

Supplementary Files / Appendix

Table A. Overview of total and cases of new onset diabetes mellitus in DIMPLES cohort.

	YEAR 1												YEAR 2											
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12
Month	March	April	May	June	July	August	September	October	November	December	January	February	March	April	May	June	July	August	September	October	November	December	January	February
All cases	98	102	102	93	87	78	98	99	125	146	122	109	89	84	92	119	124	98	143	121	130	120	109	130
New onset	79	83	81	77	68	60	82	81	101	112	97	94	69	72	82	110	112	85	129	99	110	103	93	119

Table B. Total cases per site in DIMPLES cohort

	NET change, all	Net change, severe DKA	Net change, NEW	All cases		Severe DKA		new onset (any severity)	
				Year 1 (2019-20)	Year 2 (2020-21)	Year 1 (2019-20)	Year 2 (2020-21)	Year 1 (2019-20)	Year 2 (2020-21)
Addenbrooke's Hospital	5	-1	13	24	29	6	5	16	29
Alder Hey Children's Hospital NHS Foundation Trust	-12	-3	-6	33	21	4	1	24	18
Barking, Havering & Redbridge University Hospitals NHS Trust	18	5	14	37	55	4	9	33	47
Birmingham Children's Hospital	21	9	22	34	55	4	13	29	51
Bolton NHS Foundation Trust	14	7	14	0	14	0	7	0	14
Bristol Royal Hospital for Children	-5	-4	1	60	55	13	9	51	52
Chelsea and Westminster NHS Foundation Trust	12	-1	10	13	25	3	2	13	23
Children's Health Ireland at Crumlin	1	7	3	46	47	4	11	35	38
Children's Health Ireland at Tallaght	-26	-6	-25	40	14	8	2	37	12
Children's Health Ireland at Temple Street	18	8	13	46	64	4	12	39	52
Croydon University Hospital	1	3	1	21	22	3	6	15	16
Derriford Hospital	4	2	3	28	32	5	7	22	25
Evelina London Children's Hospital	-15	2	-13	26	11	0	2	22	9
Frimley Park Hospital	2	1	-2	33	35	9	10	29	27
Ipswich Hospital	8	4	6	27	35	1	5	24	30
Hull Royal Infirmary	-3	1	0	16	13	5	6	10	10
John Radcliffe Hospital, Oxford	18	1	16	31	49	5	6	31	47
King's College Hospital London	-10	-1	-7	26	16	5	4	21	14
Kingston Hospital NHS Foundation Trust	-6	-3	-3	10	4	3	0	7	4
Leeds General Infirmary	14	8	8	23	37	9	17	12	20
Leicester Royal Infirmary	7	13	6	56	63	10	23	52	58
University Hospital Limerick	1	1	1	8	9	0	1	8	9
North Middlesex Hospital	0	5	-3	16	16	0	5	10	7
Northumbria Healthcare NHS Foundation Trust	7	0	3	18	25	2	2	18	21
Nottingham University Hospitals NHS Trust	-4	1	1	35	31	9	10	29	30
Ormskirk & District General Hospital	10	2	13	15	25	1	3	12	25
Royal Alexandra Children's Hospital	-6	-1	-5	33	27	5	4	28	23

Royal Belfast Hospital for Sick Children	8	7	8	32	40	6	13	26	34
Royal Berkshire NHS Foundation Trust	-1	2	3	28	27	2	4	23	26
Royal Derby Hospital	-3	-1	5	36	33	7	6	25	30
Royal Hospital for Children, Glasgow	28	5	35	86	114	16	21	71	106
Royal Preston Hospital	-2	2	7	22	20	5	7	9	16
Royal Wolverhampton NHS Trust	-7	1	-6	22	15	4	5	17	11
Sheffield Children's NHS Foundation Trust	4	8	5	11	15	3	11	8	13
Shrewsbury & Telford NHS Trust	-1	-1	0	20	19	4	3	17	17
South Tyneside & Sunderland NHS Foundation Trust	7	2	10	20	27	3	5	15	25
Southampton Children's Hospital	13	6	12	17	30	2	8	17	29
St George's University Hospitals NHS Foundation Trust	4	1	3	17	21	2	3	15	18
St Mary's Hospital, Imperial College Healthcare NHS Trust	1	3	4	21	22	3	6	13	17
University Hospital Lewisham	-2	1	-1	17	15	1	2	13	12
University Hospital of Wales, Cardiff	-1	1	0	17	16	1	2	14	14
Watford General Hospital	9	5	9	22	31	0	5	22	31
Whittington Health NHS Trust	-15	-5	-5	15	0	5	0	5	0
Ulster Hospital	1	2	3	20	21	2	4	16	19
University College Hospitals London	-13	-1	-5	13	0	1	0	5	0
St Richard's Hospital	-5	-1	-3	22	17	3	2	17	14
Worthing Hospital	-9	1	-10	23	14	4	5	17	7
The Royal London	10	1	10	23	33	4	5	23	33

