectives, including any prespecified hypotheses	6
Methods			
Study design	4	Present key elements of study design early in the paper	6
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	6-7
Participants	6	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants	6-7
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	7-8
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	7-8
Bias	9	Describe any efforts to address potential sources of bias	*n/a*
Study size	10	Explain how the study size was arrived at	7
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	8
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	8
		(*b*) Describe any methods used to examine subgroups and interactions	8
		(*c*) Explain how missing data were addressed	8
		(*d*) If applicable, describe analytical methods taking account of sampling strategy	n/a
		(*e*) Describe any sensitivity analyses	n/a
Results			

Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	9
		(b) Give reasons for non-participation at each stage	n/a
		(c) Consider use of a flow diagram	n/a
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	9-10
		(b) Indicate number of participants with missing data for each variable of interest	9
Outcome data	15*	Report numbers of outcome events or summary measures	10-22
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	10-22
		(*b*) Report category boundaries when continuous variables were categorized	10-22
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	n/a
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	n/a
Discussion			
Key results	18	Summarise key results with reference to study objectives	22
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	25-26
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	22-25
Generalisability	21	Discuss the generalisability (external validity) of the study results	25-26
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	26

*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.

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Management of type 2 diabetes mellitus in people with severe mental illness: an online cross-sectional survey of healthcare professionals

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ABSTRACT

Objectives

To establish healthcare professionals' (HCPs) views about clinical roles, and the barriers and enablers to delivery of diabetes care for people with severe mental illness (SMI).

Design

Cross-sectional, postal and online survey.

Setting

Trusts within the National Health Service (NHS), mental health and diabetes charities and professional bodies.

Participants

HCPs who care for people with type 2 diabetes mellitus (T2DM) and/or SMI in the UK.

Primary and secondary outcome measures

The barriers, enablers and experiences of delivering T2DM care for people with SMI, informed by the Theoretical Domains Framework (TDF).

Results

Responders were 273 HCPs, primarily mental health nurses (33.7%) and psychiatrists (32.2%). Only 25% of respondents had received training in managing T2DM in people with SMI. Univariate analysis found that mental health professionals felt responsible for significantly fewer recommended diabetes care standards than physical health professionals (p<0.001). For those seeing diabetes care as part of their role, the significant barriers to its delivery in the multiple regression analyses were a lack of knowledge (p=0.003); a need for training in communication and negotiation skills (p=0.04); a lack of optimism about the health of their clients (p=0.04) and their ability to manage T2DM in people with SMI (p=0.003); the threat of being disciplined

(*p*=0.02); fear of working with people with a mental health condition (*p*=0.01); a lack of service user engagement (*p*=0.006) and a need for incentives (*p*=0.04). The significant enablers were an understanding of the need to tailor treatments (*p*=0.04) and goals (*p*=0.02) for people with SMI.

Conclusions

This survey indicates that despite current guidelines, diabetes care in mental health settings remains peripheral. Even when diabetes care is perceived as part of a HCP's role, various individual and organisational barriers to delivering recommended T2DM care standards to people with SMI are experienced.

STRENGTHS AND LIMITATIONS OF THIS STUDY

- The survey is informed by the Theoretical Domains Framework, a robust theoretical approach to exploring the barriers and enablers to behaviour change, guided by the MRC Framework for developing complex interventions
- We attempted to recruit participants from a range of sources, including NHS trusts, charities and professional bodies in the UK
- The cross-sectional study design means cause and effect relationships cannot be established
- The survey failed to capture the barriers and enablers to delivering recommended diabetes care to people with SMI by healthcare professionals who did not see this as being part of their clinical role
- Despite the recruitment strategy aiming to target a range of healthcare professionals, GPs, diabetologists and physical health nurses are under-represented

INTRODUCTION

Diabetes affects an estimated 415 million people worldwide and accounts for 12% of international health expenditure.[1] In the UK, 6.2% of adults are estimated to have diabetes and as in other high income countries approximately 90% of these have type 2 diabetes (T2DM).[1] There are a range of important risk factors for the development of T2DM, one of which is diagnosis of a severe mental illness (SMI), which is associated with a 2-3 fold increase in likelihood of developing the condition.[2] This increased risk has been attributed to poor diet, obesity and physical inactivity,[2, 3] the effects of anti-psychotic medications[4] and high rates of smoking.[5] As a consequence, those with T2DM and SMI die significantly younger than people with T2DM without SMI[6] and experience a greater risk of T2DM complications that require specialist treatment.[7]

These significant health inequalities may in part be explained by variations in diabetes care.[8, 9] Evidence suggests that people with SMI can be less likely to receive more novel cost-intensive medications;[10] retinopathy screening;[11, 8] foot examinations;[8] testing of HbA1c,[8, 9] renal checks;[8] and diabetes education.[12] They are also less likely to be hospitalised for diabetes than those with diabetes alone.[12, 9] The reasons for these disparities in care are wide ranging. At an individual level the knowledge and skills of mental health nurses to deliver and support diabetes care has been questioned[13, 14, 15] and previous theory-driven qualitative research that underpins this study[16] found that not knowing how to manage and monitor T2DM and engage and communicate with service users were significant barriers to delivering recommended care. There is also poor awareness, particularly amongst mental health professionals, about national and local guidelines for managing T2DM.[16] Despite hope and optimism being central to facilitating recovery in people with SMI,[17] healthcare professionals have also been found to be despondent about the health of their clients,[16] which could impact on how service users are engaged and how care is delivered.

At an organisational level the lack of integrated mental and physical health care services has been identified as a barrier to delivering care. Care pathways for people with a SMI and diabetes are often complex and fragmented and healthcare professionals value integrated care and easy access to a multidisciplinary team,[16] Despite this, co-location of mental and physical services seems to have had variable impact on the delivery of diabetes care.[18] There also appears to be issues in relation to perceived roles and responsibilities. Whilst some research shows confusion and role ambiguity about the responsibility for monitoring and supporting people with T2DM and SMI,[13] our previous qualitative research indicates a clear demarcation between the perceived responsibilities of mental health versus primary care and specialist diabetes services.[16] Whilst all professional groups felt it was their role to ensure the population were able to access relevant diabetes services, support service users to lead healthier lifestyles and either monitor or help service users to monitor their blood glucose levels, it was those from primary care and specialist diabetes services that felt that starting new or titrating diabetes treatments in people with SMI was their responsibility. Mental health professionals felt that monitoring medication adherence, blood pressure, weight and assisting service users to attend their diabetes appointments were their responsibility. This is in opposition to current recommendations that promote shared responsibility between mental and physical health care services, for at least the first 12 months or until the person's condition has stabilised.[19, 20, 21]

Guided by the Medical Research Council (MRC) recommendations for developing complex interventions,[22] to create a theoretically- and evidence-based intervention, this study aimed to explore a full range of potential barriers and enablers to delivering diabetes care to people with SMI and model these relationships. This will allow for selection of key behaviour change techniques and subsequent incorporation of them in an intervention to improve the care delivered to this population. The purpose of this study was therefore to identify the primary barriers and enablers that affect the practice of primary care, specialist mental

health and diabetes specialist clinicians in their management of T2DM in people with SMI. Using this data the intervention components that could overcome these barriers and enhance the enablers could then be identified.

METHODS

Participants

A cross-sectional, online survey was conducted between September 2015 and September 2016. The target population was any healthcare professional involved in the care of people with either T2DM and/or SMI. Targeted staff emails, containing a link to the survey, were sent to relevant staff groups by 9 NHS Trusts providing mental health services in the UK. GP practices across the UK were approached via 5 Clinical Commissioning Groups. Flyers were distributed at 8 professional healthcare conferences in the UK and Europe. The Royal Colleges of GPs, Psychiatrists and Nursing, along with the Association of British Clinical Diabetologists, shared the survey via social media and/or via their postal and online newsletters, as did the charity Diabetes UK. Staff were informed that a donation of £2 would be made to a diabetes or mental health charity for each completed survey questionnaire. The study was approved by the Wales Research Ethics Committee 7 (ref. 15/WA/0310).

The size of the target population is in excess of 100,000, comprised of UK GPs, specialists in general psychiatry and endocrinology and diabetes mellitus,[23] as well as qualified mental health nurses[24] and diabetes specialist nurses.[25]

Measures

Demographic factors: Age and gender were collected from participants.

