Supplemental material

BMJ Publishing Group Limited (BMJ) disclaims all liability and responsibility arising from any reliance placed on this supplemental material which has been supplied by the author(s)

BMJ Open Qual

Supplementary File 1. Level of progress in a Quality improvement collaborative (QIC) and description of the levels (1-5)[1].

Level of progress in a QIC	Description of the levels
1	The team has not started. Plans and ideas, but no activity
2	Activity without improvements. Meetings, mapping, review of previous results, various measurements, but no change in practice
3	Some improvements. Changes in practice compared to baseline
4	Significantly improvements obtained. Changes have resulted in measurable improvements compared with baseline
5	Significantly improvements obtained, and the improvements have attained breakthrough in the system. The changes have been standardized in the system and will be continued after the end of the project

Supplemental material

BMJ Publishing Group Limited (BMJ) disclaims all liability and responsibility arising from any reliance placed on this supplemental material which has been supplied by the author(s)

BMJ Open Qual

Supplementary File 2. Questionnaire designed to map how work routines had changed when treating patients with diabetes with poor glycaemic control (defined as HbA1c ≥ 75 mmol/mol).

Questions	Answers
Does the department have a special focus on patients with HbA1c> 75 mmol/mol?	
Does the department use telephone consultations or e-mail correspondence as a supplement to those patients who at times need closer follow-up?	
Have patients with HbA1c ≥ 75 mmol/mol been offered more frequent consultations than before?	
Have you introduced telephone contacts with the relevant patient group as a suplement to regular consultations?	
Have you used the HbA1c reports HbA1c ≥ 75 mmol/mol at diabetes team-meetings?	
Have you used updated results on the "Dashboard" at meetings of the diabetes team?	
Did you have a start-up meeting / crowd meeting in the diabetes team at the start of the project?	
Did you make an action plan for the project?	
Did you discuss the topic of patients with HbA1c ≥ 75 mmol/mol at diabetes-team meetings at least once a month?	

Supplemental material

BMJ Publishing Group Limited (BMJ) disclaims all liability and responsibility arising from any reliance placed on this supplemental material which has been supplied by the author(s)

BMJ Open Qual

Supplementary File 3

Table 1. Percentage of patients with type 1 diabetes and HbA1c ≥75 mmol/mol at each of the 14 diabetes outpatient clinics in the control group in 2016, 2018 and 2019, difference after intervention (2018) and one year after intervention (2019) from baseline (2016).

Diabetes outpatient clinic in control group	2016, % (n)	2018, % (n)	2019, % (n)	Difference in HbA1c 2018-2016 [1]				Difference in HbA1c 2019-2016 [1]		
				Difference in percentage	RR (95% CI)	*p-value*		Difference in percentage	RR (95% CI)	*p-value*
1	9.0 (178)	11.7 (196)	11.3 (213)	+2.7	1.22 (0.74-2.02)	0.443		+2.3	1.22 (0.71-2.10)	0.483
2	28.7 (87)	22.8 (127)	21.1 (142)	-5.9	0.83 (0.57-1.21)	0.326		-7.6	0.78 (0.57-1.08)	0.133
3	17.9 (884)	16.0 (1103)	12.9 (1035)	-1.9	0.87 (0.75-1.01)	0.072		-5.0	0.71 (0.60-0.84)	**<0.001**
4	17.4 (69)	14.5 (83)	11.7 (94)	-2.9	0.82 (0.53-1.29)	0.393		-5.7	0.67 (0.35-1.29)	0.231
5	23.0 (356)	17.0 (546)	15.8 (669)	-6.0	0.73 (0.59-0.92)	**0.006**		-7.2	0.68 (0.55-0.85)	**<0.001**
6	16.8 (101)	22.6 (115)	23.5 (115)	+5.8	1.27 (0.87-1.88)	0.221		+6.7	1.52 (1.01-2.28)	**0.044**
7	17.0 (53)	15.9 (63)	16.4 (67)	-1.1	0.83 (0.61-1.13)	0.241		-0.6	0.94 (0.46-1.94)	0.871
8	10.3 (985)	6.3 (1066)	7.4 (1083)	-4.0	0.61 (0.49-0.77)	**<0.001**		-2.9	0.72 (0.58-0.89)	**0.002**
9	27.3 (648)	21.2 (849)	20.9 (988)	-6.1	0.79 (0.69, 0.91)	**<0.001**		-6.4	0.77 (0.66-0.89)	**<0.001**
10	10.7 (56)	14.3 (133)	14.4 (125)	+3.6	1.30 (0.57-2.99)	0.535		+3.7	1.31 (0.60-2.84)	0.499
11	15.7 (185)	14.8 (209)	15.3 (215)	-0.9	0.91 (0.63-1.31)	0.603		-0.4	0.88 (0.59-1.31)	0.519
12	9.2 (65)	14.3 (77)	13.8 (80)	+5.1	1.47 (0.71-3.11)	0.294		+4.6	1.47 (0.67-3.23)	0.337
13	17.6 (119)	14.1 (156)	17.2 (180)	-3.5	0.75 (0.51-1.01)	0.130		-0.4	0.96 (0.66-1.40)	0.826
14	15.4 (214)	12.2 (245)	14.1 (270)	-3.2	0.83 (0.61-1.13)	0.240		-1.3	0.89 (0.65-1.23)	0.482