Table C. Characteristics of patients with decompensation of pre-existing diabetes in the DIMPLES cohort

Characteristic	Overall, N = 311 ¹	Year 1 (2019-20), N = 196 ¹	Year 2 (2020-21), N = 115 ¹	p-value ²
Age (years)	13 (11,14)	13 (11,14)	13 (11,14)	0.6
Sex (female)	135 (43%)	85 (43%)	50 (43%)	>0.9
Ethnicity				0.8
Asian other	4 (1.8%)	3 (2.2%)	1 (1.2%)	
South Asian	7 (3.2%)	5 (3.6%)	2 (2.4%)	
Black	36 (16%)	23 (17%)	13 (16%)	
Mixed	12 (5.5%)	7 (5.1%)	5 (6.1%)	
White	153 (70%)	97 (70%)	56 (68%)	
Other	8 (3.6%)	3 (2.2%)	5 (6.1%)	
missing	91	58	33	
Deprivation decile				
1	48 (19%)	28 (17%)	20 (22%)	
2	62 (24%)	40 (24%)	22 (24%)	
3	30 (12%)	22 (13%)	8 (8.8%)	
4	24 (9.3%)	13 (7.8%)	11 (12%)	
5	25 (9.7%)	16 (9.6%)	9 (9.9%)	
6	12 (4.7%)	10 (6.0%)	2 (2.2%)	

Characteristic	Overall, N = 311 ¹	Year 1 (2019-20), N = 196 ¹	Year 2 (2020-21), N = 115 ¹	p-value ²
7	15 (5.8%)	9 (5.4%)	6 (6.6%)	
8	12 (4.7%)	8 (4.8%)	4 (4.4%)	
9	13 (5.0%)	10 (6.0%)	3 (3.3%)	
10	17 (6.6%)	11 (6.6%)	6 (6.6%)	
missing	53	29	24	
Comorbidities ³				
No comorbidity	247 (79%)	153 (78%)	94 (82%)	0.4
Coeliac disease	14 (4.5%)	8 (4.1%)	6 (5.2%)	0.6
Thyroid disease	16 (5.1%)	14 (7.1%)	2 (1.7%)	0.037
Other endocrine	7 (2.3%)	2 (1.0%)	5 (4.3%)	0.11
Other autoimmune	1 (0.3%)	1 (0.5%)	0 (0%)	>0.9
Other	14 (4.5%)	10 (5.1%)	4 (3.5%)	0.5
Family history ³				
Type 1 diabetes	29 (9.3%)	16 (8.2%)	13 (11%)	0.4
Type 2 diabetes	3 (1.0%)	2 (1.0%)	1 (0.9%)	>0.9
Coeliac disease	1 (0.3%)	1 (0.5%)	0 (0%)	>0.9
Thyroid disease	3 (1.0%)	2 (1.0%)	1 (0.9%)	>0.9
Other autoimmune or inflammatory disease	1 (0.3%)	0 (0%)	1 (0.9%)	0.4

Characteristic	Overall, N = 311 ¹	Year 1 (2019-20), N = 196 ¹	Year 2 (2020-21), N = 115 ¹	p-value ²
None	276 (89%)	177 (90%)	99 (86%)	0.3
Type				0.4
Type 1	306 (98%)	194 (99%)	112 (97%)	
Type 2	0 (0%)	0 (0%)	0 (0%)	
Other	5 (1.6%)	2 (1.0%)	3 (2.6%)	

¹Median (25%,75%); n (%)

²Wilcoxon rank sum test; Pearson's Chi-squared test; Fisher's exact test

³Tick all that apply

Table D. Presenting symptoms, severity, treatment and outcomes of patients with decompensation of pe-existing diabetes in the DIMPLES cohort

