

SUPPLEMENTARY DATA

Supplementary Table 1. Age-standardized incidence of hospital admission for diabetic ketoacidosis per 1000 person years in T1DM adults*

	All years	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Hospital admissions	4346	93	124	161	188	211	226	205	244	312	364	377	381	396	347	364	353
Person years	121258	3972	4957	6073	6733	7384	7701	7921	8100	8316	8573	8684	8797	8746	8551	8439	8312
Age standardized incidence																	
Total	35.84	24.94	27.04	28.56	30.08	30.03	30.61	26.81	30.79	37.76	42.08	42.75	42.18	43.6	39.08	41.31	39.13
Age groups, years																	
18-24	115.74	90.48	101.9 6	119.7 6	116.9 4	92.90	100.8 7	94.30	81.45	106.7 1	126.3 3	121.3 8	152.8 0	159.4 8	113.8 5	104.3 5	116.7 9
25-34	53.78	19.00	26.65	33.69	39.85	43.17	45.54	42.64	59.32	57.89	68.71	70.89	68.39	61.62	62.26	73.29	49.55
35-49	27.33	21.62	24.10	15.34	21.34	23.11	23.99	15.98	20.14	27.27	35.08	38.16	26.81	32.16	34.72	33.95	30.03
≥50	16.91	15.63	12.84	16.69	13.42	15.74	13.62	13.50	15.43	21.93	17.03	16.31	18.31	18.95	15.52	18.92	24.54
Gender																	
Male	30.84	23.77	22.25	20.65	24.49	25.5	28.42	21.54	29.85	33.73	33.32	35.32	33.67	40.12	35.58	34.08	35.61
Female	42.65	26.35	32.94	38.35	37.96	35.89	33.65	33.47	31.96	43.47	54.13	52.94	54.74	48.99	43.77	50.59	43.91
Duration of recorded diabetes history, years																	
<1	145.30	139.08	82.59	74.71	53.77	124.8 4	136.4 9	88.76	152.9 3	158.8 2	170.3 5	150.0 6	176.3 4	229.6 3	270.8 4	332.0 6	131.7 8
1-9	34.98	29.01	37.79	31.52	33.64	23.00	31.80	24.68	24.28	30.79	37.41	38.05	42.48	45.08	43.52	45.99	39.14
10-19	36.60	15.52	16.47	25.88	28.62	34.57	29.19	27.68	32.02	46.54	46.79	46.33	40.75	43.69	39.12	37.18	45.32
≥20	27.96	14.81	25.69	20.71	15.00	34.24	21.11	21.35	23.54	20.80	30.32	37.15	33.49	30.93	25.13	28.31	40.74
Charlson score																	
=1	31.47	24.05	24.98	28.57	21.72	26.26	28.32	26.33	26.31	33.23	35.22	36.68	37.47	39.48	36.93	37.39	36.20
=2	40.62	19.21	32.21	41.82	57.72	29.84	27.34	20.15	34.04	44.23	51.89	40.25	64.88	53.22	47.74	53.89	46.72
=3	34.89	36.69	17.17	15.86	28.51	36.59	44.64	44.01	36.17	34.52	46.87	37.97	40.17	30.25	30.85	32.21	34.36
≥4	50.17	108.47	15.99	37.51	38.07	49.19	31.82	30.94	47.99	48.79	50.16	78.22	37.82	67.64	43.04	42.45	56.61
Region																	
North East	42.50	13.66	13.04	50.42	53.40	37.10	65.89	62.43	18.54	20.17	48.34	44.16	59.78	61.57	38.07	52.71	50.02
North West	50.11	56.68	36.36	44.14	56.31	57.54	34.53	55.11	55.71	52.94	46.31	69.80	44.77	47.87	50.88	48.91	50.03
Yorkshire&The Humber	35.28	16.91	21.52	3.08	8.42	16.14	31.22	31.71	20.98	34.21	53.31	57.79	58.72	69.78	33.82	47.04	51.31
East Midlands	32.19	4.58	20.32	37.20	23.16	22.56	28.36	28.67	9.42	56.12	26.98	42.26	51.21	62.15	43.70	53.05	42.47
West Midlands	34.19	16.23	17.60	24.74	33.37	26.93	34.94	19.69	17.63	35.82	48.09	42.65	49.35	64.30	27.24	32.56	33.44
East of England	28.89	3.64	25.50	21.76	17.66	21.89	17.20	14.34	29.14	46.02	39.96	25.55	36.93	36.27	28.57	31.17	50.14
South West	36.54	34.13	47.25	22.86	25.21	32.91	30.37	28.81	29.59	24.24	44.22	49.37	52.64	41.85	43.38	34.22	32.69
South Central	29.63	18.85	22.36	39.61	30.56	28.04	26.85	19.33	28.90	25.69	31.07	26.53	36.40	29.60	32.79	42.36	24.95
London	35.82	18.36	13.32	30.66	20.39	30.26	33.10	21.32	40.74	45.23	52.11	37.43	32.28	43.93	50.53	37.52	34.64
South East Coast	32.53	32.07	38.41	20.56	32.60	17.28	35.94	14.73	23.54	29.63	33.04	38.94	29.21	30.92	38.23	50.01	48.31

*The standard population for calculating age standardized incidence was the entire cohort of T1DM adults during the study period, according to the following age categories: 18-24, 25-34, 35-49, and ≥50 years.

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Supplementary Table 2. Age-standardized incidence of hospital admission for diabetic ketoacidosis per 1000 person years in T2DM adults*