Occupational factors: Data were collected on profession, length of time in current role, length of time qualified, country of practice, and site of practice (in- or outpatient). Participants were asked the proportion of their patient group who had T2DM, SMI, and comorbid T2DM and SMI. If they had received training in how to care for people with T2DM and comorbid T2DM

and SMI, and if so when and where this was. Along with the access they had to any clinical guidelines for the management of T2DM.

Barriers and enablers: A 33-item questionnaire (Supplementary file A) was developed to measure the barriers and enablers to delivering diabetes care to people with SMI, based on qualitative work undertaken by the team.[16] Items were generated based on the beliefs reported by healthcare professionals in these interviews, with the most relevant selected through a consensus approach.[16] The Theoretical Domains Framework (TDF)[26] was used to guide this process to ensure that the survey was able to capture a comprehensive range of factors that could act as barriers or enablers to delivering diabetes care. Items covered each of the 14 domains within the TDF (1) knowledge (2) skills (3) intention (4) social professional role & identity (5) social influence (6) goals (7) beliefs about consequences (8) beliefs about capabilities (9) memory, attention & decision processes (10) environmental context & resources (11) behavioural regulation (12) emotion (13) reinforcement (14) optimism. Responses were on a 5-point Likert scale from 1 strongly agree to 5 strongly disagree. All items were reverse scored.

Delivery of diabetes care: As part of the 33-item TDF questionnaire participants were asked if each of the nine key components of diabetes care[27] were part of their role. A sum score was calculated in order to measure the degree to which diabetes care was part of a person's professional role. If participants responded yes to this question, they were then asked 'Over the past 12 months, given 10 service users with diabetes and SMI, for how many did you deliver that aspect of care?'

Sample size estimation

To conduct multiple regression analyses with 38 predictor variables, which included the 33 items of the barrier and enablers questionnaire, gender, age, profession, years in role and years in practice, a total of 208 participants were required. Calculation was based upon an anticipated medium effect size of f^2=0.15, with 80% power and alpha 0.05.

Analysis

Data were analysed using IBM SPSS Statistics v.23. Differences between the professional groups were explored using ANOVA. Negative binomial and Poisson regressions were used to assess the predictors of the number of people with SMI for which diabetes guidelines were implemented. Entry of variables into the multiple regression analysis was based on significant univariate associations between the predictor and outcome (p = 0.05).

In order to identify the intervention components, otherwise known as behaviour change techniques, which could overcome the identified barriers and enhance the enablers to delivering T2DM to people with SMI, we were informed by matrixes that map theoretical domains of the TDF to the appropriate behaviour change techniques.[28, 29, 30] The experience of the research team, which included clinicians, psychologists and clinician educators, were then used to select the appropriate behaviour change techniques.

RESULTS

Participants

A total of 386 healthcare professionals consented into the study. Across the entire dataset there was 27.86% missing data, with complete data for 151 participants (39.11%), and 113 participants (29.27%) with more than 50% missing data. Of the 88 individual variables all had some degree of missing data. After excluding participants with more than 50% missing data there was a final sample of 273 (71%). Little's Missing Completely at Random (MCAR) test was non-significant (χ^2 = 439.564, df = 484, p = 0.93) and hence data was assumed to be MCAR. Missing data was therefore managed using multiple imputation methods.

A majority of the 273 participants were British (n=179, 66%) and female (n=96, 35%) (Table 1). Participants were primarily mental health nurses (n=92, 33.7%) or psychiatrists (n = 88,

32.2%). Most were practicing in England, in a community setting and had been in their current role for on average 9 years (SD = 8.39 years).

Table 1. Participant descriptors

Variable	n	%
Ethnicity		
British	179	66
Any other white	29	11
Irish	10	3.7
Indian	10	3.7
African	9	3.3
Asian	5	1.8
Pakistani	5	1.8
Any other ethnic group	5	1.8
White and black African	4	1.5
Any other mixed	4	1.5
White and Asian	3	1.1
Caribbean	3	1.1
Bangladeshi	2	0.7
Chinese	2	0.7
White and black Caribbean	1	0.4
Any other black	1	0.4
Profession		
mental health nurse		
psychiatrist	92	34
general practitioner	88	32
diabetes specialist nurse	24	8.8
practice nurse	17	6.2
diabetologist	12	4.4
physical health nurse	8	2.2
other	8	2.9
district or community nurse	6	2.9
occupational therapist	5	1.8
assistant practitioner	2	0.7
social worker or social	2	0.7
therapist	2	0.7
endocrinologist	1	0.4
dietician	1	0.4
student	1	0.4
audiologist and speech	1	0.4
therapist	1	0.4
healthcare assistant	1	0.4
mental health support worker	1	0.4
podiatrist		
Country of practice		
England	236	86
Scotland	4	1.5
Wales	2	0.7
Other	5	1.8
Site		
community	142	52

Variable	n	%
inpatient	72	26
both	59	22

Care of T2DM

The proportion of respondents' case load with T2DM was primarily either less than 5% or greater than 20% (Table 2). Approximately 60% of the sample specifically managed diabetes in people with SMI, however only 25% had received any training in how to do so. Of those that had, this had been within their service or via CPD, in the past year. There was no significant association between profession and receipt of training (χ^2 (1, n = 273) = 4.72, p = 0.32).

Table 2. Case load and experiences of training

Variable	n	%
Proportion of patients with T2DM		
5% or less	76	27.8
10%	47	17.2
15%	33	12.1
20% or more	71	26.0
Have you had specific training in assessing and managing T2DM?		
Yes	147	53.8
No	126	46.2
When was the most recent training in T2DM you received?		
In the last year	65	44.23
1-2 years ago	26	17.69
2-4 years ago	20	13.61
More than 4 years ago	36	24.49
If you have received training for assessing and /or managing T2DM, where was this?		
Degree	49	33.33
Diploma	21	14.29
In-service training	94	63.95
CPD	69	46.94
Postgraduate	2	1.36
Other	15	10.20
Do you have access to clinical guidelines for the management of type 2 diabetes?		
Yes	238	87.2
No	35	12.8
If yes, which guidelines are these?		
National Institute for Health and Care Excellence	12	5.04
Local trust	146	61.34
World Health Organisation	3	1.26
Scottish Intercollegiate Guidelines Network	5	2.10
Trend UK	1	0.42
American Diabetes Association	5	2.10

Variable	n	%
Research Society for the Study of Diabetes in India	1	0.42
International Diabetes Federation	1	0.42
American Association of Clinical Endocrinologists	2	0.84
European Medicines Agency	1	0.42
Joint British Diabetes Societies	2	0.84
Charity	2	0.84
European Foundation for the Study of Diabetes	1	0.42
Other	8	3.36
Do any of the patients that you provide care for have SMI?		
Yes	258	94.5
No	15	5.5
If yes, what proportion of your patients has SMI?		
5% or less	42	16.28
10%	11	4.26
15%	11	4.26
20% or more	162	62.79
Have you had specific training in assessing and managing SMI?		
Yes	209	76.6
No	64	23.4
When was the most training in SMI you received?		
In the last year	137	65.55
1-2 years ago	19	9.09
2-4 years ago	19	9.09
More than 4 years ago	34	16.27
If you have received training for assessing and/or managing SMI, was this:		
Pre-registration	17	8.13
Post-registration	49	23.44
Both	143	68.42
If you have received training for assessing and /or managing SMI, where was this?		
Degree	110	52.63
Diploma	63	30.14
In-service training	158	75.60
CPD	128	61.24
MRCPsych	7	3.35
Other	10	4.78
Do you provide diabetes care for people who have SMI?		
Yes	163	59.7
No	110	40.3
Have you had specific training in assessing and managing diabetes in people with SMI?		
Yes	71	26
No	202	74
When was the most training in assessing and managing diabetes in people with SMI you received?		
In the last year	29	40.85
1-2 years ago	18	25.35
2-4 years ago	12	16.90
More than 4 years ago	12	16.90
If you have received training for assessing and/or managing diabetes in people with SMI, was this:		
Pre-registration	6	8.45
Post-registration	45	63.38

Variable	n	%
Both	20	28.17
If you have received training for assessing and /or managing T2DM in people with SMI, where was this?		
Degree	10	14.08
Diploma	9	12.68
In-service training	44	61.97
CPD	36	50.70
Other	5	7.04

Barriers and enablers to delivering diabetes care

In order to have sufficient numbers to make univariate comparisons between professions, participants were grouped as either (1) mental health nurses and support workers, (2) psychiatrists, (3) GPs, (3) other nurses (including practice nurses, diabetes specialist nurses, district or community nurses, healthcare assistants, assistant practitioners), (4) allied and other health professions and (5) diabetologists and endocrinologists. Figure 1 displays the responses in relation to each of the 33-items of the TDF questionnaire. Only statistically significant differences between the professions are reported below (see Supplementary file B for all analyses).