Characteristic	Overall, N = 420 ¹	Year 1 (2019-20), N = 244 ¹	Year 2 (2020-21), N = 176 ¹	p-value ²
<i>Presenting symptoms</i>				
Polyuria				0.2
Yes	54 (13%)	31 (13%)	23 (13%)	
No	201 (48%)	125 (51%)	76 (43%)	
Unknown	165 (39%)	88 (36%)	77 (44%)	
Polydipsia				0.079
Yes	58 (14%)	33 (14%)	25 (14%)	
No	193 (46%)	123 (50%)	70 (40%)	
Unknown	169 (40%)	88 (36%)	81 (46%)	
Weight loss				0.009
Yes	20 (4.8%)	8 (3.3%)	12 (6.8%)	
No	199 (47%)	130 (53%)	69 (39%)	
Unknown	201 (48%)	106 (43%)	95 (54%)	
Lethargy				0.050
Yes	154 (37%)	85 (35%)	69 (39%)	
No	117 (28%)	79 (32%)	38 (22%)	
Unknown	149 (35%)	80 (33%)	69 (39%)	

Characteristic	Overall, N = 420 ¹	Year 1 (2019-20), N = 244 ¹	Year 2 (2020-21), N = 176 ¹	p-value ²
Confusion				0.072
Yes	39 (9.3%)	20 (8.2%)	19 (11%)	
No	228 (54%)	144 (59%)	84 (48%)	
Unknown	153 (36%)	80 (33%)	73 (41%)	
Vomiting				>0.9
Yes	339 (81%)	198 (81%)	141 (80%)	
No	62 (15%)	35 (14%)	27 (15%)	
Unknown	19 (4.5%)	11 (4.5%)	8 (4.5%)	
Fever				0.4
Yes	30 (7.1%)	21 (8.6%)	9 (5.1%)	
No	317 (75%)	181 (74%)	136 (77%)	
Unknown	73 (17%)	42 (17%)	31 (18%)	
Tachycardia	291 (71%)	162 (68%)	129 (75%)	0.14
missing	11	7	4	
Tachypnea	217 (54%)	118 (51%)	99 (58%)	0.14
missing	18	12	6	
Level of consciousness				0.2
Alert	386 (92%)	224 (92%)	162 (92%)	

Characteristic	Overall, N = 420 ¹	Year 1 (2019-20), N = 244 ¹	Year 2 (2020-21), N = 176 ¹	p-value ²
Verbal	17 (4.0%)	7 (2.9%)	10 (5.7%)	
Pain	2 (0.5%)	2 (0.8%)	0 (0%)	
Unresponsive	2 (0.5%)	1 (0.4%)	1 (0.6%)	
Not documented	13 (3.1%)	10 (4.1%)	3 (1.7%)	
Oxygen saturations				>0.9
Normal %O2 saturations	416 (99%)	242 (99%)	174 (99%)	
%O2 saturations <94%	4 (1.0%)	2 (0.8%)	2 (1.1%)	
Duration of symptoms (days)	1 (1,2)	1 (1,2)	1 (1,2)	0.9
missing	3	2	1	
<i>Laboratory values</i>				
HbA1c	86 (70,110)	86 (72,110)	86 (70,111)	0.9
missing	267	162	105	
HbA1c percentage	10 (9,13)	10 (9,12)	10 (9,13)	0.8
missing	346	204	142	
<i>Measures of severity</i>				
Triage urgency classification				0.4
Immediate	48 (11%)	26 (11%)	22 (12%)	
Very urgent	244 (58%)	142 (58%)	102 (58%)	