	All years	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Hospital admissions	1148	16	17	24	31	44	46	53	52	71	100	101	111	118	112	131	121
Person years	1342896	22930	30506	40743	49515	59977	68910	77989	86773	95122	102937	109022	114894	118783	120684	121817	122295
Age standardized incidence																	
Total	0.85	0.70	0.56	0.60	0.63	0.73	0.67	0.68	0.60	0.75	0.97	0.92	0.96	0.99	0.92	1.07	0.98
Age groups, years																	
18-49	2.05	0.89	0.67	1.25	1.58	0.95	1.22	2.13	1.36	1.33	2.45	2.41	3.14	2.28	2.22	2.65	2.22
50-64	0.81	0.41	0.31	0.63	0.59	0.76	0.67	0.59	0.60	0.82	1.01	1.12	1.07	0.84	0.81	0.87	0.73
≥65	0.66	0.82	0.67	0.46	0.48	0.68	0.57	0.46	0.45	0.60	0.67	0.54	0.49	0.83	0.74	0.88	0.88
Gender																	
Male	0.67	0.26	0.37	0.77	0.60	0.53	0.45	0.60	0.42	0.51	0.84	0.76	0.74	0.72	0.67	0.84	0.80
Female	1.09	1.24	0.75	0.37	0.69	0.93	0.94	0.77	0.83	1.04	1.10	1.14	1.22	1.32	1.26	1.38	1.26
Duration of recorded diabetes history, years																	
<1	2.28	2.38	2.50	2.25	2.15	2.25	1.68	1.70	2.33	1.93	2.78	2.39	3.36	2.55	2.34	3.52	1.14
1-4	0.35	0.34	0.35	0.55	0.45	0.27	0.24	0.09	0.21	0.19	0.27	0.35	0.44	0.34	0.34	0.50	0.73
5-9	0.71	0.45	0.31	0.16	0.23	0.77	0.43	0.71	0.55	0.88	0.84	0.89	0.90	0.77	0.89	0.60	0.64
≥10	1.39	1.19	0.63	0.53	0.93	0.99	1.30	1.89	0.90	1.16	1.83	1.41	1.28	1.75	1.29	1.65	1.51
Charlson score																	
=1	0.67	0.62	0.50	0.46	0.67	0.96	0.60	0.39	0.50	0.50	0.60	0.66	1.06	1.02	0.59	0.58	0.58
=2	0.72	0.79	0.24	0.37	0.82	0.58	0.69	0.83	0.68	0.87	0.58	0.69	0.78	0.98	0.72	0.73	0.71
=3	0.85	0.88	1.21	1.41	0.21	0.21	0.64	0.82	0.77	0.84	0.79	1.17	1.07	0.50	0.69	1.17	0.97
≥4	1.24	0.52	0.58	0.56	0.89	0.87	1.21	1.58	0.53	0.89	2.08	1.17	1.16	1.10	1.35	1.41	1.35
Glucose-lowering drugs																	
Sulfonylureas with or without NIGLD	0.34	0.80	0.28	0.22	0.34	0.46	0.33	0.12	0.27	0.20	0.39	0.44	0.29	0.35	0.27	0.36	0.44
Insulin only	7.55	2.17	2.98	4.14	5.07	3.80	5.51	8.21	4.87	3.97	9.21	7.78	10.65	8.75	9.62	11.06	10.86
Insulin and NIGLD	3.49	2.73	2.52	2.22	1.10	2.40	2.36	2.68	2.02	3.74	3.70	3.89	4.02	4.42	3.99	4.48	3.71
Other†	0.13	0.14	0.27	0.28	0.38	0.30	0.07	0.03	0.12	0.17	0.11	0.10	0.11	0.08	0.12	0.10	0.14
Region																	
North East, Yorkshire & The Humber, East Midlands‡	0.50	0.31	0.45	0.38	0.68	0.74	0.52	0.57	0.62	0.37	0.78	0.17	0.27	0.46	0.42	1.14	0.17
North West	0.81	1.43	0.40	0.45	0.92	0.68	0.44	0.31	0.83	0.89	1.19	0.45	1.10	0.94	0.75	1.00	0.88
West Midlands	0.68	0.28	0.24	0.41	0.18	0.58	0.50	0.67	0.61	0.91	0.76	0.56	1.06	0.59	0.93	1.02	0.39
East of England	0.87	0	0.97	1.09	0.33	1.04	0.82	0.42	0.47	0.62	0.50	1.03	1.05	1.68	0.92	1.04	0.95
South West	0.90	0.35	0.49	0.35	0.75	0.45	0.47	0.89	0.40	1.43	1.09	1.04	0.82	1.30	0.96	1.13	0.81
South Central	0.97	1.94	0.41	0.52	0.56	0.71	1.02	1.13	0.31	0.77	0.80	1.46	1.01	0.81	1.00	0.91	1.59
London	1.13	0.73	1.09	0.57	0.92	0.76	0.78	1.18	0.79	0.45	1.01	1.44	1.47	1.17	1.45	1.44	1.20
South East Coast	0.83	1.12	0.36	1.10	0.60	0.86	0.81	0.42	0.64	0.44	1.35	1.27	0.61	0.84	0.67	0.82	1.10

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NIGLD, non-insulin glucose-lowering drug.

* The standard population for calculating age standardized incidence was the entire cohort of T2DM adults during the study period, according to the following age categories: 18-49, 50-64 and ≥ 65 years.

† Other included self-management only and monotherapy or combination of non-insulin glucose-lowering drug (excluding sulfonylureas).

‡ Combined due to the small number of DKA hospital admissions in these three regions

Supplementary Table 3. Trends in hospital admission for diabetic ketoacidosis by diabetes type and subgroups

	Trend 1			Trend 2			Trend 3		
	Period	APC (95% CI)	P	Period	APC (95% CI)	P	Period	APC (95% CI)	P
Type 1 diabetes									
Overall	1998-2004	0.63 (-1.87, 3.18)	0.58	2004-2007	14.10 (2.34, 27.22)	0.02	2007-2013	-1.15 (-2.71, 0.44)	0.13
Age group, years									
18-24	1998-2005	-2.88 (-9.78, 4.55)	0.39	2005-2009	13.81 (-5.92, 37.68)	0.16	2009-2013	-8.54 (-17.23, 1.05)	0.07
25-34	1998-2007	11.92 (7.08, 16.99)	0.0002	2007-2013	-2.58 (-7.69, 2.82)	0.31			
35-49	1998-2013	4.29 (1.77, 6.88)	0.003						
≥ 50	1998-2013	2.79 (1.01, 4.60)	0.005						
Gender									
Male	1998-2013	3.81 (2.43, 5.21)	<0.0001						
Female	1998-2005	0.81 (-4.39, 6.28)	0.74	2005-2008	16.47 (-10.02, 50.76)	0.21	2008-2013	-4.79 (-9.97, 0.70)	0.08
Duration of recorded diabetes history, years									
<1	1998-2013	7.70 (3.61, 11.96)	0.001						
1-10	1998-2005	-4.04 (-9.89, 2.19)	0.17	2005-2009	14.69 (-4.00, 37.01)	0.11	2009-2013	-1.43 (-11.93, 10.33)	0.78
10-19	1998-2007	10.00 (4.60, 15.68)	0.002	2007-2013	-2.05 (-8.01, 4.30)	0.48			
≥ 20	1998-2013	5.09 (2.22, 8.04)	0.002						
Charlson comorbidity score									
1	1998-2013	3.77 (2.58, 4.97)	<0.0001						
2	1998-2013	3.69 (0.07, 7.44)	0.046						
3	1998-2000	-27.74 (-71.74, 84.80)	0.45	2000-2003	37.57 (-39.62, 213.41)	0.40	2003-2013	-3.34 (-6.62, 0.05)	0.053
≥ 4	1998-2013	2.39 (-2.03, 7.01)	0.27						
Region									
North East	1998-2013	1.78 (-2.99, 6.78)	0.44						
North West	1998-2013	0.09 (-2.00, 2.23)	0.93						
Yorkshire&The Humber	1998-2013	10.44 (4.79, 16.41)	0.001						
East Midlands	1998-2013	7.47 (2.01, 13.22)	0.01						
West Midlands	1998-2013	4.94 (0.38, 9.71)	0.04						
East of England	1998-2013	5.80 (1.48, 10.30)	0.01						
South West	1998-2005	-4.69 (-12.75, 4.12)	0.25	2005-2008	26.54 (-25.27, 114.27)	0.33	2008-2013	-8.81 (-17.23, 0.48)	0.06
South Central	1998-2013	1.56 (-0.99, 4.19)	0.21						
London	1998-2013	3.75 (0.30, 7.31)	0.04						
South East Coast	1998-2013	4.65 (1.40, 8.02)	0.008						