Barriers

Individual factors

Only a third of the sample felt confident in their abilities to manage T2DM in people with SMI and only 42% were optimistic about the health of their clients with T2DM. Although 57% felt that managing T2DM in people with SMI was at times worrying or concerning, only a third felt frustrated and only 4% fearful of working with people with SMI. Physical health nurses were however, significantly more scared to work with someone with SMI compared with psychiatrists (p = 0.002).

Organisations factors

A third of respondents felt they would be disciplined if they did not manage T2DM in someone with SMI. Mental health nurses and support workers were significantly more likely to believe this than both psychiatrists ($p = 0.002$) and GPs ($p = 0.03$).

Whilst 65% reported that they needed more training in diabetes in order to manage T2DM in people with SMI, a third requested more training to improve their communication and negotiation skills. Allied and other health professionals, along with mental health nurses and support workers, were more likely to agree that they needed more training in diabetes than GPs (MHN: $p = 0.12$; AHP: $p = 0.02$) and diabetologists or endocrinologists (AHP: $p = 0.04$). Physical health nurses were more likely to request training in communication and negotiation skills compared with psychiatrists ($p < 0.001$).

Only a third of the sample felt that there was a definite focus within their organisation on the management of T2DM in people with SMI. GPs were significantly less likely to agree that this was the case than mental health professionals (MHN: $p < 0.001$; psychiatrists: $p = 0.01$), physical health nurses ($p = 0.02$) and diabetologist or endocrinologists ($p = 0.03$).

Perceived roles and responsibilities varied significantly between professions and the elements of care. Only a quarter of the sample felt that examining sensation and circulation in the feet; agreeing a personalised HbA1c target and offering regular reviews; and referring to retinopathy screening were part of their role (Table 3). Approximately half felt that providing general education, monitoring cholesterol and kidney function and providing personalised advice about diet and exercise were part of their clinical role. Whilst 67% and 83% of participants, respectively, felt that monitoring blood pressure and giving advice about weight management were within their remit. Diabetologists or endocrinologists, GPs and physical health nurses all reported being responsible for significantly more of the 9 diabetes

care standards than mental health nurses and support workers ($p < 0.001$), psychiatrists ($p < 0.001$) and allied and other health professions ($p < 0.001$).

Table 3. Healthcare professional perceived role in the management of T2DM in SMI

	This is part of my clinical role n(%)	Average number of service users out of 10, with both type 2 diabetes and SMI that had been…? M(SD)
Given advice about weight management	226(82.78)	5.84(3.28)
Had their BP monitored	184(67.40)	6.75(2.92)
Given general education about T2DM	162(59.34)	5.58(3.12)
Given personalised advice about diet and nutrition	159(58.24)	5.88(3.11)
Had their cholesterol monitored	128(46.87)	6.77(2.80)
Had their kidney function monitored	121(44.32)	7.39(2.44)
Had their feet examined	77(28.21)	5.45(3.29)
Agreed personalised HbA1c target	77(28.21)	6.55(2.85)
Referred to retinopathy screening	68(24.91)	4.92(3.81)

Enablers

Individual factors

Half of the sample reported that they knew how to manage T2DM in people with SMI, although allied and other health professionals felt significantly less able to manage T2DM in people with SMI than mental health nurses and support workers ($p = 0.03$), GPs ($p = 0.04$) and diabetologists and endocrinologists ($p = 0.003$). Diabetologists and endocrinologists also felt more able than psychiatrists ($p = 0.03$). Whilst 61% knew the local or national guidelines for managing T2DM, 75% reported that the likelihood of following these guidelines were high. Those working primarily within the physical health domain felt significantly more knowledgeable about these guidelines than mental health nurses and support workers ($p \leq 0.001$), psychiatrists ($p < 0.001$) and allied and other health professionals ($p = 0.001$).

For 61% of the sample, care of T2DM had become a routine part of their role, more so for GPs than psychiatrists ($p = 0.009$) and other allied health professionals ($p = 0.009$), and 53% felt optimistic that they would be able to do it in the future. Although 91% believed that

managing T2DM in people with SMI is as important as managing their mental health, in practice 38% prioritised the management of mental health over the management of T2DM.

For three quarters of respondents, being able to engage with service users was a key factor in being able to manage T2DM in this population. For 65% this included being able to tailor treatments, along with the service user's goals and targets (87%), depending on the client's needs and abilities. Physical health nurses were more likely to report doing this than psychiatrists ($p < 0.01$). For half of the sample this was aided by having a plan and reviewing their practise to improve the delivery of future care.

Between 80 and 90% reported that poorly controlled T2DM in people with SMI further affected the service user's mental health and that if they didn't take steps to manage T2DM service users would come to serious harm.

Organisational factors

Less than a quarter of participants felt they were encouraged to manage T2DM in people with SMI by incentives. Both mental health nurses and support workers, and GPs were however more likely to agree that incentives encouraged them compared to psychiatrists (MHN: $p = 0.007$; GP: $p = 0.01$). Overall 60% of the sample had sufficient time to manage this population, mental health nurses and support workers were however more likely to agree that this was the case than GPs ($p = 0.04$). Between half and three quarters of respondents felt they had access to other professionals or worked within multidisciplinary teams who could assist them in caring for someone with T2DM and SMI, this included working with family members or carers. This could be better aided by integrated IT systems for 62% of participants.

Implementation of diabetes care

For those participants who indicated that a diabetes care standard was part of their role (Table 3), on average 5 out of every 10 service users with diabetes and SMI were referred on for retinopathy screening; 5-6 were offered diabetes education, advice about weight management, diet and nutrition or had their feet examined; 6-7 had their BP monitored, personalised HbA1c targets agreed or their cholesterol monitored and 7 out of 10 had their kidney function monitored.

Predictors of implementing diabetes care

Table 4 displays the results of Poisson and negative binomial regression analyses to predict implementation of the 9 diabetes care standards. The predictors shown in the table are those that were entered into the multiple regression analyses as they were significantly related to the outcomes in the univariate analysis.

Table 4. Poisson and negative binomial regressions displaying predictors of diabetes care.

Outcome	Predictors	Hypothesis Test			Exp(β)	95% Wald Confidence Interval for Exp(β)	
		Wald χ2	df	*p*		Lower	Upper
Education	**(Intercept)**	**6.07**	**1.00**	**0.02**	**2.39**	**1.19**	**4.80**
	I know the guidelines	0.38	1.00	0.90	0.99	0.90	1.10
	I know how to manage	**5.51**	**1.00**	**0.04**	**1.15**	**1.02**	**1.30**
	I will follow the NICE diabetes guidelines	1.75	1.00	0.33	1.07	0.96	1.18
	I have access to people with specialist diabetes knowledge	0.48	1.00	0.76	1.02	0.94	1.10
	I need more training in diabetes	1.79	1.00	0.25	0.96	0.89	1.02
	I am optimistic that I will be able to manage T2DM in people with SMI	0.07	1.00	0.88	0.99	0.88	1.11
	Managing T2DM in someone with SMI is a routine part of my job	0.74	1.00	0.52	1.04	0.94	1.16
	I tailor the treatment of T2DM in people with SMI depending on their needs	0.14	1.00	0.95	1.00	0.90	1.11
	Managing T2DM in people with SMI worries or concerns me	1.55	1.00	0.26	0.95	0.88	1.03
	I feel confident	0.62	1.00	0.64	0.96	0.84	1.10
	I review how I manage T2DM in people with SMI, and identify ways in which I can improve	0.24	1.00	0.86	1.01	0.92	1.11
	How many of the 9 diabetes care standard are you responsible for?	**10.52**	**1.00**	**0.00**	**1.06**	**1.02**	**1.10**
Weight	**(Intercept)**	**16.34**	**1.00**	**0.00**	**2.97**	**1.75**	**5.03**
	Profession	**24.18**	**4.00**	**0.00**	**-**	**-**	**-**
	Mental health nurses and support workers	0.55	1.00	0.50	0.91	0.71	1.18
	Psychiatrists	2.86	1.00	0.09	1.24	0.97	1.59
	GP	1.15	1.00	0.33	0.86	0.65	1.14
	Other nurses	0.35	1.00	0.56	1.08	0.84	1.38
	I know the guidelines	3.21	1.00	0.10	1.08	0.99	1.17
	I know how to manage	1.55	1.00	0.24	1.06	0.96	1.17
	I have access to people with specialist diabetes knowledge	1.99	1.00	0.26	0.96	0.90	1.02
	I need more training in diabetes	1.10	1.00	0.34	0.97	0.92	1.03
	I feel confident	0.21	1.00	0.80	1.01	0.92	1.11
	I review how I manage T2DM in people with SMI, and identify ways in which I can improve	1.84	1.00	0.32	1.05	0.97	1.13
	How many of the 9 diabetes care standard are you responsible for?	**7.00**	**1.00**	**0.02**	**1.04**	**1.01**	**1.07**
Diet	**(Intercept)**	**11.62**	**1.00**	**0.01**	**2.07**	**1.36**	**3.16**