Characteristic	Overall, N = 420 ¹	Year 1 (2019-20), N = 244 ¹	Year 2 (2020-21), N = 176 ¹	p-value ²
Urgent	67 (16%)	42 (17%)	25 (14%)	
Non-urgent	7 (1.7%)	5 (2.0%)	2 (1.1%)	
Standard	0 (0%)	0 (0%)	0 (0%)	
Not documented	51 (12%)	29 (12%)	22 (12%)	
Unknown	3 (0.7%)	0 (0%)	3 (1.7%)	
pH	7.20 (7.09,7.27)	7.21 (7.10,7.27)	7.20 (7.07,7.26)	0.2
missing	3	1	2	
Fluid bolus >=20 mls/kg	55 (13%)	24 (9.8%)	31 (18%)	0.020
Inotropes / vasopressors	0 (0%)	0 (0%)	0 (0%)	
Mechanical ventilation	2 (0.5%)	1 (0.4%)	1 (0.6%)	>0.9
Route of initial insulin administration				0.2
Subcutaneous	71 (17%)	46 (19%)	25 (14%)	
Intravenous	349 (83%)	198 (81%)	151 (86%)	
Diabetic keto-acidosis				0.8
Not in DKA	0 (0%)	0 (0%)	0 (0%)	
Mild	218 (52%)	130 (53%)	88 (50%)	
Moderate	97 (23%)	55 (23%)	42 (24%)	
Severe	105 (25%)	59 (24%)	46 (26%)	

Characteristic	Overall, N = 420 ¹	Year 1 (2019-20), N = 244 ¹	Year 2 (2020-21), N = 176 ¹	p-value ²
Disposition ³				
Admission to inpatient ward	313 (75%)	178 (73%)	135 (77%)	0.4
High dependency unit	105 (25%)	60 (25%)	45 (26%)	0.8
Paediatric intensive care unit	19 (4.5%)	12 (4.9%)	7 (4.0%)	0.6
Critical care retrieval	3 (0.7%)	0 (0%)	3 (1.7%)	0.073
Transfer to other hospital	8 (1.9%)	0 (0%)	8 (4.5%)	<0.001
Discharged home from ED	4 (1.0%)	4 (1.6%)	0 (0%)	0.14
Admitted to short stay unit	8 (1.9%)	7 (2.9%)	1 (0.6%)	0.15
Patient died	0 (0%)	0 (0%)	0 (0%)	
Length of stay in hospital (days)	2 (1,4)	2 (1,3)	2 (2,4)	0.049
Length of stay in hospital >72 hrs	181 (43%)	98 (40%)	83 (47%)	0.2

¹n (%); Median (25%,75%)

²Pearson's Chi-squared test; Fisher's exact test; Wilcoxon rank sum test

³Tick all that apply

Table E. Patients (n=16) with positive SARS-CoV-2 PCR on admission.

age	ssex	weight	IMD centile	ethnicity	new vs decompensation; type of Abs	severity of DKA	delays [^]	duration of symptoms (days)*	pH	base excess	HCO ₃ ⁻	disposition	LOS (days)
9	female	31.7	8	Asian - any other Asian background	New onset; Abs ⁺ 1,3,4,5	Moderate	4	8	7.17	-17.6	11.6	Admitted to ward	8
13	female	40.0	3	Black - Caribbean or Black British Caribbean	New onset; Abs 1,3,4,5	Severe	2, 7 [§]	7	6.87	-28.5	6.4	Admitted to HDU	0
12	female	74.7	1	Asian - Pakistani or British Pakistani	New onset Abs nil	not in DKA		30	7.36	-4.3	21.2	Admitted to ward	2
4	female	15.7	1	White - any other White background	New onset; Abs n/a	Mild		45	7.28	-15.5	8.9	Admitted to ward	10
15	female		4	White - British	Decompensation of known disease	Mild		3	7.28	-10.2	16.6	Admitted to ward	3
13	male	36.5	6	White - British	New onset; Abs 1,3,5	Mild		14	7.21	-14.2	13.7	Admitted to ward	3
9	male	40.3	2	Mixed - any other Mixed background ¹	New onset; Abs 1	Moderate		7	7.11	n/a	10.3	Admitted to ward	5
10	female	38.5	9	White - British	New onset; Abs 3,5	not in DKA		90	7.33	-10.5	16.7	Admitted to ward	1