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Type 2 diabetes

Overall	1998-2013	4.24 (2.82, 5.69)	<0.0001			
Age group, years						
18-49	1998-2013	5.98 (2.18, 9.92)	0.004			
50-64	1998-2008	9.67 (4.61, 14.97)	0.001	2008-2013	-6.72 (-13.66, 0.77)	0.07
≥65	1998-2013	3.60 (1.00, 6.26)	0.01			
Gender						
Male	1998-2013	3.64 (1.05, 6.29)	0.009			
Female	1998-2013	4.39 (2.33, 6.49)	0.0004			
Duration of recorded diabetes history, years						
<1	1998-2013	1.53 (-2.27, 5.47)	0.41			
1-4	1998-2004	-18.85 (-32.38, -2.61)	0.03	2004-2013	14.62 (7.91, 21.74)	0.0004
5-9	1998-2008	11.11 (2.43, 20.51)	0.02	2008-2013	-7.57 (-18.05, 4.25)	0.18
≥10	1998-2013	3.42 (0.27, 6.67)	0.04			
Charlson comorbidity score						
1	1998-2013	1.36 (-2.71, 5.60)	0.49			
2	1998-2013	1.55 (-1.29, 4.46)	0.26			
3	1998-2013	1.39 (-3.37, 6.38)	0.55			
≥4	1998-2013	3.71 (-0.86, 8.48)	0.10			
Current status of glucose lowering drug use						
Sulfonylureas	1998-2013	-0.88 (-5.06, 3.48)	0.67			
Insulin only	1998-2013	8.09 (4.97, 11.31)	0.0001			
Insulin + NIGLD	1998-2009	5.61 (2.86, 8.44)	0.0006			
Other*	1998-2013	-6.88 (-11.53, -1.99)	0.01			
Region						
North East, Yorkshire & The Humber, East Midlands†	1998-2013	1.45 (-4.93, 8.26)	0.64			
North West	1998-2013	1.65 (-2.75, 6.25)	0.44			
West Midlands	1998-2013	4.88 (-0.39, 10.43)	0.07			
East of England	1998-2013	3.79 (-1.52, 9.39)	0.15			
South West	1998-2013	4.34 (-0.63, 9.55)	0.08			
South Central	1998-2013	3.51 (-1.30, 8.54)	0.14			
London	1998-2013	4.56 (1.25, 7.97)	0.01			
South East Coast	1998-2013	1.42 (-3.39, 6.48)	0.54			

Abbreviations: APC, annual percent change; CI, confidence interval; NIGLD, non-insulin glucose-lowering drug.

* Included self-management alone (i.e., not currently taking any glucose-lowering drug), oral glucose-lowering drug monotherapy (excluding sulfonylureas) or combinations of any glucose-lowering drugs (excluding insulin and sulfonylureas).

† Combined due to the small number of DKA hospital admissions in these three regions

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Supplementary Table 4. Characteristics of adults with T1DM and T2DM in different years according to the number of hospital admission for DKA during the entire study period

	T1DM					P	T2DM			
	Number of hospital admission for DKA				P		Number of hospital admission for DKA			P
	0	1	2	≥3			0	1	≥2	
Year 1998										
N (%)	4462 (91.27)	272 (5.56)	76 (1.55)	79 (1.62)			27838 (99.35)	145 (0.52)	36 (0.13)	
Age, years	49.0 ± 18.4	44.3 ± 17.4	39.8 ± 17.7	37.8 ± 15.2	<0.0001		66.3 ± 12.6	63.0 ± 14.2	56.6 ± 14.6	<0.0001
Male	57.1	50.7	57.9	57.0	0.2		54.0	42.1	25.0	<0.0001
Duration of recorded diabetes history, years	17.5 ± 12.7	17.1 ± 11.6	15.9 ± 11.1	14.6 ± 10.5	0.1		6.8 ± 6.4	9.3 ± 7.9	9.5 ± 11.3	<0.0001
Charlson comorbidity score	1.3 ± 1.5	1.1 ± 1.3	0.8 ± 1.1	0.8 ± 1.1	0.0008		1.2 ± 1.4	1.1 ± 1.23	0.8 ± 1.0	0.08
Glucose-lowering drugs										<0.0001
None							27.1	13.8	0	
Metformin only							10.3	6.2	5.6	
Insulin only							3.8	17.2	38.9	
Insulin + NIGLD							4.9	15.2	33.3	
Sulfonylureas only							28.5	18.6	11.1	
Sulfonylureas + other NIGLD							24.9	29.0	11.1	
Other							0.5	0	0	
Year 2005										
N (%)	8004 (88.29)	661 (7.29)	192 (2.12)	209 (2.31)			96017 (99.49)	404 (0.42)	93 (0.10)	
Age, years	47.8 ± 17.6	42.1 ± 17.3	40.6 ± 17.3	37.6 ± 15.0	<0.0001		66.3 ± 13.1	62.4 ± 15.0	57.5 ± 16.4	<0.0001
Male	58.4	54.2	54.7	47.4	0.002		54.5	46.5	35.5	<0.0001
Duration of recorded diabetes history, years	19.1 ± 13.5	17.2 ± 12.3	18.5 ± 12.1	15.2 ± 11.2	<0.0001		6.8 ± 6.4	9.9 ± 8.1	11.7 ± 11.0	<0.0001
Charlson comorbidity score	1.7 ± 1.6	1.5 ± 1.5	1.5 ± 1.5	1.5 ± 1.5	0.004		1.6 ± 1.5	1.8 ± 1.7	1.6 ± 1.5	0.04
Glucose-lowering drugs										<0.0001
None							25.0	5.9	4.3	
Metformin only							21.5	7.4	4.3	
Insulin only							4.2	25.7	36.6	
Insulin + NIGLD							10.0	34.9	47.3	
Sulfonylureas only							8.8	4.0	2.2	
Sulfonylureas + other NIGLD							25.9	18.8	5.4	
Other							5.0	3.2	0	
Year 2013										
N (%)	8189 (88.51)	730 (7.89)	171 (1.85)	162 (1.75)			134076 (99.66)	394 (0.29)	66 (0.05)	
Age, years	45.6 ± 17.3	41.0 ± 16.5	41.1 ± 16.8	38.1 ± 13.8	<0.0001		66.7 ± 13.4	62.6 ± 15.1	58.9 ± 16.8	<0.0001
Male	58.3	57.1	51.5	46.9	0.009		55.8	49.8	28.8	<0.0001

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Duration of recorded diabetes history, years	20.8 ± 14.3	16.7 ± 12.2	20.3 ± 13.0	17.7 ± 10.0	<0.0001	8.7 ± 6.8	12.1 ± 8.5	15.8 ± 10.1	<0.0001
Charlson comorbidity score	2.7 ± 1.5	2.6 ± 1.4	2.7 ± 1.5	2.8 ± 1.6	0.36	2.9 ± 1.8	3.4 ± 2.1	3.6 ± 1.9	<0.0001
Glucose-lowering drugs									<0.0001
None						22.1	3.6	3.0	
Metformin only						29.7	6.6	1.5	
Insulin only						3.7	28.9	47.0	
Insulin + NIGLD						10.6	43.9	43.9	
Sulfonylureas only						3.7	2.3	1.5	
Sulfonylureas + other NIGLD						23.6	10.9	3.0	
Other						6.7	3.8	0	

DKA, diabetic ketoacidosis; NIGLD, non-insulin glucose lowering drug; T1DM, type 1 diabetes mellitus; T2DM; type 2 diabetes mellitus.

Values were mean ± standard deviation or percentage unless otherwise specified.

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Supplementary Table 5. Grouping adults with T1DM according to the number of hospital admission for DKA by year

year	N	Number of DKA hospital admissions			
		0	1	2	≥3
1998	4889	4823	54	6	6
1999	6126	6034	77	11	4
2000	7025	6900	106	12	7
2001	7841	7708	109	12	12
2002	8451	8283	142	17	9
2003	8605	8417	166	16	6
2004	8935	8778	131	17	9
2005	9066	8878	160	14	14
2006	9284	9055	183	27	19
2007	9593	9329	207	35	22
2008	9718	9454	205	35	24
2009	9780	9523	210	26	21
2010	9927	9642	234	33	18
2011	9717	9458	209	28	22
2012	9465	9212	196	36	21
2013	9252	8989	211	31	21

SUPPLEMENTARY DATA

Supplementary Table 6. Grouping adults with T2DM according to the number of hospital admission for DKA by year

year	N	Number of DKA hospital admissions		
		0	1	≥2
1998	28019	28003	16	0
1999	37327	37311	16	0
2000	47105	47081	24	0
2001	57419	57391	25	3
2002	68383	68343	37	3
2003	77130	77086	42	2
2004	87546	87497	46	3
2005	96514	96467	43	4
2006	105141	105079	54	8
2007	113736	113645	85	6
2008	120959	120863	91	5
2009	126746	126649	86	11
2010	133397	133298	87	12
2011	134865	134768	88	9
2012	134828	134710	109	9
2013	134536	134433	95	8

