Supplementary Material

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Variable	*Confirmed DKA*	*Unconfirmed DKA*	*P*-value
Sex (*n*) †			
Male	55	55	
Female	30	33	0.875
Ethnicity group (*n*) ‡			
White	36	39	
Asian	6	9	
Black	15	15	
Other	2	2	0.948
IMD quintile (*n*) ‡			
1 (most deprived)	11	16	
2	12	15	
3	7	9	
4	5	9	
5 (least deprived)	6	5	0.917
Type of diabetes (*n*) ‡			
Type 1 diabetes	26	27	
Type 2 diabetes	57	60	
Unknown type	2	1	0.950
Age (years) §			
n	85	88	
median	61	67	
IQR	47.5 – 74.5	52.25 – 76.00	0.183
BMI (kg.m^{-2}) §			
n	37	52	
median	25.83	24.62	
IQR	23.77 – 29.72	20.75 – 28.82	0.105

Table S1: Comparison of *Confirmed DKA* and *Unconfirmed DKA* cohort demographics. Tests indicated by † (Fisher's Exact), ‡ (Fisher-Freeman-Halton Exact), and § (independent-samples Mann-Whitney U).

	Total (*N* = 85)			Alive (*n* = 63)			Deceased (*n* = 22)			
	Mean	**SD**	***n***	**Mean**	**SD**	***n***	**Mean**	**SD**	***n***	***P*-value**
pH										
Type 1 diabetes	7.10	0.16	26	7.10	0.16	25	7.26	-	1	
Type 2 diabetes	7.13	0.15	57	7.11	0.16	36	7.17	0.14	21	
Unknown type	7.10	0.17	2	7.10	0.17	2	-	-	-	
Combined types	7.12	0.16	85	7.10	0.16	63	7.17	0.14	22	0.0554
Bicarbonate (mmol/L)										
Type 1 diabetes	11.3	4.5	26	11.1	4.6	25	15.1	-	1	
Type 2 diabetes	10.7	4.5	55	9.8	4.8	34	12.3	3.3	21	
Unknown type	11.8	5.2	2	11.8	5.2	2	-	-	-	
Combined types	10.9	4.5	83	10.4	4.8	61	12.4	3.3	22	0.1473
Glucose (mmol/L)										
Type 1 diabetes	28.8	12.9	26	29.4	12.9	25	14.2	-	1	
Type 2 diabetes	26.3	14.0	†56	27.3	15.0	†35	24.5	11.9	21	
Unknown type	45.9	11.2	2	45.9	11.2	2	-	-	-	
Combined types	27.5	14.0	†84	28.8	14.5	†62	24.1	11.8	22	0.2229
β-hydroxybutyrate (mmol/L)										
Type 1 diabetes	5.1	1.3	†20	5.2	1.3	†19	4.1	-	1	
Type 2 diabetes	5.2	1.3	†54	5.3	1.2	†33	5.1	1.5	21	
Unknown type	4.5	0.5	2	4.5	0.5	2	-	-	-	
Combined types	5.2	1.3	†76	5.2	1.2	†54	5.1	1.5	22	0.6428
Lactate (mmol/L)										
Type 1 diabetes	3.2	2.0	21	3.2	2.0	21	-	-	-	
Type 2 diabetes	3.1	2.1	46	2.8	1.3	27	3.5	2.8	19	
Unknown type	5.0	2.6	2	5.0	2.6	2	-	-	-	
Combined types	3.2	2.1	69	3.0	1.7	50	3.5	2.8	19	0.6918
Creatinine (µmol/L)										
Type 1 diabetes	190	218	20	190	218	20	-	-	-	
Type 2 diabetes	151	98	51	143	89	32	163	110	19	
Unknown type	137	35	2	137	35	2	-	-	-	
Combined types	161	142	73	160	151	54	163	110	19	0.5143

Table S2: Admission biochemistry of *Confirmed DKA* cohort. Assays were conducted on a variety of main hospital laboratory analysers, and/or emergency department point-of-care bench-top machines, and/or hand-held point-of-care meters. Assay methods were not recorded in the audit. † Missing values for blood glucose and β-hydroxybutyrate were indicated by contributors to have been above the upper limit of the respective assay reportable ranges (URR). Missing values for other analytes were not recorded. *P*-values denote a comparison between Alive and Deceased groups by Mann-Whitney U-test for each analyte, combining results from all cases, irrespective of type of diabetes, without imputation for values above assay URR.