[1] RR and p-value calculated from binomial Generalized Estimating Equations (GEE)- model with log link and unstructured correlation structure. CI= Confidence interval

Supplemental material

BMJ Publishing Group Limited (BMJ) disclaims all liability and responsibility arising from any reliance
placed on this supplemental material which has been supplied by the author(s)

BMJ Open Qual

Table 2. Mean HbA1c in patients with type 1 diabetes in the 14 diabetes outpatient clinics in the control group in 2016, 2018 og 2019, difference in mean

HbA1c after intervention (2018) and one year after intervention (2019) from baseline (2016).

Diabetes outpatient clinic in control group	Mean HbA1c, mmol/mol				Difference in mean HbA1c, mmol/mol			
	2016 (n)	2018 (n)	2019 (n)		Difference 2018-2016 (95% CI)	p-value*	Difference 2019-2016 (95% CI)	p-value*
1	58.8 (178)	59.3 (196)	57.7 (213)		0.2 (-2.0, 2.3)	0.887	-1.4 (-3.8, 1.1)	0.272
2	68.4 (87)	65.3 (127)	63.4 (142)		-3.2 (-6.2, -0.3)	**0.032**	-4.2 (-6.8, -1.6)	**0.002**
3	62.6 (884)	62.1 (1103)	60.1 (1035)		-0.8 (-1.5, -0.01)	0.050	-2.7 (3.5, -1.9)	**<0.001**
4	60.7 (69)	57.4 (83)	58.2 (94)		-3.2 (-5.8, -0.6)	**0.016**	-2.4 (-5.3, 0.6)	0.113
5	66.4 (356)	63.1 (546)	62.0 (669)		-3.0 (-4.4, -1.6)	**<0.001**	-4.1 (-5.6, -2.7)	**<0.001**
6	61.6 (101)	64.3 (115)	64.4 (115)		2.2 (-0.04, 4.5)	0.054	3.2 (0.8, 5.5)	**0.008**
7	61.6 (53)	64.0 (63)	63.5 (67)		1.8 (-1.0, 4.7)	0.213	1.7 (-1.3, 4.7)	0.272
8	61.4 (985)	58.3 (1066)	57.6 (1083)		-3.4 (-3.9, -2.8)	**<0.001**	-3.9 (-4.5, -3.3)	**<0.001**
9	67.2 (648)	65.2 (849)	65.0 (988)		-1.7 (-2.6, -0.7)	**<0.001**	-1.7 (-2.7, -0.6)	**0.002**
10	63.8 (56)	63.2 (133)	62.1 (125)		-0.9 (-3.1, 1.3)	0.412	-2.0 (-4.3, 0.3)	0.088
11	62.8 (185)	62.3 (209)	61.8 (215)		-0.7 (-2.2, 0.9)	0.409	-1.6 (-3.5, 0.3)	0.105
12	58.1 (65)	60.3 (77)	60.8 (80)		1.2 (-1.0, 3.4)	0.275	2.3 (0.1, 4.5)	**0.043**
13	61.9 (119)	62.4 (156)	61.6 (180)		0.2 (-1.9, 2.4)	0.834	0.3 (-1.9, 2.5)	0.763
14	60.9 (214)	58.2 (245)	59.6 (270)		-2.2 (-3.6, -0.8)	**0.003**	-1.0 (-2.5, 0.5)	0.203

*p-value calculated from linear Generalized Estimating Equations (GEE)- model with identity link and unstructured correlation structure. CI= Confidence interval.

Supplemental material

BMJ Publishing Group Limited (BMJ) disclaims all liability and responsibility arising from any reliance placed on this supplemental material which has been supplied by the author(s)

BMJ Open Qual

Supplementary File 4

Table 1. Sensitivity analysis of overall percentage of patients with type 1 diabetes and HbA1c ≥75 mmol/mol and RR (95% CI) at the diabetes outpatient clinics

in the intervention- and control group in 2016, 2018 and 2019, difference after intervention (2018) and one year after intervention (2019) from baseline

(2016).