Supplementary Table 7. The 30-day all-cause readmission rate for hospital admission for DKA during the entire study period, 1998-2013

	All		Include only the first readmission in each year from each patient		Include only the first readmission from each patient	
	Total number of DKA admissions	Readmission rate, %	Total number of DKA admissions	Readmission rate,%	Total number of DKA admissions	Readmission rate,%
T1DM	4346	12.67	3196	9.39	2214	6.05
T2DM	1148	6.18	1029	5.05	883	3.74

SUPPLEMENTARY DATA

Supplementary Table 8. The outcomes of patients according to different number of hospital admission for DKA*

	The number of DKA hospital admissions in T1DM			The number of DKA hospital admissions in T2DM	
	1	2	≥3	1	≥2
Length of hospital stay	Ref.	0.93 (0.85, 1.01)	1.09 (0.96, 1.23)	Ref.	1.09 (0.88, 1.33)
30-day all-cause mortality	Ref.	0.52 (0.22, 1.26)	1.34 (0.66, 2.71)	Ref.	1.70 (0.73, 3.97)
1-year all-cause mortality	Ref.	0.90 (0.65, 1.25)	1.90 (1.15, 3.13)	Ref.	2.05 (1.16, 3.62)

* We used negative binomial models for length of hospital stay in days (continuous variable) and logistic models for 30-day and 1-year all-cause mortality. The estimates were adjusted for calendar year, age, gender, duration of recorded diabetes history, and Charlson comorbidity score. For T2DM, we additionally adjusted for glucose-lowering medications. Robust error variance was applied to account for recurrent DKA admissions.

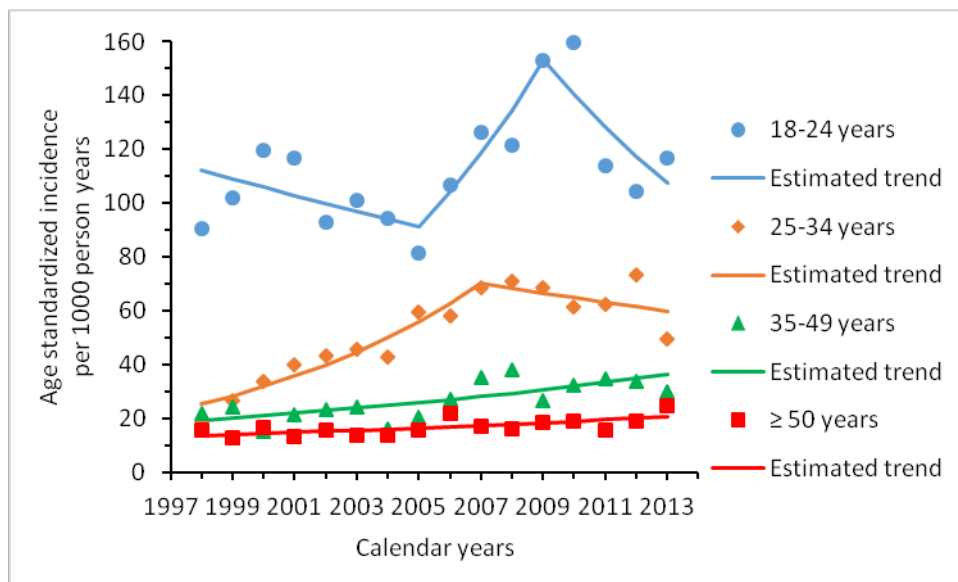
Supplementary Table 9. Key characteristics for T1DM adults over time

year	Number of patients	Number of DKA admissions	Person years with diabetes	Percent of patients with duration of recorded diabetes history <1 year	Percent male	Percent of patients aged 18-24 years
1998	4889	93	3972.33	3.64	56.78	8.02
1999	6126	124	4956.78	4.52	57.15	7.56
2000	7025	161	6073.28	4.88	57.57	7.57
2001	7841	188	6732.55	4.73	57.53	7.77
2002	8451	211	7384.20	4.41	57.39	7.89
2003	8605	225	7700.73	3.38	57.83	8.46
2004	8935	205	7920.67	3.46	58.19	8.91
2005	9066	242	8100.24	3.32	57.77	9.08
2006	9284	312	8316.45	3.39	57.81	9.88
2007	9593	364	8572.82	3.18	57.93	10.41
2008	9718	377	8683.64	3.00	58.06	10.38
2009	9780	380	8796.86	2.85	58.23	11.01
2010	9927	396	8746.30	2.73	58.35	11.16
2011	9717	347	8551.30	2.64	58.47	12.02
2012	9465	363	8438.59	2.87	58.14	11.98
2013	9252	353	8311.70	2.64	57.85	12.47

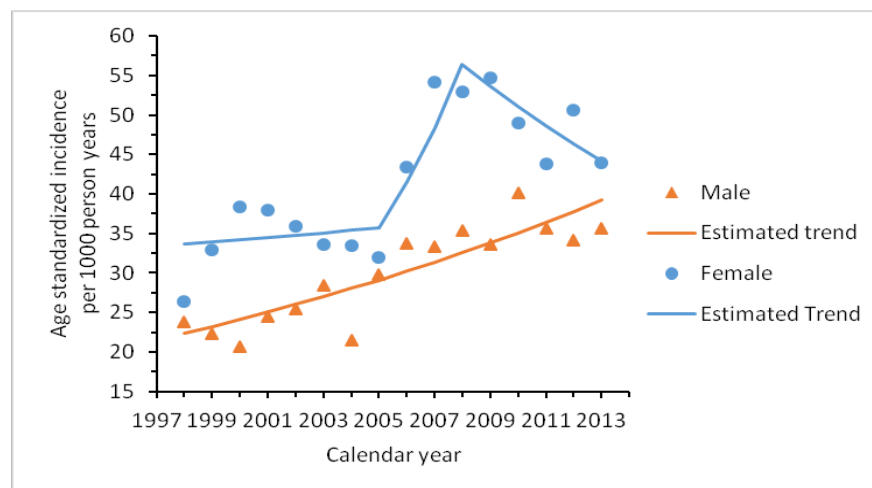
SUPPLEMENTARY DATA

Supplementary Figure 1. Trends in hospital admission for diabetic ketoacidosis in T1DM adults, by age (1A), gender (1B), duration of recorded diabetes history (1C), Charlson comorbidity score (1D), and region (1E)

