

# First estimates of the cost of treating diabetic ketoacidosis in the UK

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**Diabetic ketoacidosis (DKA)** is a common metabolic emergency, with an incidence in the UK 3.6%, or 4.8 episodes per 100 patient-years. US estimates of the cost of a DKA episode are ~US\$17,500 but to date there have been no detailed UK estimates. Study authors conducted a national survey in 2014 looking at the management of DKA in the UK [1]. Each UK hospital was asked to report on the treatment and outcomes of 5 consecutive patients presenting with DKA. **72 of 220 hospitals returned data on 281 patients** (283 admissions).

Our cost analysis was based on patient-level factors collected as part of the survey and informed by the Joint British Diabetes Societies (JBDS) Inpatient Care Group guidelines. We performed predictive mean matching (PMM) to impute missing values.

## Key assumptions

- 15 minute assessment by jr doctor at admission
- Blood and urine collection (15 minutes nurse time)
- IV insulin per JBDS guidelines every hour from admission to DKA resolution (15min nurse + 5min jr doctor per hour)
- 30 minute assessment by diabetes specialist team nurse
- Location of care during the DKA phase was recorded in the questionnaire; assumed patients transferred to a general ward upon DKA resolution
- Maximum 4 hours in A&E after which patients equally likely to be transferred to HDU or ITU until DKA resolution
- Each patient receives 30min follow-up visit from specialist diabetes team nurse

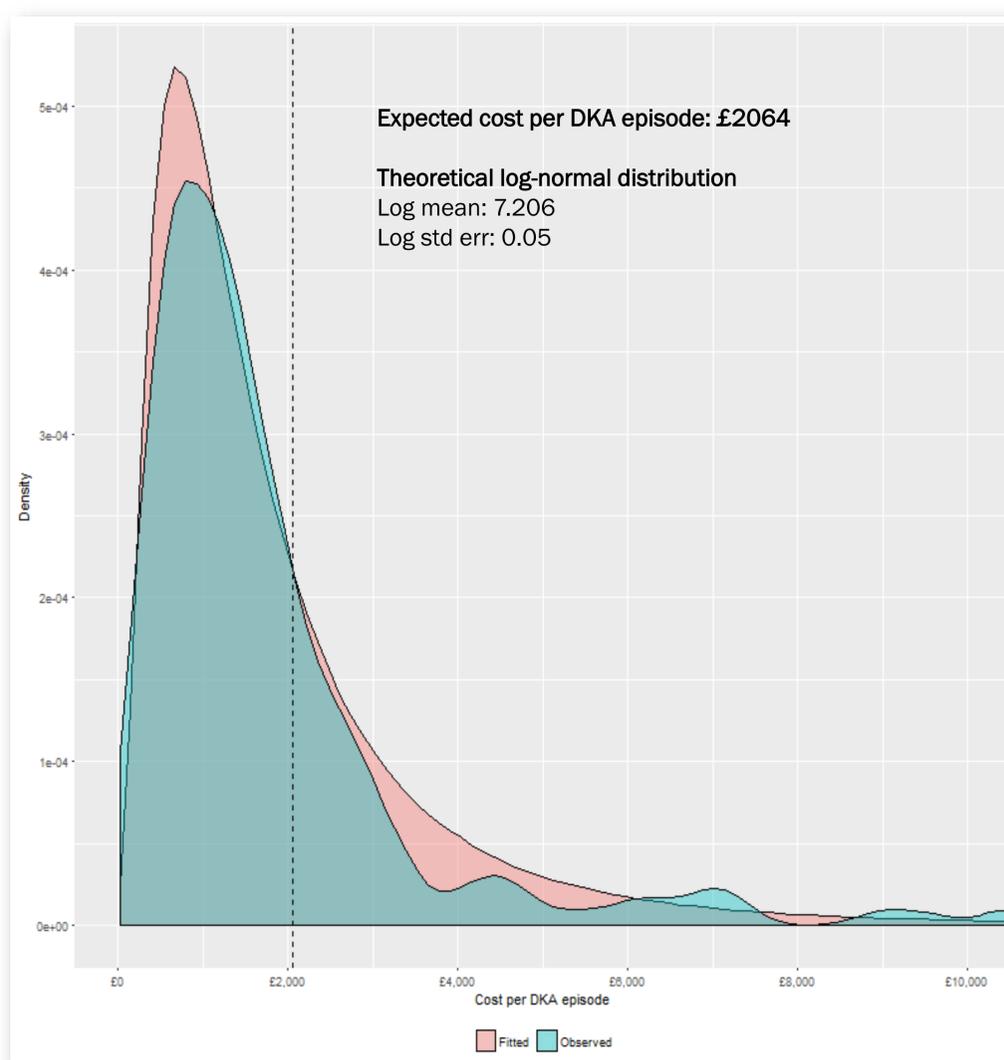
Cost Component	Unit Cost (£)
<b>Hospital facilities</b>	
Level 1: General Ward – per day	428.49
Level 2: HDU – per day	889.14
Level 3: ITU – per day	2004.45
Acute Medical Unit (AMU) - per day	428.49
A&E – per day	2552.00
Other wards – per day	428.49
<b>Healthcare staff (per hour)</b>	
Staff Nurse (Band 6)	13.32
Specialist Registrar (Middle band)	23.76
Junior Doctor	14.39
Diabetes Specialist Nurse (Band 6)	16.70
<b>Investigations and drugs</b>	
X-Ray	25.00
Laboratory blood tests	1.00
Electrocardiogram (ECG)	32.00
Urine test strip	0.43
Intravenous insulin	5.24
1 litre 0.9% sodium chloride solution with potassium	2.20

## Results [3]

**The expected cost of a DKA episode was £2064** [95% CI: £1800, £2563], including physician and nursing time, laboratory and diagnostic assessments, intravenous insulin, and ward per diems.

An episode of hypoglycaemia following DKA had statistically significant impact, reducing the expected cost of an episode by £935 (p=0.03). Males had a significantly shorter time to DKA resolution (-6.2 hours, p=0.003). No other patient characteristics were statistically significant at 0.05.

We found that a log-normal distribution, with a log mean of 7.206 and standard error of 0.05, had the best fit with the observed (imputed) distribution of total costs. This distribution can be used to inform future economic evaluations.



## References

- [1] Dhatariya KK, Nunney I, Higgins K, Sampson MJ, Iceton G. A national survey of the management of diabetic ketoacidosis in the UK in 2014. *Diabetic Med* 2016; 33(2):252-260.
- [2] Morris TP, White IR, Royston P. Tuning multiple imputation by predictive mean matching and local residual draws. *BMC Med Res Methodol* 2014; 14(1):75.
- [3] Dhatariya K, Skedgel C, Fordham R. The cost of treating diabetic ketoacidosis in the UK: a national survey of hospital resource use. *Diabetes Medicine*. 2017 Oct; 34(10):1361-1366.