Parameter	Entire cohort	Alive	Deceased	*P*-value
HbA_{1c} (%)				
n	74	54	20	
mean (SD)	10.9 (5.0)	11.3 (4.7)	9.6 (5.4)	
median (IQR)	10.9 (8.7 – 12.4)	11.2 (9.7 – 12.4)	9.0 (7.1 – 11.6)	
HbA_{1c} (mmol/mol)				
n	74	54	20	
mean (SD)	95.2 (31.0)	100.2 (27.8)	81.8 (35.1)	
median (IQR)	95.0 (71.75 – 112.0)	98.5 (82.5 – 112.0)	75.0 (54.0 – 103.0)	0.301
Interval between most recent HbA_{1c} and admission (days)				
n	63	46	17	
mean (SD)	104.8 (192.4)	94.9 (35.1)	131.4 (176.2)	
median (IQR)	33.0 (2.0 – 133.5)	21.0 (1.0 – 97.25)	42.0 (18.5 – 197.0)	0.0574

Table S3: Latest available HbA_{1c} and interval between hospital admission and HbA_{1c} assay for *Confirmed DKA* cohort. *P*-value for difference in HbA_{1c} is derived from age-adjusted binomial logistic regression for mortality, treating age and HbA_{1c} as continuous variables. *P*-value for difference in interval between HbA1c and admission is derived from independent-samples Mann-Whitney U test.

Parameter	Entire cohort		Alive		Deceased		*P*-value
	n	%	*n*	%	*n*	%	
Sex †							
Female	30	35.3	21	24.7	9	10.6	
Male	55	64.7	42	49.4	13	15.3	
Total	85	100.0	63	74.1	22	25.9	0.6068
Chronic kidney disease stage ‡							
0, 1 or 2	37	43.5	32	37.6	5	5.9	
3	18	21.2	10	11.8	8	9.4	
4	10	11.8	7	8.2	3	3.5	
5	1	1.2	1	1.2	-	-	
RRT	2	2.4	2	2.4	-	-	0.4655
Active or previous diabetic foot ulcer †							
Yes	5	5.9	5	5.9	-	-	
No	50	58.8	41	48.2	9	10.6	0.5778
Diabetic nephropathy †							
Yes	8	9.4	7	8.2	1	1.2	
No	39	45.9	29	34.1	10	11.8	0.6593
Diabetic peripheral neuropathy †							
Yes	5	5.9	4	4.7	1	1.2	
No	38	44.7	28	32.9	10	11.8	>0.9999
Diabetic retinopathy †							
Yes	14	16.5	8	9.4	6	7.1	
No	31	36.5	24	28.2	7	8.2	0.2861
Peripheral vascular disease †							
Yes	3	3.5	2	2.4	1	1.2	
No	44	51.8	32	37.6	12	14.1	>0.9999
Ischaemic heart disease (including myocardial infarction) and/or heart failure †							
Yes	8	9.4	5	5.9	3	3.5	
No	36	42.4	29	34.1	7	8.2	0.3550
Stroke or Transient ischaemic attack †							
Yes	6	7.1	3	3.5	3	3.5	
No	50	58.8	38	44.7	12	14.1	0.3263
Hypertension †							
Yes	32	37.6	21	24.7	11	12.9	
No	27	31.8	21	24.7	6	7.1	0.3915
Dementia †							
Yes	5	5.9	1	1.2	4	4.7	
No	50	58.8	37	43.5	13	15.3	0.0278
Asthma †							
Yes	7	8.2	4	4.7	3	3.5	
No	44	51.8	33	38.8	11	12.9	0.3763
Chronic obstructive pulmonary disease †							
Yes	2	2.4	1	1.2	1	1.2	
No	46	54.1	33	38.8	13	15.3	0.5027
Malignant neoplasm †							
Yes	3	3.5	1	1.2	2	2.4	
No	48	56.5	36	42.4	12	14.1	0.1792
Smoker †							
Current or ex	7	8.2	5	5.9	2	2.4	
No	25	29.4	20	23.5	5	5.9	0.6317
Basal insulin †							
Yes	37	43.5	32	37.6	5	5.9	
No	30	35.3	17	20.0	13	15.3	0.0115