1A

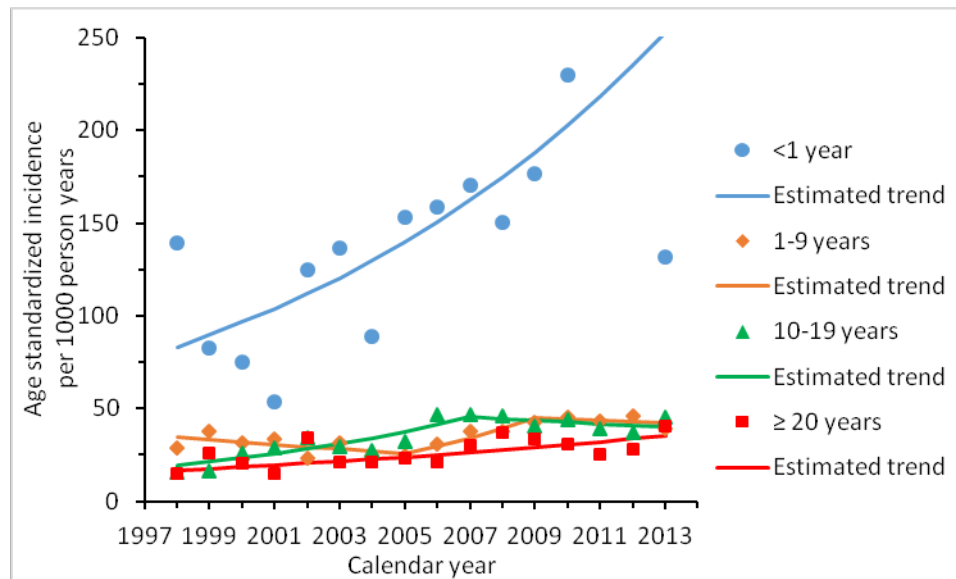


1B



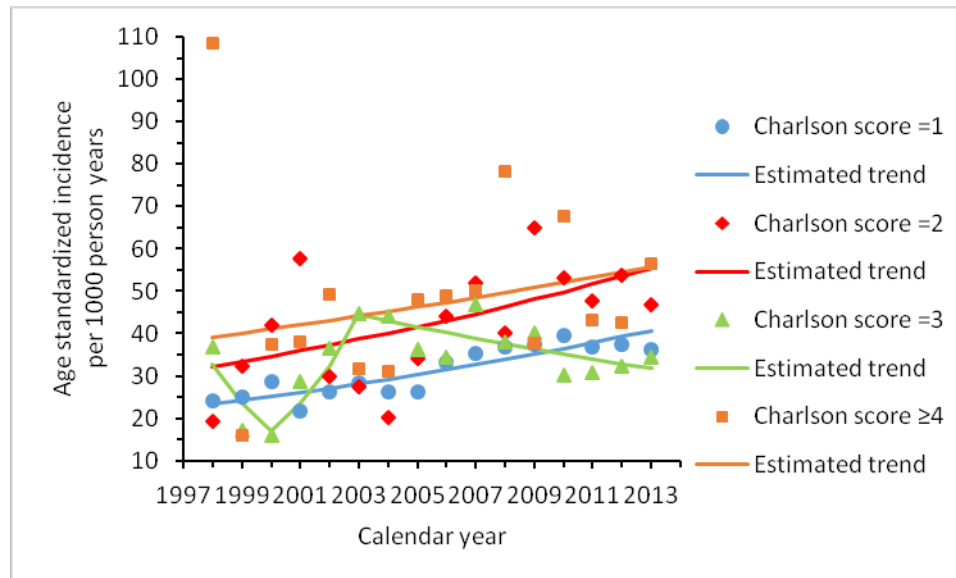
SUPPLEMENTARY DATA

1C



SUPPLEMENTARY DATA

1D



SUPPLEMENTARY DATA

1E

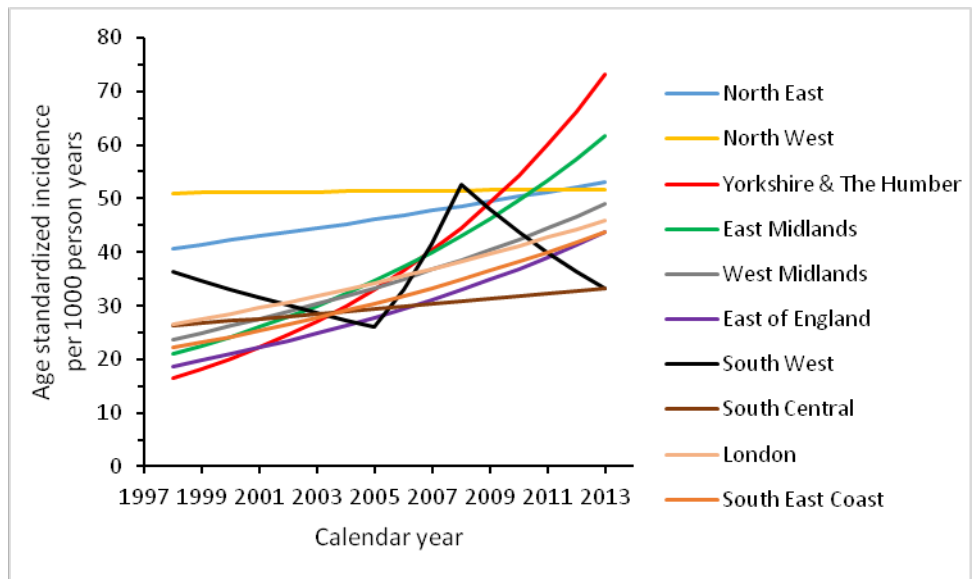
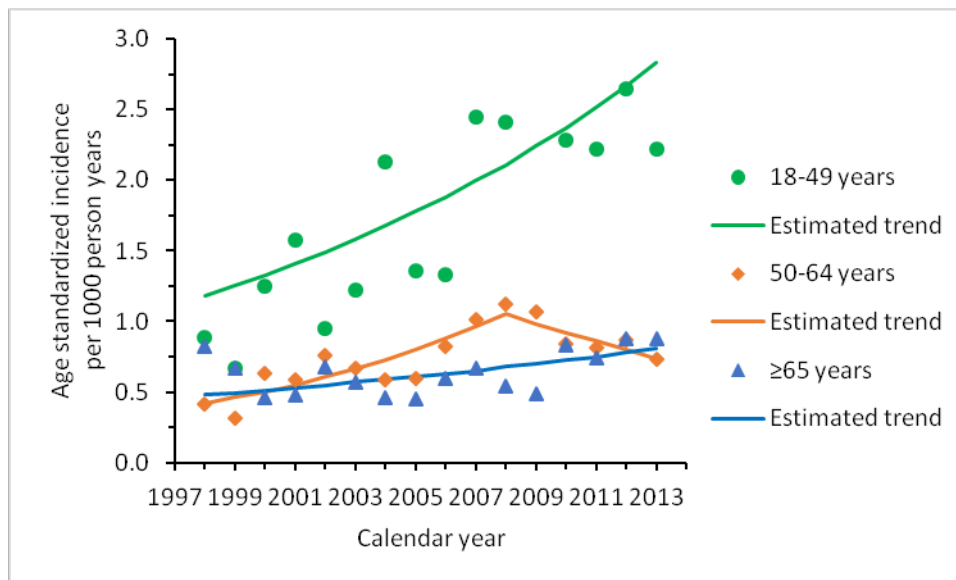


Figure 1E shows the estimated DKA trends in 10 regions in England. Due to the large number of the subgroups, the observed age standardized incidence rates were not plotted. They can be found in supplementary Table 1.

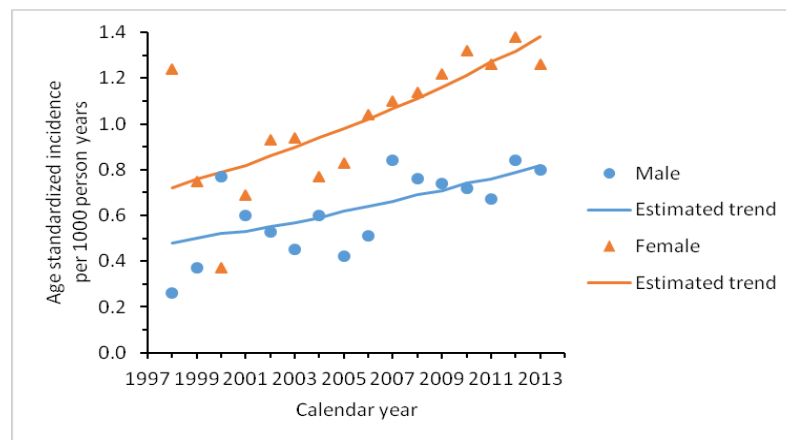
SUPPLEMENTARY DATA

Supplementary Figure 2. Trends in hospital admission for diabetic ketoacidosis in T2DM adults, by age (2A), gender (2B), duration of recorded diabetes history (2C), Charlson comorbidity score (2D), current use of glucose-lowering drugs (2E), and region (2F)