Outcome	Predictors	Hypothesis Test			Exp(β)	95% Wald Confidence Interval for Exp(β)	
		Wald χ2	df	*p*		Lower	Upper
	I know the guidelines	0.51	1.00	0.65	1.02	0.94	1.12
	I know how to manage	1.26	1.00	0.41	1.05	0.95	1.16
	I feel optimistic about the health of my clients	**4.69**	**1.00**	**0.04**	**1.08**	**1.01**	**1.17**
	Managing T2DM in someone with SMI is a routine part of my job	0.17	1.00	0.85	1.01	0.92	1.10
	I review how I manage T2DM in people with SMI, and identify ways in which I can improve	3.60	1.00	0.15	1.08	0.99	1.18
	How many of the 9 diabetes care standard are you responsible for?	4.48	1.00	0.06	1.04	1.00	1.07
BP	**(Intercept)**	**7.47**	**1.00**	**0.01**	**2.43**	**1.28**	**4.58**
	I will follow the NICE diabetes guidelines	0.14	1.00	0.79	1.01	0.94	1.09
	I have access to people with specialist diabetes knowledge	0.33	1.00	0.79	1.01	0.94	1.09
	I need more training in diabetes	4.24	1.00	0.05	0.94	0.88	1.00
	I am optimistic that I will be able to manage T2DM in people with SMI	2.97	1.00	0.11	1.09	0.99	1.20
	Managing T2DM in someone with SMI is a routine part of my job	**5.33**	**1.00**	**0.04**	**1.11**	**1.01**	**1.22**
	I tailor the treatment of T2DM in people with SMI depending on their needs	0.51	1.00	0.53	0.97	0.89	1.06
	My patient's level of engagement is a key factor	3.14	1.00	0.09	1.07	0.99	1.16
	I feel confident	3.58	1.00	0.08	0.91	0.83	1.01
	If I didn't take steps to manage T2DM in people with SMI, they would come to serious harm	3.76	1.00	0.11	1.09	1.00	1.18
	I review how I manage T2DM in people with SMI, and identify ways in which I can improve	0.54	1.00	0.60	1.02	0.95	1.11
	How many of the 9 diabetes care standard are you responsible for?	4.36	1.00	0.06	1.03	1.00	1.06
Feet	(Intercept)	0.30	1.00	0.79	0.87	0.29	2.59
	I need more training in communication and negotiation skills	4.98	1.00	0.05	1.11	1.01	1.22
	Diabetes goals and targets need to be tailored for people with SMI	0.92	1.00	0.42	1.08	0.91	1.29
	My patient's level of engagement is a key factor	**8.45**	**1.00**	**0.01**	**1.21**	**1.06**	**1.38**
	How many of the 9 diabetes care standard are you responsible for?	**7.44**	**1.00**	**0.02**	**1.09**	**1.02**	**1.16**
	Profession	9.36	4.00	0.08	-	-	-
	Mental health nurses and support workers	4.69	1.00	0.07	0.70	0.50	0.98
	Psychiatrists	**4.73**	**1.00**	**0.04**	**0.68**	**0.47**	**0.97**
	GP	**5.36**	**1.00**	**0.03**	**0.62**	**0.42**	**0.93**
	Other nurses	1.30	1.00	0.27	0.85	0.64	1.13

Outcome	Predictors	Hypothesis Test			Exp(β)	95% Wald Confidence Interval for Exp(β)	
		Wald χ2	df	*p*		Lower	Upper
Cholesterol	**(Intercept)**	**62.95**	**1.00**	**0.00**	**4.83**	**3.27**	**7.12**
	Working with people with SMI scares me	**6.97**	**1.00**	**0.01**	**0.90**	**0.83**	**0.97**
	My patient's level of engagement is a key factor	**8.68**	**1.00**	**0.00**	**1.14**	**1.05**	**1.25**
HbA1c	**(Intercept)**	**6.57**	**1.00**	**0.01**	**2.42**	**1.23**	**4.77**
	Diabetes goals and targets need to be tailored for people with SMI	1.57	1.00	0.23	1.08	0.96	1.22
	I am optimistic that I will be able to manage T2DM in people with SMI	**9.16**	**1.00**	**0.00**	**1.20**	**1.06**	**1.34**
Retinopathy	(Intercept)	0.34	1.00	0.59	1.79	0.24	13.35
	Diabetes goals and targets need to be tailored for people with SMI	**5.55**	**1.00**	**0.03**	**1.62**	**1.08**	**2.42**
	I would be disciplined if I did not manage T2DM in people with SMI	**6.14**	**1.00**	**0.02**	**0.71**	**0.53**	**0.93**
	Incentives, such as CQUINS or QOF points, encourage me	**4.43**	**1.00**	**0.04**	**0.77**	**0.60**	**0.98**
	Family members and carers help me	2.05	1.00	0.16	1.22	0.93	1.60

Education

The significant independent predictors of the number of people who were given general education about T2DM were knowledge about how to manage T2DM in people with SMI (p = 0.04) and the degree to which diabetes care was part of their role (p < 0.001). For every additional element of diabetes care that was part of a person's role there was a 6% (95% CI, 1.02 to 1.10) increase in the number of people referred to diabetes education (p = 0.003). For every point increase in knowledge about managing diabetes there was a 15% (95% CI, 1.02 to 1.30) increase in number of people referred to diabetes education (p = 0.04).

Weight

The significant independent predictors of the number of people who had advice about weight management were the degree to which diabetes care was part of their role (p = 0.02) and profession (p < 0.001). For every additional element of diabetes care that was part of their role there was a 4% (95% CI, 1.01 to 1.07) increase in number of people advised about weight management. Psychiatrists reported advising more people about weight management than both mental health nurses and support workers (MD = 1.78, Std. Error = 0.44) and GPs (MD = 2.06, Std. Error = 0.64).

Diet and nutrition

Optimism about the health of their clients (p = 0.04) was the only independent predictor of the number of people who were advised about diet and nutrition. For every point increase in optimism about the health of their clients there was an 8% (95% CI, 1.01 to 1.17) increase in number of people given personalised advice about diet and nutrition.

Monitoring BP

The degree to which diabetes care was a routine part of their role (p = 0.04) was the only independent predictor of the number of people who had their BP monitored. For every point increase in the routine nature of diabetes care in a respondent's role there was an 11%

(95% CI, 1.02 to 1.22) increase in number of people given personalised advice about diet and nutrition.

Examining feet

The degree to which diabetes care was part of their role (p = 0.02), the level of engagement from the service user (p = 0.01) and profession (psychiatrists p = 0.04 and GPs p = 0.03 compared with allied and other health professions) were the significant independent predictors of the number of people who had their feet examined. For every additional element of diabetes care that was part of their role there was a 9% (95% CI, 1.02 to 1.16) increase in number of people who had their feet checked. For every point increase engagement from the service user there was a 21% (95% CI, 1.06 to 1.38) increase in number of foot checks.