11	male	35.0	n/a	White - British	New onset Abs 1	Severe		5	6.95	-23.0	8.0	Admitted to HDU	4
12	male	32.0	1	Not collected	New onset; Abs n/a	Severe		60	7.09	-21.4	6.8	Admitted to HDU	2
15	male	43.0	2	Not stated	New onset; Abs 1	Moderate		30	7.27	-10.0	17.0	Admitted to ward	3
15	female	55.0	2	Black - Caribbean or Black British Caribbean	Decompensation of known disease	Severe		2	6.78	-31.0	4.7	Admitted to HDU	15
2	male	11.9	2	White - any other White background	New onset; Abs 1,3	Severe		3	7.02	-25.5	3.7	Admitted to HDU	7
12	female	63.8	3	Black - any other Black background	Decompensation of known disease	Moderate		2	7.12	-18.0	12.1	Admitted to ward	5
13	female	67.5	4	White - British	Decompensation of known disease [attributing factor: compliance with treatment]	Severe		1	6.90	-26.2	7.2	Admitted to ward	2
10	male	31.7	8	Black - African or British African	New onset; Abs 1,3	Mild		30	7.22	n/a	14.1	Admitted to ward	10

Abs antibodies; DKA diabetic keto-acidosis; IMD index of multiple deprivation; LOS length of stay;

All type 1 DM

@ Arrival month: 1—12 Year 1 starting March 2019, 13—24 Year 2 ("COVID-19 period") starting March 2020.

^Delays:

- 1 Delay in getting GP appointment
 - 2 Delay in GP referral to hospital
 - 3 General COVID-related advice to "stay at home" - NO consultation with primary care (GP, 111, or equivalent)
 - 4 Advised to stay at home as outcome of primary care consultation (GP, 111, or equivalent) - either COVID or non-COVID-related
 - 5 Parent/child concerns over visiting hospital - non-COVID related
 - 6 Parent/child concerns over visiting hospital - related to COVID exposure
 - 7 Other
 - 8 No delay documented
- § reason, Other: "Telephone consult with paediatric consultant one week earlier for nocturnal enuresis, also had 5kg weight loss. Diagnosis not considered"

+Type of antibodies (for new onset disease):

- 1 GAD abs
- 2 Insulin auto-abs
- 3 Islet cell abs
- 4 Insulin PTP2a
- 5 ZNT8

Table F. Patients (n=8) with positive SARS-CoV-2 serology on admission.

age	sex	weight	IMD centile	ethnicity	new vs decompensation	comorbidities	severity of DKA	delays ^	duration of Symptoms (days)	co-existing diagnoses	pH	base excess	HCO ₃ ⁻	disposition	LOS days
12	female	73.0	2	Asian - Pakistani or British Pakistani	New onset IgM+/IgG-; Abs nil	Acne	not in DKA	8	49	Asthma	7.41	-1.7	23.3	Admitted to ward	4
15	male	48.3	2	Asian - Bangladeshi or British Bangladeshi	New onset IgG+/IgM-; Abs ⁺ 1,2,3,4,5	none	not in DKA	8	N/A	N/A	7.36	3.1	21.8	Admitted to ward	5
9	female	35.6	2	Black - any other Black background	New onset IgG+/IgM Abs nil	Respiratory	not in DKA	1	30	N/A	7.38	-5.5	26.2	Admitted to ward	6
7	male	27.0	6	White - British	New onset IgG+/IgM-; Abs 1,3,4,5	none	not in DKA	8	7	N/A	7.36	-1.7	23.7	Admitted to ward	3
13	male	39.0	4	Asian - Bangladeshi or British Bangladesh	New onset IgG+/IgM- Abs nil	Respiratory	not in DKA	8	90	N/A	7.34	.2	23.5	Admitted to ward	4
15	female	46.3	2	Black - African or British African	New onset IgG+/IgM-; Abs 1	none	Moderate	8	14	N/A	7.17	-24.1	4.4	Admitted to ward	2
5	male	18.6	3	Asian - any other Asian background	New onset IgG+/IgM-; Abs 1	none	not in DKA	8	3	N/A	7.33	-3.2	22.7	Admitted to ward	5

13	male	55.4	3	Asian - any other Asian background	New onset IgG+/IgM-; Abs 1,3	none	Moderate	8	4	N/A	7.16	-20.5	8.2	Admitted to HDU	0
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Abs antibodies; DKA diabetic keto-acidosis; IMD index of multiple deprivation; LOS length of stay;

All type 1 DM

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5 Parent/child concerns over visiting hospital - non-COVID related

6 Parent/child concerns over visiting hospital - related to COVID exposure

7 Other

8 No delay documented

*Type of antibodies (for new onset disease):

1 GAD abs

2 Insulin auto-abs

3 Islet cell abs

4 Insulin PTP2a

5 ZNT8