Parameter	Entire cohort		Alive		Deceased		*P*-value
	n	%	*n*	%	*n*	%	
Rapid insulin †							
Yes	35	41.2	31	36.5	4	4.7	
No	31	36.5	18	21.2	13	15.3	0.0099
Continuous subcutaneous insulin infusion †							
Yes	1	1.2	1	1.2	-	-	
No	42	49.4	33	38.8	9	10.6	>0.9999
Biphasic insulin †							
Yes	14	16.5	13	15.3	1	1.2	
No	49	57.6	33	38.8	16	18.8	0.0876
Any insulin (combined category) †							
Yes	54	63.5	48	56.5	6	7.1	
No	23	27.1	11	12.9	12	14.1	0.0002
Sulfonylurea †							
Yes	14	16.5	7	8.2	7	8.2	
No	44	51.8	33	38.8	11	12.9	0.1023
Metformin †							
Yes	38	44.7	26	30.6	12	14.1	
No	22	25.9	17	20.0	5	5.9	0.5599
Dipeptidyl Peptidase-4 inhibitor †							
Yes	19	22.4	12	14.1	7	8.2	
No	40	47.1	30	35.3	10	11.8	0.3718
Sodium glucose co-transporter-2 inhibitor †							
Yes	8	9.4	6	7.1	2	2.4	
No	50	58.8	36	42.4	14	16.5	>0.9999
Pioglitazone †							
Yes	3	3.5	2	2.4	1	1.2	
No	49	57.6	36	42.4	13	15.3	>0.9999
Glucagon-like peptide-1 receptor agonist †							
Yes	4	4.7	4	4.7	-	-	
No	53	62.4	36	42.4	17	20.0	0.3062
Meglitinide							
Yes	-	-	-	-	-	-	
No	52	61.2	38	44.7	14	16.5	-
Acarbose							
Yes	-	-	-	-	-	-	
No	52	61.2	38	44.7	14	16.5	-
Number of oral hypoglycaemic agents ‡							
0	16	18.8	13	15.3	3	3.5	
1	20	23.5	15	17.6	5	5.9	
2	16	18.8	10	11.8	6	7.1	
3	10	11.8	6	7.1	4	4.7	0.1576
Angiotension-2 converting enzyme inhibitor / angiotensin receptor blocker †							
Yes	20	23.5	14	16.5	6	7.1	
No	40	47.1	28	32.9	12	14.1	>0.9999
Oral corticosteroid †							
Yes	1	1.2	-	-	1	1.2	
No	51	60.0	38	44.7	13	15.3	0.2692
Statin †							
Yes	26	30.6	18	21.2	8	9.4	
No	35	41.2	26	30.6	9	10.6	0.7751
Antiplatelet †							
Yes	12	14.1	7	8.2	5	5.9	
No	42	49.4	33	38.8	9	10.6	0.2605

Parameter		Entire cohort		Alive		Deceased		*P*-value
		n	%	*n*	%	*n*	%	
Anticoagulant †								
	Yes	17	20.0	15	17.6	2	2.4	
	No	33	38.8	23	27.1	10	11.8	0.1811
Non-steroidal anti-inflammatory drug †								
	Yes	1	1.2	1	1.2	-	-	
	No	50	58.8	36	42.4	14	16.5	>0.9999

Table S4: Comparison of *Confirmed DKA* cohort clinical characteristics by mortality. RRT: renal replacement therapy. No corrections have been applied for multiple tests of statistical significance, and missing data are ignored. Tests indicated by † (Fisher's Exact test) and ‡ (χ^2 test for trend).

Variable	*Confirmed HHS*	*Unconfirmed HHS*	*P*-value
Sex (*n*) †			
Male	12	40	
Female	8	22	0.792
Ethnicity group (*n*) ‡			
White	4	14	
Asian	1	5	
Black	8	18	
Other	1	6	0.821
IMD quintile (*n*) ‡			
1 (most deprived)	3	8	
2	3	9	
3	2	3	
4	2	10	
5 (least deprived)	-	5	0.666
Age (years) §			
n	20	62	
median	79	73.5	
IQR	64.5 – 83.75	60 – 81	0.210
BMI (kg.m^{-2}) §			
n	11	34	
median	28.2	26.0	
IQR	23.66 – 37.73	23.87 – 28.18	0.255

Table S5: Comparison of *Confirmed HHS* and *Unconfirmed HHS* cohort demographics. Tests indicated by † (Fisher's Exact), ‡ (Fisher-Freeman-Halton Exact), and § (independent-samples Mann-Whitney U).