Agreeing a personalised HbA1c target and provide ongoing review

How optimistic a person was in their ability to manage T2DM in people with SMI (p < 0.001) was the only independent predictor of the number of service users with whom HbA1c targets were set and ongoing reviews provided. For every point increase in how optimistic a person was in their ability to manage T2DM in people with SMI there was a 20% (95% CI, 1.07 to 1.34) increase in number of service users with whom HbA1c targets were set and ongoing reviews provided.

Monitoring cholesterol

The level of engagement from the service user (p < 0.001) and fear of working with someone with a SMI (p = 0.01) were the independent predictors of the number of people who had their cholesterol monitored. For every point increase in the perceived impact of service user engagement there was a 14% (95% CI, 1.05 to 1.25) increase in the number of people whose cholesterol was monitored and for every point increase in fear there was a 10% (95% CI, 0.83 to 0.97) decrease in the in number of cholesterol checks performed.

Monitoring kidney function

There were no significant univariate associations between the number of people in whom kidney function was monitored and any of the demographic, occupational or TDF factors.

Referring to retinopathy screening

The belief that goals and targets need to be tailored for people with SMI (p = 0.03), that they would be disciplined for not managing T2DM in people with SMI (p = 0.02) and the need for incentives to encourage them to manage T2DM in this population (p = 0.04) were the significant independent predictors of the number of people referred on for retinopathy screening. For every point increase in the belief that goals and targets need to be tailored for people with SMI there was a 62% (95% CI, 1.08 to 2.42) increase in number of people who were referred on for retinopathy screening. For every point increase in the belief they would be disciplined for not managing T2DM in people with SMI or that incentives would encourage them to manage T2DM in this population, there was a 29% (95% CI, 0.54 to 0.93) and 23% (95% CI, 0.60 to 0.98) decrease, respectively, in the number of people referred on for retinopathy screening.

Intervention components

Table 5 highlights the TDF domains which were found to be either barriers or enablers to delivering T2DM care to people with SMI, along with the associated behaviour change techniques.[28, 29, 30] The techniques highlighted in column 2 are those intervention components selected as most appropriate for addressing the barrier or enabler identified in the study.

Table 5. Mapping of relevant TDF domains on intervention components

RELEVANT TDF DOMAINS	BEHAVIOUR CHANGE TECHNIQUES
Knowledge	**Information regarding behaviour, outcome** Health consequences

	Biofeedback Antecedents Feedback on the behaviour
Social professional role and identity	**Social process of encouragement, pressure and support**
Optimism	**Verbal persuasion to boost self-efficacy** **Focus on past success**
Social influence	Social process of encouragement, pressure and support **Modelling/demonstration of the behaviour by others** Social comparison Vicarious reinforcement Restructuring the social environment Identification of self as a role model Social reward
Emotion	Stress management Coping skills **Reduce negative emotions** Emotional consequences **Self-assessment of affective consequences** Social support (emotional)
Goals	Goal/target specified: behaviour or outcome Contract Rewards; incentives (Inc. self-evaluation) Graded task, starting with easy tasks **Increasing skills: problem-solving, decision-making, goal-setting** Social process of encouragement, pressure and support Persuasive communication Information regarding behaviour, outcome Motivational interviewing

	Review of outcome goal(s) Review of behaviour goal(s) Action planning (including implementation intentions)
Reinforcement	Threat **Self-reward** Differential reinforcement Incentive Thinning Negative reinforcement Shaping Counter conditioning Discrimination training Material reward Social reward Non-specific reward Response cost **Anticipation of future rewards or removal of punishment** Punishment Extinction Classical conditioning Counter conditioning

DISCUSSION

We found that delivery of diabetes care for people with SMI is influenced by a range of individual and organisational factors. Although there were clear differences in the extent of involvement, mental health professionals noted active engagement in many of the aspects of diabetes care, as identified elsewhere in the literature.[14, 13, 15] Confirming our qualitative findings[16] however, specialist mental health clinicians reported being responsible for fewer

diabetes care standards than primary care and specialist diabetes clinicians. This contests the idea that there is confusion and role ambiguity about the responsibility for monitoring and supporting T2DM in SMI.[13] In fact this survey indicates clear boundaries, but when diabetes management is perceived to be a greater part of a person's role, more service users are treated according to recommended standards. This clearly reflects conflict between the shared care approach,[21, 20] which promotes mental health professionals broadening their deliverer to address physical and mental health.[19] This indicates a need for NHS trusts to define roles and responsibilities more clearly. This is particularly relevant given that only a third of the sample felt that there was a definite focus in their trust on the management of T2DM in people with SMI.

Although 54% of respondents had received training in diabetes, only a quarter had been trained in how to manage the condition in people with SMI, and this figure did not differ between the professions. Despite receiving training, those working in mental health settings felt less knowledgeable about the guidelines for T2DM and had a desire for more training in how to manage the condition. This supports the findings of studies conducted in other UK mental health trusts[31, 14, 13, 15, 32] and theory-driven qualitative work that formed the basis of this study.[16] Importantly, this lack of knowledge and skills meant that healthcare professionals treated fewer service users according to recommended diabetes care standards. Evaluations of diabetes training and educational packages for mental health clinicians are limited. Improvements in understanding and knowledge of diabetes have been reported; however, these findings are based on a small scale, single group study consisting of primarily mental health students and hence fail to explore its impact on practice.[33] Any such programme will need to consider the barriers to attending training of this nature, including a lack of management support, staff shortages, the discretionary nature of attending and lack of funding[34] along with the challenges of using psychosocial interventions to change practice.[35, 36, 37]

Being able to communicate and engage with service users was identified as an important facilitator in delivering effective diabetes care. As opposed to those working in mental health settings, primary care and diabetes specialists felt they needed more training in communication and negotiation skills in order for them to be able to motivate their clients and deliver recommended care. Difficulties motivating service users with diabetes to self-manage has been identified elsewhere in the literature[13, 32, 38] and presents an ongoing challenge for interventions aimed at changing the behaviour of service users with T2DM.[39] Respondents stressed the importance of tailoring diabetes treatment, along with any goals and targets, to the needs and abilities of the service user. Mental health staff report experiencing difficulties engaging service users in their diabetes care, due to limitations in cognitive and executive functioning.[32, 38] Together this highlights the importance of training healthcare professionals to also be able to identity suitable times within the service user's journey when they may need more support in order for them to self-manage effectively. The challenges of communicating and engaging service users in their care, may also be precipitated or be a consequence of the fear some healthcare professionals experience about working with someone with a SMI. This further supports research that shows some clinicians experience discomfort in dealing with people with mental illness leading to physical diagnoses often being missed.[40]

Only a third of the sample were optimistic about the health of their clients with T2DM, and a majority of respondents lacked optimism about their ability to manage T2DM in people with SMI. This led to fewer service users receiving the recommended diabetes care standards. Given the importance of hope and optimism in the process of personal recovery in mental health[17] this could be an important focus for interventions aimed at improving diabetes care and outcomes for service users, with the potential for wider benefits. The powerful position that healthcare professionals hold as hope-inspiring role models[17] can either enhance or diminish the hope of service users.[41, 42] This is particularly important considering that practitioner hope has been found to influence the outcomes of therapy over

and above client hope[43] and that cultivating hope in the context of T2DM is also associated with increased adherence.[44]

In line with the findings of our qualitative work[16] a third of respondents felt that they would be disciplined if they did not manage diabetes in people with SMI and approximately a quarter felt that incentives would encourage them. Despite this, the threat of being disciplined and need for incentives appeared to have a counterintuitive effect in the multiple regression analyses. The greater the perceived threat of being disciplined and a stronger belief that incentives would encourage them to manage diabetes, the fewer service users received recommended diabetes care. This suggests that perceived threat of being disciplined and possibly the discordance between desire and receipt of incentives, was having a paralysing effect on practice. Blame and punishment are felt by healthcare professionals to be part of health service culture, particularly when someone is involved in an error, near miss or incident.[45] This however can lead to disempowerment, disunity and a lack of compassion in the workforce.[46] Rather than allowing people to experiment without fear of reprisal and view errors as learning opportunities,[46] the workforce are fearful of personal accountability, litigation and complaints.[47] Although participants felt that incentives would improve their practice, this study and the evidence for pay-for-performance systems, such as QOF, in changing healthcare professional behaviour is limited and there is insufficient evidence for their impact on patient health outcomes.[48]