2A

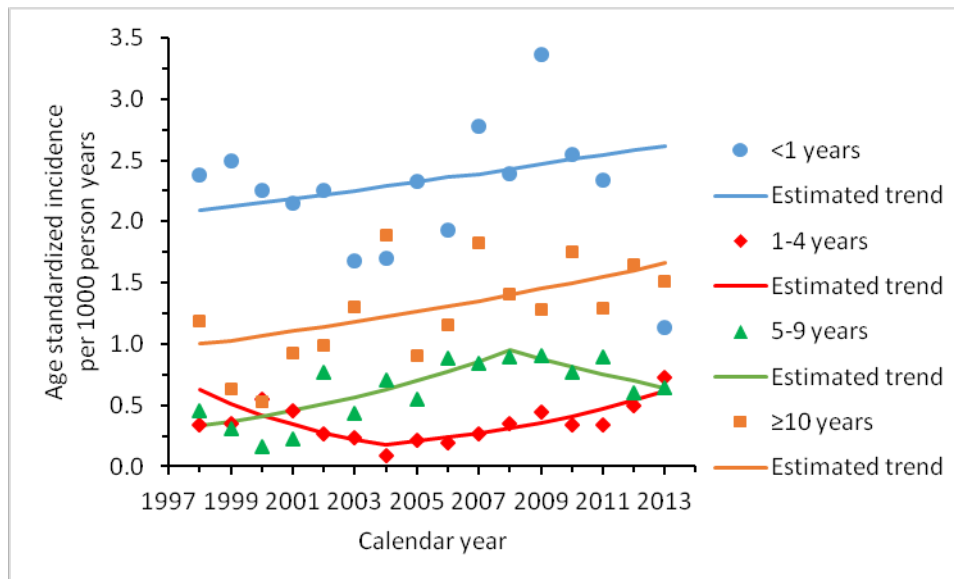


2B

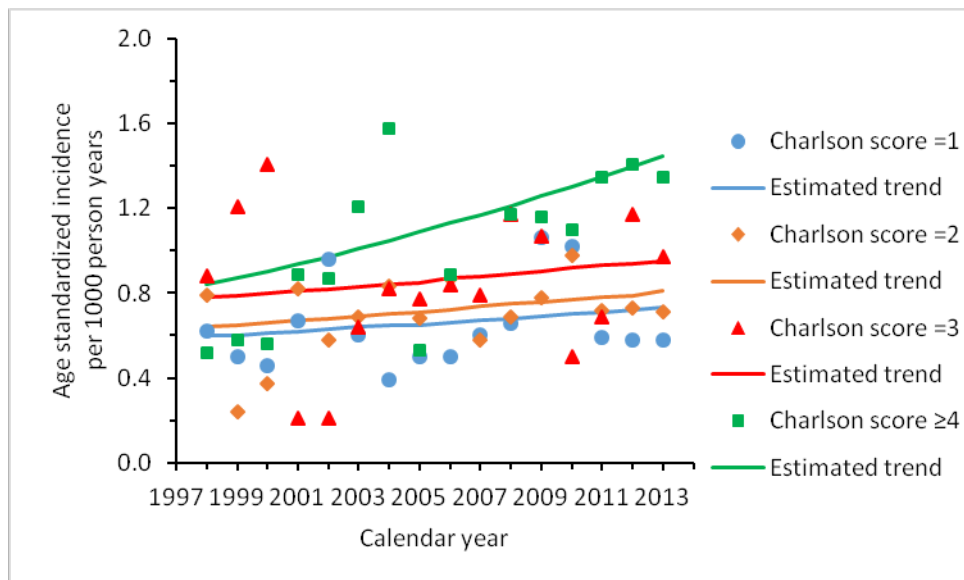


SUPPLEMENTARY DATA

2C

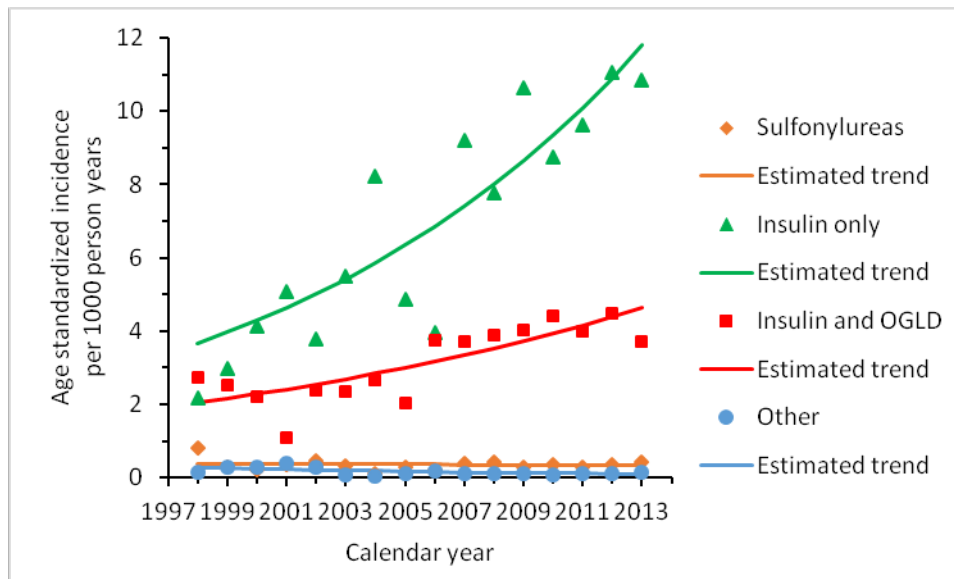


2D

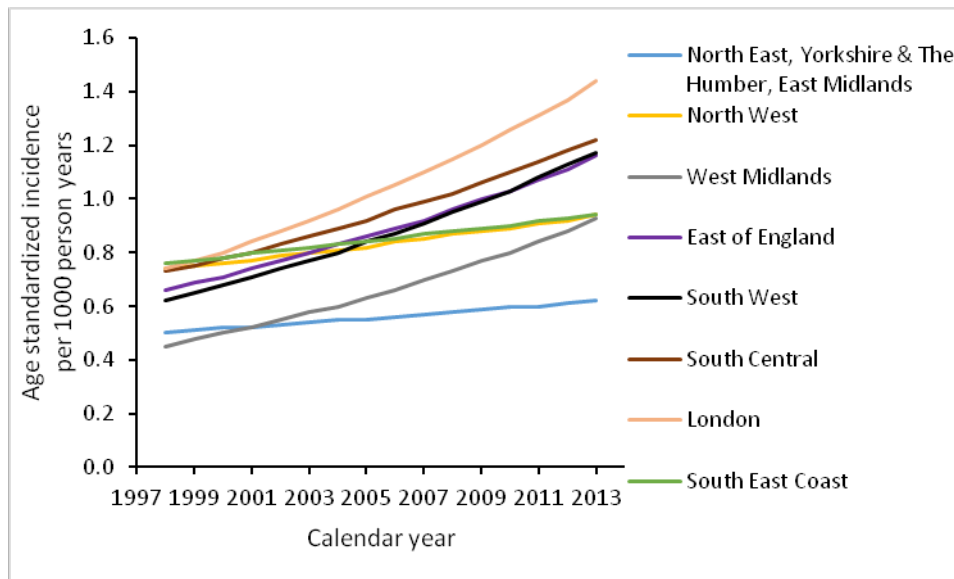


SUPPLEMENTARY DATA

2E



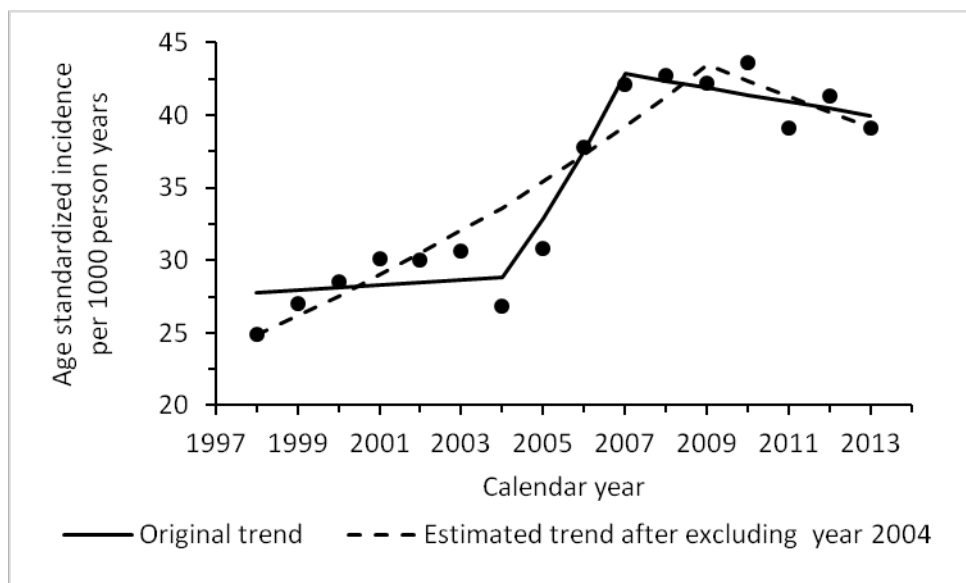
2F



SUPPLEMENTARY DATA

Figure 2F shows the estimated DKA trends in 10 regions in England. Due to the large number of the subgroups, the observed age standardized incidence rates were not plotted. They can be found in supplementary Table 2.

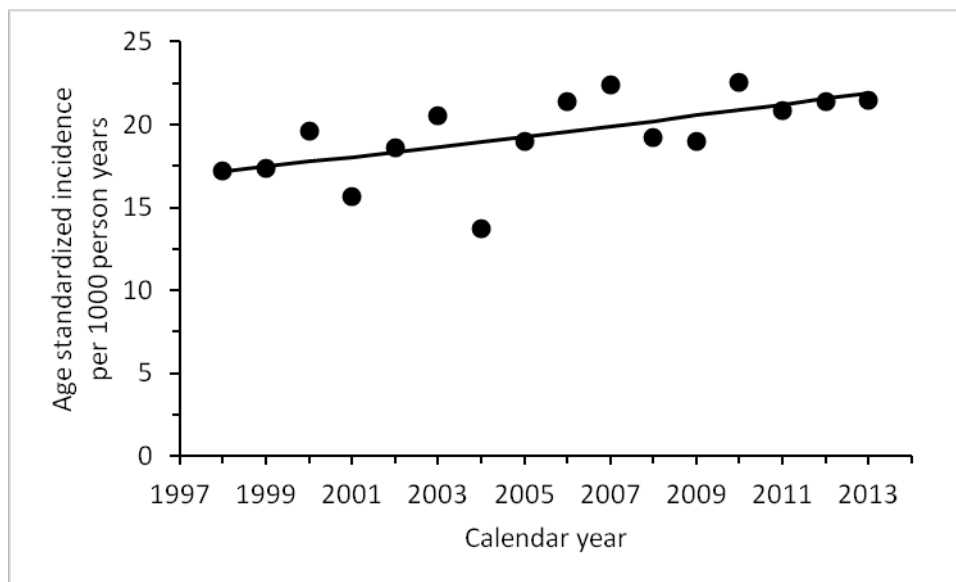
Supplementary Figure. 3. Trends in hospital admission for diabetic ketoacidosis in T1DM adults, after excluding the year 2004 data