	Total (*N* = 20)			Alive (*n* = 7)			Deceased (*n* = 13)			
	Mean	**SD**	***n***	**Mean**	**SD**	***n***	**Mean**	**SD**	***n***	***P*-value**
pH	7.33	0.07	18	7.31	0.09	5	7.34	0.05	13	0.4872
Bicarbonate (mmol/L)	23.3	5.4	19	22.7	2.5	7	23.7	6.5	12	0.7732
Glucose (mmol/L)	38.2	6.8	†19	36.3	4.4	7	39.3	7.7	†12	0.4673
β-hydroxybutyrate (mmol/L)	1.1	0.6	14	1.1	0.7	5	1.0	0.6	9	0.7737
Lactate (mmol/L)	3.0	1.9	18	2.9	2.5	6	3.0	1.5	12	0.4521
Creatinine (µmol/L)	275	231	19	256	272	7	286	202	12	0.6358

Table S6: Admission biochemistry of *Confirmed HHS* cohort. Assays were conducted on a variety of main hospital laboratory analysers, and/or emergency department point-of-care bench-top machines, and/or hand-held point-of-care meters. Assay methods were not recorded in the audit. † The missing value for blood glucose was indicated by the contributor to have been above the upper limit of the assay reportable range (URR). Missing values for other analytes were not recorded. *P*-values denote a comparison between Alive and Deceased groups by Mann-Whitney U-test for each analyte, without imputation for the value above assay URR.

Parameter	Entire cohort		Alive		Deceased		*P*-value
	n	%	*n*	%	*n*	%	
Sex †							
Female	8	40	4	20	4	20	
Male	12	60	3	15	9	45	0.3563
Total	20	100	7	35	13	65	
Chronic Kidney Disease stage ‡							
0, 1 or 2	5	25	1	5	4	20	
3	3	15	-	-	3	15	
4	3	15	2	10	1	5	
5	2	10	1	5	1	5	
RRT	-	-	-	-	-	-	0.1921
Foot ulcer							
Yes	-	-	-	-	-	-	
No	11	55	4	20	7	35	-
Diabetic nephropathy †							
Yes	9	45	3	15	6	30	
No	7	35	3	15	4	20	0.9999
Diabetic peripheral neuropathy †							
Yes	1	5	1	5	-	-	
No	12	60	5	25	7	35	0.4615
Diabetic retinopathy †							
Yes	5	25	1	5	4	20	
No	8	40	3	15	5	25	>0.9999
Peripheral vascular disease							
Yes	-	-	-	-	-	-	
No	13	65	5	25	8	40	-
Ischaemic heart disease †							
Yes	4	20	2	10	2	10	
No	8	40	2	10	6	30	0.5475
Stroke or transient ischaemic attack †							
Yes	4	20	2	10	2	10	
No	13	65	4	20	9	45	0.5840
Hypertension †							
Yes	8	40	2	10	6	30	
No	4	20	2	10	2	10	0.5475
Dementia †							
Yes	2	10	-	-	2	10	
No	9	45	4	20	5	25	0.4909
Asthma							
Yes	-	-	-	-	-	-	
No	12	60	4	20	8	40	-
Chronic obstructive pulmonary disease							
Yes	-	-	-	-	-	-	
No	12	60	4	20	8	40	-
Malignant neoplasm †							
Yes	1	5	-	-	1	5	
No	10	50	4	20	6	30	>0.9999
Smoker †							
Current or ex	3	15	1	5	2	10	
No	2	10	1	5	1	5	>0.9999
Basal insulin †							
Yes	8	40	5	25	3	15	
No	10	50	2	10	8	40	0.1448