Taken together, our findings suggest that a number of strategies could be implemented to improve the care offered to people with diabetes and SMI, and as a consequence address the inequalities experienced by this population. These techniques include increasing healthcare professionals' knowledge about the guidelines for managing T2DM in people with SMI, increasing awareness of their role and responsibilities towards this patient group, boosting self-efficacy for addressing the needs of these clients, modelling or demonstrating how healthcare professionals can work with clients who are less engaged in the care of their

diabetes, reduce fear of working with people with a SMI, increase skills in being able to tailor goals and targets to the needs of the individual service user and eradicate fear of being disciplined. Identification of these barriers and enablers, and subsequent BCTs now allows us to move towards development, feasibility testing and piloting of a new approach to delivering care.[22]

The study had a number of limitations. The need to adjust p-values in studies using multiple outcome measures has been debated widely in the literature.[49] The number of outcomes measures considered as a family-wise hypothesis has however not been defined and although by not adjusting this may increase the likelihood of a type I error, adjusting would increase the chance of type II errors which are no less important. We therefore acknowledge that some of the findings of this study may have been due to chance. As with any online survey there are concerns about the representativeness of the sample.[50] There was a bias in responses towards those who were likely to be more interested in the topic, with significantly more responses from those working within mental health settings. This raises a broader question about whether SMI is a priority or issue for diabetes specialists. Due to the online recruitment methods it was not possible estimate the response rate. In comparison to the target population this sample represents only 0.3% of the population therefore raising concerns about the generalizability of the findings to the broader population. Despite the recruitment strategy aiming to target a range of healthcare professionals GPs, diabetologists and physical health nurses are under-represented. The data from this study focused on predicting delivery of diabetes care to people with SMI by healthcare professionals who stated this was part of their role. It may have however, been the case that elements of diabetes care could have been undertaken by a professional even when it was not explicitly part of their job. Our results are also only a snapshot of the experiences and beliefs of healthcare professionals; as the care of diabetes in people with SMI becomes of greater priority and services begin to develop, these views may change.

COMPETING INTERESTS

We have read and understood BMJ policy on declaration of interests and declare the following interests: we have none.

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AUTHOR CONTRIBUTIONS

HM - made a substantial contribution to the conception and design of the study, the data analysis, interpretation of the data, created a first draft of the manuscript, approved the final version and agrees to be accountable for all aspects of the work.

FLG - made a substantial contribution to the conception and design of the study, collection and interpretation of the data, commented on drafts of the manuscript, approved the final version and agrees to be accountable for all aspects of the work.

MH, AS, JC, JJ, CF and KM all made a substantial contribution to the conception and design of the study, interpretation of the data, commented on drafts of the manuscript, approved the final version and agree to be accountable for all aspects of the work.

DATA SHARING

There is no other additional unpublished data to be shared.

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Figure 1. Barriers and enablers to delivery of T2DM care in people with SMI (n = 273)

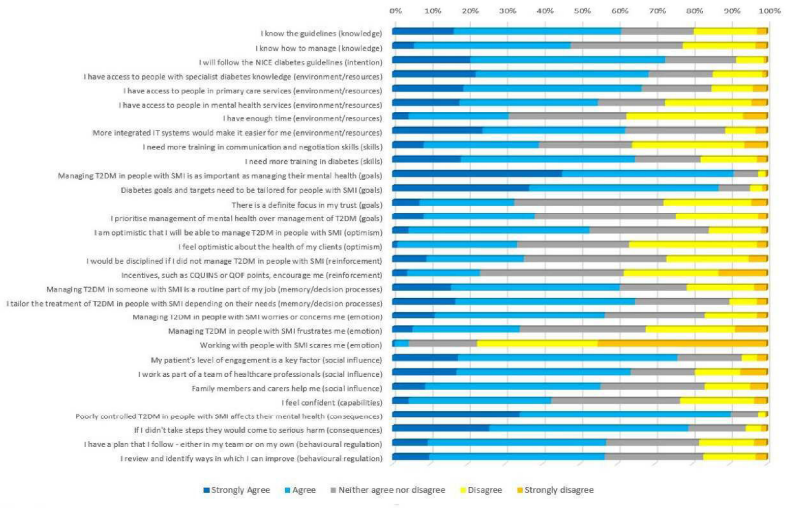

Figure 1.

Figure 1. Barriers and enablers to delivery of T2DM care in people with SMI (n = 273)

297x210mm (300 x 300 DPI)

Supplementary File A.

Questionnaire to Measures the Barriers and Enablers to Delivering Diabetes Care in People with SMI (*TDF domain*)

I know the guidelines, national or local, for managing type 2 diabetes (*knowledge*)	Strong Agree	☐
	Agree	☐
	Neither Agree nor Disagree	☐
	Disagree	☐
	Strongly Disagree	☐
I know how to manage type 2 diabetes in people with SMI (*knowledge*)	Strong Agree	☐
	Agree	☐
	Neither Agree nor Disagree	☐
	Disagree	☐
	Strongly Disagree	☐
How likely is it that you will follow the NICE diabetes guidelines for your patients who have type 2 diabetes and SMI? (*intention*)	Very Likely	☐
	Likely	☐
	Neither Likely nor Unlikely	☐
	Unlikely	☐
	Very Unlikely	☐
I have access to people with specialist diabetes knowledge to help me manage type 2 diabetes in people with SMI (*environmental context & resources*)	Strong Agree	☐
	Agree	☐
	Neither Agree nor Disagree	☐
	Disagree	☐
	Strongly Disagree	☐
I have access to people in primary care services for my patients with type 2 diabetes and SMI (*environmental context & resources*)	Strong Agree	☐
	Agree	☐
	Neither Agree nor Disagree	☐
	Disagree	☐
	Strongly Disagree	☐

I have access to people in mental health services for my patients with type 2 diabetes and SMI (*environmental context & resources*)	Strong Agree ☐ Agree ☐ Neither Agree nor Disagree ☐ Disagree ☐ Strongly Disagree ☐
I have enough time to manage type 2 diabetes in people with SMI (*environmental context & resources*)	Strong Agree ☐ Agree ☐ Neither Agree nor Disagree ☐ Disagree ☐ Strongly Disagree ☐
More integrated IT systems would make it easier for me to manage type 2 diabetes in people with SMI (*environmental context & resources*)	Strong Agree ☐ Agree ☐ Neither Agree nor Disagree ☐ Disagree ☐ Strongly Disagree ☐
I need more training in communication and negotiation skills in order to manage type 2 diabetes in people with SMI (*skills*)	Strong Agree ☐ Agree ☐ Neither Agree nor Disagree ☐ Disagree ☐ Strongly Disagree ☐
I need more training in diabetes in order to manage type 2 diabetes in people with SMI (*skills*)	Strong Agree ☐ Agree ☐ Neither Agree nor Disagree ☐ Disagree ☐ Strongly Disagree ☐

Managing patients' type 2 diabetes in people with SMI is as important as managing their mental health (*goal*)	Strong Agree ☐ Agree ☐ Neither Agree nor Disagree ☐ Disagree ☐ Strongly Disagree ☐
Diabetes goals and targets need to be tailored for people with SMI (*goal*)	Strong Agree ☐ Agree ☐ Neither Agree nor Disagree ☐ Disagree ☐ Strongly Disagree ☐
There is a definite focus in my trust on managing type 2 diabetes in people with SMI (*goal*)	Strong Agree ☐ Agree ☐ Neither Agree nor Disagree ☐ Disagree ☐ Strongly Disagree ☐
I prioritise management of mental health over management of type 2 diabetes in people with type 2 diabetes and SMI (*goal*)	Strong Agree ☐ Agree ☐ Neither Agree nor Disagree ☐ Disagree ☐ Strongly Disagree ☐
I am optimistic that I will be able to manage type 2 diabetes in people with SMI (*optimism*)	Strong Agree ☐ Agree ☐ Neither Agree nor Disagree ☐ Disagree ☐ Strongly Disagree ☐