	Overall percentage of patients with type 1 diabetes and HbA1c ≥75 mmol/mol				Difference in HbA1c 2018-2016[3]				Difference in HbA1c 2019-2016[3]		
	2016, % (n) [1]	2018, % (n) [1]		2016, % (n) [2]	2019, % (n) [2]	Difference in percentage	RR (95% CI)	*p-value*	Difference in percentage	RR (95% CI)	*p-value*
All intervention clinics (n=13)	19.1 (807)	14.9 (630)		19.1 (787)	13.2 (546)	-4.2	0.78 (0.73-0.84)	**<0.001**	-5.9	0.69 (0.64-0.75)	**<0.001**
All control clinics (n=14)	16.5 (557)	13.0 (439)		16.3 (520)	12.4 (395)	-3.5	0.79 (0.72-0.86)	**<0.001**	-3.9	0.76 (0.69-0.83)	**<0.001**
Interaction test between groups (unadjusted for baseline HbA1c)							0.99 (0.89-1.11)	0.864		0.91 (0.81-1.03)	0.146
Interaction test between groups (adjusted for baseline HbA1c)							1.06 (0.96-1.17)	0.253		0.99 (0.89-1.11)	0.885

[1] Patients with type 1 diabetes and HbA1c measured in both 2016 and 2018. [2] Patients with type 1 diabetes and HbA1c measured in both 2016 and 2019. [3] RR (relative risk of having HbA1c ≥ 75

mmol/mol) and corresponding p-value calculated from binomial GEE model with log link and unstructured correlation structure.

Supplemental material

BMJ Publishing Group Limited (BMJ) disclaims all liability and responsibility arising from any reliance placed on this supplemental material which has been supplied by the author(s)

BMJ Open Qual

Table 2. Sensitivity analysis of overall mean HbA1c of patients with type 1 diabetes at the diabetes outpatient clinics in the intervention- and control group in 2016, 2018 and 2019, difference after intervention (2018) and one year after intervention (2019) from baseline (2016).

	Overall mean HbA1c for patients with type 1 diabetes					Difference in mean HbA1c, mmol/mol			
	2016 (n) [1]	2018 (n) [1]		2016 (n) [2]	2019 (n) [2]		Difference 2018-2016 (95% CI)	*p-value*[3]	Difference 2018-2016 (95% CI)	*p*-value[3]
All clinics in the intervention group (n=13)	64.2 (4220)	62.2 (4220)		64.1 (4127)	61.5 (4127)		-2.1 (-2.4, -1.7)	**<0.001**	-2.7 (-3.0, -2.3)	**<0.001**
All clinics in the control group (n=14)	62.9 (3374)	61.1 (3374)		62.7 (3198)	60.4 (3198)		-1.8 (-2.2, -1.5)	**<0.001**	-2.3 (-2.7, -1.9)	**<0.001**
Interaction test between groups (unadjusted for baseline HbA1c)							-0.3 (-0.7, 0.2)	0.317	-0.3 (-0.9, 0.2)	0.233
Interaction test between groups (adjusted for baseline HbA1c)							0.2 (-0.2, 0.6)	0.370	0.2 (-0.2, 0.7)	0.316

[1] Patients with type 1 diabetes and HbA1c measured in both 2016 and 2018. [2] Patients with type 1 diabetes and HbA1c measured in both 2016 and 2019. [3] p-value calculated from linear GEE model with identity link and unstructured correlation structure

Supplemental material

BMJ Publishing Group Limited (BMJ) disclaims all liability and responsibility arising from any reliance placed on this supplemental material which has been supplied by the author(s)

BMJ Open Qual

Supplementary File 5. Summary of key elements from the action plans made by the intervention outpatient diabetes clinics to reduce the proportion of patients with HbA1c ≥ 75 mmol/mol.

- Make a list of patients with HbA1c ≥75 mmol/mol, and each caregiver responsible for a patient should have a review of the treatment plan for their patients.

- Offer more frequent consultation for a period for the patients with T1DM and HbA1c ≥ 75 mmol/mol.

- Raise awareness for each of the patients that a high HbA1c is serious condition that require action, and map the reasons for the lack of goal attainment

- Encourage to more frequent self-monitoring for the patients that measure to rarely

- Change to the newest insulin for the patients with old regimes. For example, to slow-acting insulin analogues to reduce the risk of hypoglycemia

- Increase use of insulin pump and the clinic's competence

- Increase use of CGM and the clinic's competence

- Re-education in diet and use of insulin

- Offer courses to the patients to increase the diabetes-knowledge when needed

- Offer courses in diet and carbohydrate assessment at the clinic

- Increased use of telephone consultations in addition to ordinary consultations

- What to do with patients that do not meet for ordinary consultations

- Increase use of Diasend

- Offer individual conversations and group conversations with psychologist or other personnel with skills in behavior-change

- Weekly and/or monthly discussion of process goal and share of patients with HbA1c ≥75 mmol/mol in the diabetes team using local reports and dashboard

- Courses in the clinics regarding challenges related to patients with diabetes and HbA1c ≥75 mmol/mol