Parameter		Entire cohort		Alive		Deceased		*P*-value
		n	%	*n*	%	*n*	%	
Rapid insulin †								
	Yes	1	5	1	5	-	-	
	No	16	80	5	25	11	55	0.3529
Pump								
	Yes	-	-	-	-	-	-	
	No	12	60	4	20	8	40	-
Premixed insulin †								
	Yes	2	10	-	-	2	10	
	No	15	75	6	30	9	45	0.5147
Any insulin †								
	Yes	10	50	5	25	5	25	
	No	8	40	2	10	6	30	0.3665
Sulfonylurea †								
	Yes	5	25	3	15	2	10	
	No	12	60	3	15	9	45	0.2801
Metformin †								
	Yes	9	45	3	15	6	30	
	No	8	40	3	15	5	25	>0.9999
Dipeptidyl peptidase-4 inhibitor †								
	Yes	6	30	4	20	2	10	
	No	12	60	3	15	9	45	0.1414
Sodium glucose co-transporter-2 inhibitor †								
	Yes	1	5	1	5	-	-	
	No	13	65	5	25	8	40	0.4286
Pioglitazone †								
	Yes	2	10	-	-	2	10	
	No	10	50	4	20	6	30	0.5152
Glucagon-like peptide-1 receptor agonist †								
	Yes	2	10	2	10	-	-	
	No	15	75	4	20	11	55	0.1103
Meglitinide								
	Yes	-	-	-	-	-	-	
	No	12	60	4	20	8	40	-
Acarbose †								
	Yes	1	5	-	-	1	5	
	No	11	55	4	20	7	35	>0.9999
Number of oral hypoglycaemic agents ‡								
	0	4	20	1	5	3	15	
	1	7	35	2	10	5	25	
	2	4	20	3	15	1	5	
	3	3	15	1	5	2	10	0.4203
Angiotensin-2 converting enzyme inhibitor / angiotensin receptor blocker †								
	Yes	10	50	5	25	5	25	
	No	7	35	2	10	5	25	0.6221
Oral corticosteroid								
	Yes	-	-	-	-	-	-	
	No	11	55	4	20	7	35	-
Statin †								
	Yes	11	55	7	35	4	20	
	No	6	30	-	-	6	30	0.0345
Antiplatelet †								
	Yes	4	20	3	15	1	5	
	No	7	35	1	5	6	30	0.0879

Parameter	Entire cohort		Alive		Deceased		*P*-value
	n	**%**	***n***	**%**	***n***	**%**	
Anticoagulant †							
Yes	2	10	1	5	1	5	
No	10	50	3	15	7	35	>0.9999
Non-steroidal anti-inflammatory drug							
Yes	-	-	-	-	-	-	
No	11	55	4	20	7	35	-

Table S7: Comparison of *Confirmed HHS* cohort clinical characteristics by mortality. RRT: renal replacement therapy. No corrections have been applied for multiple tests of statistical significance, and missing data are ignored. Tests indicated by † (Fisher's Exact test) and ‡ (χ^2 test for trend).

Parameter	Entire cohort	Alive	Deceased	*P*-value
HbA_{1c} (%)				
n	19	7	12	
mean (SD)	10.3 (5.9)	12.3 (4.7)	9.0 (6.0)	
median (IQR)	9.1 (6.9 – 12.5)	12.3 (11.2 – 15.1)	7.2 (6.6 – 9.7)	
HbA_{1c} (mmol/mol)				
n	19	7	12	
mean (SD)	88.6 (41.0)	111.3 (28.1)	75.4 (41.6)	
median (IQR)	76 (52 – 113)	111 (99 – 141)	55 (49 – 82)	0.134
Interval between most recent HbA_{1c} and admission (days)				
n	18	7	11	
mean (SD)	200.3 (204.3)	95.3 (51.6)	267.1 (216.2)	
median (IQR)	205.5 (22.0 – 288.0)	11.0 (7.0 – 276.0)	218.0 (133.0 – 335.0)	0.0853

Table S8: Latest available HbA_{1c} and interval between hospital admission and HbA_{1c} assay for *Confirmed HHS* cohort. *P*-value for difference in HbA_{1c} is derived from age-adjusted binomial logistic regression for mortality, treating age and HbA_{1c} as continuous variables. *P*-value for difference in interval between HbA1c and admission is derived from independent-samples Mann-Whitney U test.