I feel optimistic about the health of my patients with type 2 diabetes and SMI (*optimism*)	Strong Agree ☐ Agree ☐ Neither Agree nor Disagree ☐ Disagree ☐ Strongly Disagree ☐
I would be disciplined if I did not manage type 2 diabetes in people with SMI (*reinforcement*)	Strong Agree ☐ Agree ☐ Neither Agree nor Disagree ☐ Disagree ☐ Strongly Disagree ☐
Incentives, such as CQUINS or QOF points, encourage me to manage type 2 diabetes in people with SMI (*reinforcement*)	Strong Agree ☐ Agree ☐ Neither Agree nor Disagree ☐ Disagree ☐ Strongly Disagree ☐
Managing type 2 diabetes in someone with SMI is a routine part of my job (*memory, attention and decision*)	Strong Agree ☐ Agree ☐ Neither Agree nor Disagree ☐ Disagree ☐ Strongly Disagree ☐
I tailor the treatment of type 2 diabetes in people with SMI depending on their needs (*memory, attention and decision*)	Strong Agree ☐ Agree ☐ Neither Agree nor Disagree ☐ Disagree ☐ Strongly Disagree ☐

Managing type 2 diabetes in people with SMI worries or concerns me (*emotion*)	Strong Agree ☐ Agree ☐ Neither Agree nor Disagree ☐ Disagree ☐ Strongly Disagree ☐
Managing type 2 diabetes in people with SMI frustrates me (*emotion*)	Strong Agree ☐ Agree ☐ Neither Agree nor Disagree ☐ Disagree ☐ Strongly Disagree ☐
Working with people with SMI scares me (*emotion*)	Strong Agree ☐ Agree ☐ Neither Agree nor Disagree ☐ Disagree ☐ Strongly Disagree ☐
My patient's level of engagement is a key factor in how I manage the type 2 diabetes in people with SMI (*social influence*)	Strong Agree ☐ Agree ☐ Neither Agree nor Disagree ☐ Disagree ☐ Strongly Disagree ☐
I work as part of a team of healthcare professionals to help manage type 2 diabetes in people with SMI (*social influence*)	Strong Agree ☐ Agree ☐ Neither Agree nor Disagree ☐ Disagree ☐ Strongly Disagree ☐

Family members and carers help me manage type 2 diabetes in people with SMI (*social influence*)	Strong Agree ☐ Agree ☐ Neither Agree nor Disagree ☐ Disagree ☐ Strongly Disagree ☐
I feel confident about managing type 2 diabetes in people with SMI (*beliefs about capabilities*)	Strong Agree ☐ Agree ☐ Neither Agree nor Disagree ☐ Disagree ☐ Strongly Disagree ☐
Poorly controlled type 2 diabetes in people with SMI affects their mental health (*beliefs about consequences*)	Strong Agree ☐ Agree ☐ Neither Agree nor Disagree ☐ Disagree ☐ Strongly Disagree ☐
If I didn't take steps to manage type 2 diabetes in people with SMI, they would come to serious harm (*beliefs about consequences*)	Strong Agree ☐ Agree ☐ Neither Agree nor Disagree ☐ Disagree ☐ Strongly Disagree ☐
I have a plan that I follow - either in my team or on my own - when managing type 2 diabetes in people with SMI (*behavioural regulation*)	Strong Agree ☐ Agree ☐ Neither Agree nor Disagree ☐ Disagree ☐ Strongly Disagree ☐

I review how I manage type 2 diabetes in people with SMI, and identify ways in which I can improve (*behavioural regulation*)	Strong Agree	☐
	Agree	☐
	Neither Agree nor Disagree	☐
	Disagree	☐
	Strongly Disagree	☐
Is providing general education about type 2 diabetes part of your clinical role? (*social professional role & identity*)	Yes	☐
	No	☐
If yes, over the past 12 months, given 10 patients with both type 2 diabetes and SMI, for how many did you provide general education about diabetes?		
Is giving advice about weight management to patients with both type 2 diabetes and SMI part of your clinical role? (*social professional role & identity*)	Yes	☐
	No	☐
If yes, over the past 12 months, given 10 patients with both type 2 diabetes and SMI, for how many did you advice about weight management*?*		
Is providing personalised advice about diet and nutrition to patients with type 2 diabetes and SMI part of your clinical role? (*social professional role & identity*)	Yes	☐
	No	☐
If yes, over the past 12 months, given 10 patients with both type 2 diabetes and SMI, for how many did you advice about diet and nutrition*?*		
Is monitoring the blood pressure for patients with type 2 diabetes and SMI a part of your role? (*social professional role & identity*)	Yes	☐
	No	☐
If yes, over the past 12 months, given 10 patients with both type 2 diabetes and SMI, for how many did you monitor their BP?		
Is examining the circulation and sensation in the feet of patients with type 2 diabetes and SMI part of your clinical role? (*social professional role & identity*)	Yes	☐
	No	☐
If yes, over the past 12 months, given 10 patients with both type 2 diabetes and SMI, for how many did you examine their feet?		
Is working with patients with type 2 diabetes and SMI to agree a personalised HbA1c target and provide ongoing reviews a part of your clinical role? (*social professional role & identity*)	Yes	☐
	No	☐

If yes, over the past 12 months, given 10 patients with both type 2 diabetes and SMI, for how many did you agree a personalised HbA1c target and provide ongoing reviews?

Is working with patients with type 2 diabetes and SMI to monitor their cholesterol part of your clinical role? (*social professional role & identity*)

Yes ☐

No ☐

If yes, over the past 12 months, given 10 patients with both type 2 diabetes and SMI, for how many did you monitor cholesterol?

Is working with patients with type 2 diabetes and SMI to monitor their kidney function part of your clinical role? (*social professional role & identity*)

Yes ☐

No ☐

If yes, over the past 12 months, given 10 patients with both type 2 diabetes and SMI, for how many did you monitor kidney function?

Is working with patients with type 2 diabetes and SMI to refer to retinopathy screening a part of your clinical role? (*social professional role & identity*)

Yes ☐

No ☐

If yes, over the past 12 months, given 10 patients with both type 2 diabetes and SMI, for how many did you refer to retinopathy screening?

Supplementary File B.

Differences between professions on the barriers and enablers to delivering care

	Mental Health Nurse (n = 124)	Psychiatrist (n=108)	GP (n=29)	Other Nurses (n=60)	Allied Health Professionals (n=37)	Diabetologist or Endocrinologist (n=11)	ANOVA
I know the guidelines	3.31(1.08)	3.11(1.04)	4.13(0.76)	3.95(1.15)	3.10(1.14)	4.54(0.63)	F (5, 50.63) = 24.78, **$p < 0.001$**, ω^2 = 0.23
I know how to manage	3.41(0.98)	3.08(0.94)	3.42(0.91)	3.13(1.06)	2.81(1.17)	3.83(0.87)	F (5, 267) = 4.34, **$p = 001$**, η^2 = 0.08
I will follow the NICE diabetes guidelines	3.80(0.99)	3.67(0.94)	3.85(1.00)	3.85(1.09)	3.38(1.21)	3.73(1.06)	F (5, 267) = 1.46, p = 0.21, η^2 = 0.03
I have access to people with specialist diabetes knowledge	3.62(1.07)	3.72(1.09)	3.88(0.82)	3.80(1.10)	3.27(1.12)	3.75(1.25)	F (5, 48.68) = 2.14, p = 0.08, ω^2 = 0.02
I have access to people in primary care services	3.61(1.07)	3.68(1.08)	3.82(1.21)	3.27(1.25)	3.39(1.25)	3.42(1.19)	F (5, 267) = 2.18, p = 0.06, η^2 = 0.04
I have access to people in mental health services	3.57(1.11)	3.30(1.29)	3.12(1.16)	3.31(1.19)	3.14(1.36)	3.29(1.10)	F (5, 48.04) = 1.43, p = 0.23, ω^2 = 0.01
I have enough time	3.10(1.02)	2.74(1.04)	2.48(1.02)	3.07(1.10)	2.84(1.20)	2.59(1.11)	F (5, 267) = 3.12, **$p = 0.009$**, η^2 = 0.009
More integrated IT systems would make it easier for me	3.72(1.05)	3.72(1.18)	3.33(1.06)	3.40(1.02)	3.48(1.34)	3.97(0.95)	F (5, 267) = 2.38, **$p = 0.04$**, η^2 = 0.04
I need more training in communication and negotiation kills	3.07(1.12)	2.75(1.12)	3.05(1.17)	3.33(1.11)	3.20(1.41)	3.64(1.22)	F (5, 46.14) = 5.73, **$p < 0.001$**, ω^2 = 0.08
I need more training in diabetes	3.64(1.10)	3.61(1.13)	3.18(1.04)	3.44(1.09)	3.79(1.28)	3.21(1.36)	F (5, 267) = 4.18, **$p = 0.001$**, η^2 = 0.07
Managing T2DM in people with SMI is as important as	4.31(0.86)	4.16(0.87)	4.07(0.91)	4.18(0.90)	4.21(1.17)	4.14(1.00)	F (5, 267) = 2.47, **$p = 0.03$**, η^2 = xxx