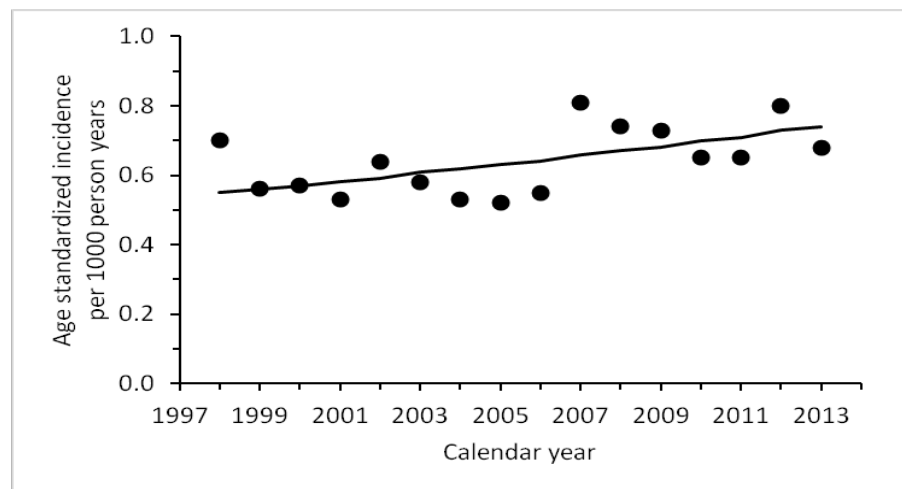
Black dots represented age standardized incidence rate in each year. The standard population for calculating age standardized incidence was the entire cohort of adults with T1DM during the study period. The following age categories were used: 18-24, 25-34, 35-49, and ≥ 50 years.

SUPPLEMENTARY DATA

Supplementary Figure. 4A. Trends in hospital admission for DKA in T1DM adults, with analyzing only the first DKA admission during the study period from each patient



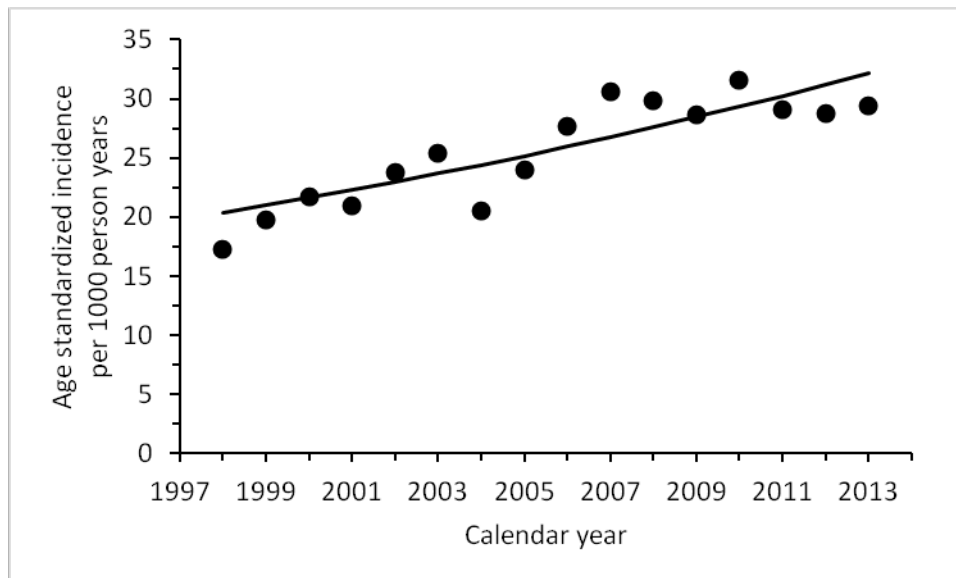
Supplementary Figure. 4B. Trends in hospital admission for DKA in T2DM adults, with analyzing only the first DKA admission during the study period from each patient