	Mental Health Nurse (n = 124)	Psychiatrist (n=108)	GP (n=29)	Other Nurses (n=60)	Allied Health Professionals (n=37)	Diabetologist or Endocrinologist (n=11)	ANOVA
managing their mental health							
Diabetes goals and targets need to be tailored for people with SMI	4.06(0.94)	3.86(0.93)	4.17(0.92)	4.21(0.97)	4.09(1.18)	4.62(0.62)	F (5, 267) = 3.57, **$p = 0.004$**,η^2 = 0.06
There is a definite focus in my trust	3.22(1.01)	3.05(1.00)	2.50(0.92)	3.10(1.16)	3.07(1.19)	3.17(1.33)	F (5, 267) = 3.97, **$p = 0.002$**, η^2 = 0.07
I prioritise management of mental health over management of T2DM	2.79(1.02)	2.65(1.09)	2.76(0.80)	3.00(0.91)	2.96(1.18)	3.03(1.06)	F (5, 46.84) = 2.30, p = 0.06, ω^2 = 0.02
I am optimistic that I will be able to manage T2DM in people with SMI	3.45(0.91)	3.18(0.98)	3.52(0.80)	3.39(0.93)	3.20(1.07)	3.56(1.08)	F (5, 267) = 2.99, **$p = 0.01$**, η^2 = 0.05
I feel optimistic about the health of my clients	3.02(0.98)	2.82(0.97)	2.78(0.98)	3.04(0.97)	2.75(1.09)	3.06(1.27)	F (5, 267) = 1.82, p = 0.11, η^2 = 0.03
I would be disciplined if I did not manage T2DM in people with SMI	3.37(1.11)	2.95(1.08)	2.79(1.00)	3.15(1.12)	3.16(1.26)	3.16(1.05)	F (5, 267) = 3.81, **$p = 0.002$**, η^2 = 0.07
Incentives, such as CQUINS or QOF points, encourage me	2.88(1.12)	2.51(1.11)	3.14(1.00)	2.81(1.20)	2.79(1.16)	2.82(0.90)	F (5, 267) = 3.53, **$p = 0.004$**, η^2 = 0.06
Managing T2DM in someone with SMI is a routine part of my job	3.50(1.14)	3.23(1.11)	3.93(0.90)	3.62(1.22)	3.29(1.35)	3.63(0.80)	F (5, 52.25) = 5.13, **$p = 0.001$**, ω^2 = 0.07
I tailor the treatment of T2DM in people with SMI depending on their needs	3.57(1.06)	3.39(0.98)	3.91(0.92)	3.95(1.10)	3.33(1.21)	4.08(0.84)	F (5, 267) = 5.25, **$p < 0.001$**, η^2 = 0.09
Managing T2DM in people with SMI worries or concerns me	3.38(1.05)	3.54(1.02)	3.27(1.03)	3.32(1.12)	3.32(1.37)	3.19(0.96)	F (5, 267) = 0.70, p =0.62, η^2 = 0.01
Managing T2DM in people with SMI frustrates me	2.84(1.08)	3.07(1.12)	3.26(1.05)	3.06(1.13)	3.13(1.38)	3.00(0.86)	F (5, 267) = 1.25, p = 0.29, η^2 = 0.02

	Mental Health Nurse (n = 124)	Psychiatrist (n=108)	GP (n=29)	Other Nurses (n=60)	Allied Health Professionals (n=37)	Diabetologist or Endocrinologist (n=11)	ANOVA
Working with people with SMI scares me	1.91(1.04)	1.73(0.96)	1.97(0.98)	2.29(1.10)	2.15(1.20)	2.49(1.03)	$F(5, 267) = 4.08$, $p = 0.001$, $\eta^2 = 0.07$
My patient's level of engagement is a key factor	3.77(1.04)	3.56(1.04)	3.96(0.73)	3.79(1.12)	3.40(1.32)	4.08(0.75)	$F(5, 50.40) = 3.29$, $p = 0.01$, $\omega^2 = 0.04$
I work as part of a team of healthcare professionals	3.53(1.15)	3.29(1.25)	3.71(1.24)	3.53(1.17)	3.41(1.35)	3.91(1.09)	$F(5, 267) = 2.02$, $p = 0.08$, $\eta^2 = 0.04$
Family members and carers help me manage T2DM in people with SMI	3.18(1.11)	3.37(1.05)	3.58(0.97)	3.43(1.13)	3.00(1.32)	3.89(0.69)	$F(5, 50.09) = 3.48$, $p = 0.009$, $\omega^2 = 0.04$
I feel confident in managing T2DM in people with SMI	3.30(1.03)	3.01(1.00)	3.33(0.93)	3.21(1.03)	2.99(1.09)	3.51(0.83)	$F(5, 267) = 2.09$, $p = 0.07$, $\eta^2 = 0.04$
Poorly controlled T2DM in people with SMI affects their mental health	4.08(0.95)	4.13(0.90)	3.81(0.77)	4.02(0.98)	3.74(1.27)	4.28(0.88)	$F(5, 267) = 1.68$, $p = 0.14$, $\eta^2 = 0.03$
If I didn't take steps to manage T2DM in people with SMI, they would come to serious harm	3.79(1.04)	3.91(1.08)	3.85(0.88)	3.86(0.97)	3.77(1.26)	4.02(0.82)	$F(5, 267) = 0.14$, $p = 0.98$, $\eta^2 < 0.001$
I have a plan that I follow - either in my team or on my own	3.39(1.13)	3.37(1.03)	3.39(0.99)	3.41(1.10)	3.33(1.15)	3.67(0.94)	$F(5, 267) = 0.18$, $p = 0.97$, $\eta^2 < 0.001$
I review how I manage T2DM in people with SMI, and identify ways in which I can improve	3.43(1.12)	3.37(1.03)	3.29(0.97)	3.62(1.05)	3.34(1.15)	3.70(0.9)	$F(5, 267) = 1.51$, $p = 0.20$, $\eta^2 = 0.03$
How many of the 9 diabetes care standard are you responsible for?	3.81(2.30)	3.69(2.47)	6.65(2.02)	5.83(2.92)	2.42(3.06)	7.67(1.58)	$F(5, 267) = 14.46$, $p < 0.001$, $\eta^2 = 0.21$

Responses were 1-5, with a higher score reflecting greater agreement.

STROBE 2007 (v4) Statement—Checklist of items that should be included in reports of *cross-sectional studies*

Section/Topic	Item #	Recommendation	Reported on page #
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	1
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	2
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	5-6
Objectives	3	State specific objectives, including any prespecified hypotheses	6
Methods			
Study design	4	Present key elements of study design early in the paper	6
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	6-7
Participants	6	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants	6-7
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	7-8
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	7-8
Bias	9	Describe any efforts to address potential sources of bias	*n/a*
Study size	10	Explain how the study size was arrived at	7
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	8
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	8
		(*b*) Describe any methods used to examine subgroups and interactions	8
		(*c*) Explain how missing data were addressed	8
		(*d*) If applicable, describe analytical methods taking account of sampling strategy	n/a
		(*e*) Describe any sensitivity analyses	n/a
Results			

Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	9
		(b) Give reasons for non-participation at each stage	n/a
		(c) Consider use of a flow diagram	n/a
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	9-10
		(b) Indicate number of participants with missing data for each variable of interest	9
Outcome data	15*	Report numbers of outcome events or summary measures	10-22
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	10-22
		(*b*) Report category boundaries when continuous variables were categorized	10-22
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	n/a
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	n/a
Discussion			
Key results	18	Summarise key results with reference to study objectives	22
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	25-26
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	22-25
Generalisability	21	Discuss the generalisability (external validity) of the study results	25-26
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	26

*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.