SUPPLEMENTARY DATA

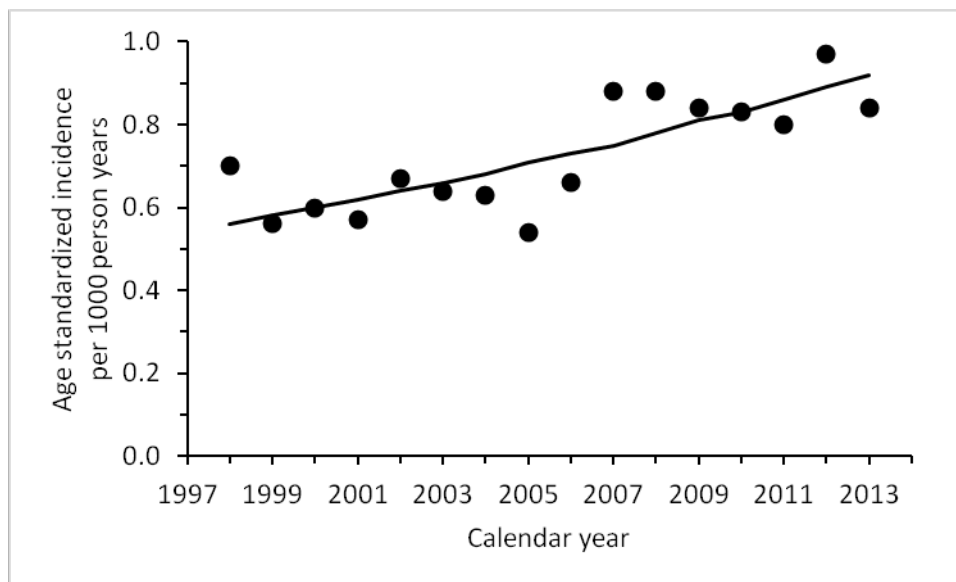
APC, annual percent change. Black dots represented age standardized incidence rate in each year. Solid line represented estimated trend from using joinpoint regression. APC and 95% CI, along with P value for trend, were shown in the figure. The standard population for calculating age standardized incidence was the entire cohort of adults with T1DM or T2DM during the study period. For T1DM, the following age categories were used: 18-24, 25-34, 35-49, and ≥ 50 years. For T2DM, the following age categories were used: 18-49, 50-64, and ≥ 65 years.

Supplementary Figure. 5A. Trends in hospital admission for DKA in T1DM adults, with analyzing only the first DKA admission in each year from each patient



SUPPLEMENTARY DATA

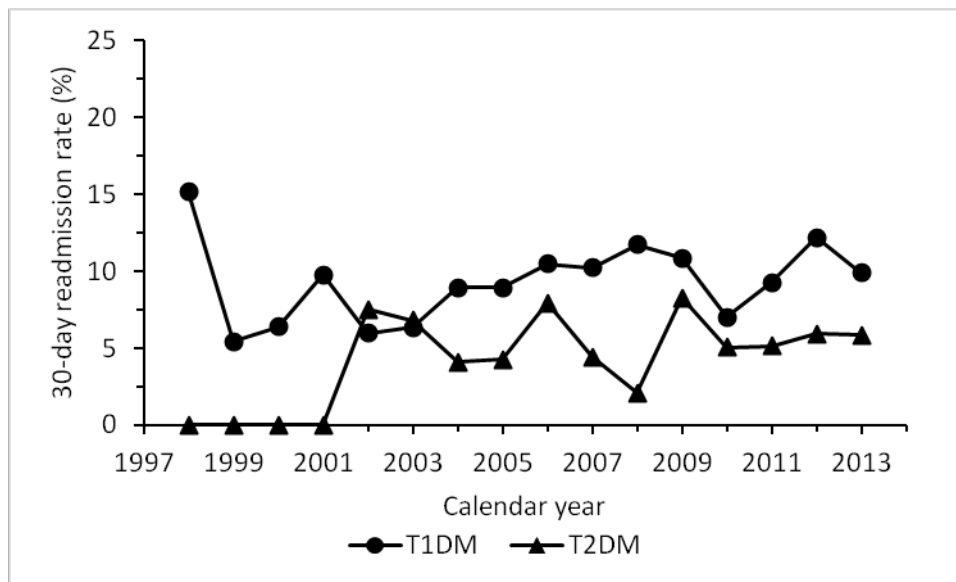
Supplementary Figure 5B. Trends in hospital admission for DKA in T2DM adults, with analyzing only the first DKA admission in each year from each patient



APC, annual percent change. Black dots represented age standardized incidence rate in each year. Solid line represented estimated trend from using joinpoint regression. APC and 95% CI, along with P value for trend, were shown in the figure. The standard population for calculating age standardized incidence was the entire cohort of adults with T1DM or T2DM during the study period. For T1DM, the following age categories were used: 18-24, 25-34, 35-49, and ≥ 50 years. For T2DM, the following age categories were used: 18-49, 50-64, and ≥ 65 years.

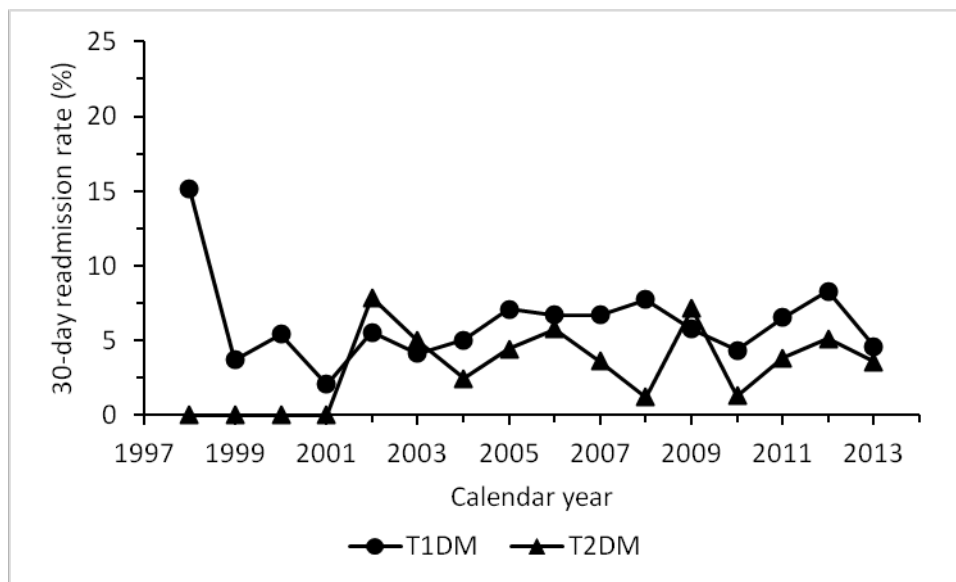
SUPPLEMENTARY DATA

Supplementary Figure. 6A. Trends in 30-day all-cause readmission rate for hospital admission for DKA when including only the first readmission in each year in each patient



SUPPLEMENTARY DATA

Supplementary Figure. 6B. Trends in 30-day all-cause readmission rate for hospital admission for DKA when including only the first readmission in each patient



Estimates were obtained from logistic regression models with robust error variance to account for recurrent DKA admissions. Estimates were adjusted for calendar year, age, gender, duration of recorded diabetes history, Charlson comorbidity score, and current use of glucose-lowering drugs (for T2DM only).

SUPPLEMENTARY DATA

Supplementary Figure. 7. Proportion of T2DM adults with duration <1 year and ≥ 10 years, 1998-2013

