

# Can we use Outpatient and Accident & Emergency records from Health Episode Statistics for epidemiological research?

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## Background

- In recent years we have seen a large rise in the use of electronic healthcare records (EHRs) to model and analyse secondary healthcare services.
- EHRs offer novel insight into common non-communicable diseases and healthcare utilisation of the UK Armed Forces.
- Secondary health systems in the United Kingdom (UK) are unique for recording Outpatient and Accident & Emergency (A&E) visits.
- These EHRs offer a variety of parameters such as admission/discharge date, diagnosis (ICD10 codes), treatment/procedure undertaken (OPCS codes) and the cost of treatment.

**Aim:** This study aims to evaluate the suitability of using Outpatient and Accident & Emergency (A&E) records from Health Episode Statistics (HES) for epidemiological research. It uses the example of a linked dataset for serving and ex-serving military personnel from the King's Centre for Military Health Research (KCMHR) cohort to these records.



## Methods

- Data linkage between EHRs of England, Scotland and Wales and the KCMHR cohort study. The study includes two phases of data collection: phase 1 from 2004-2006 and phase 2 from 2007-2009 (Fear et al, 2010[1]; Hotopf et al, 2006[2]).
- Phases recruited approximately 10% of UK military personnel who had been deployed to the first phase of the 2003 Iraq war and a further sample of military personnel who had not been deployed to Iraq at that time.
- A total of **8,602 participants** consented for their NHS records to be obtained and linked.
- EHRs for each nation were requested by matching on unique patient identifiers which were: NHS/CHI Number, forename, surname, sex and date of birth.
- Record Linkage: Personal identifiers were passed to each nation data provider. Record linkage in Scotland and Wales was undertaken using pseudo-anonymised fuzzy matching. England required NHS number to be the blocking variable.
- Variables for each nation were evaluated and linked based on variable commonality principles.
- A national dataset of health and social care covering A&E and Outpatients was developed (Figure 1).

Figure 1: Linkage framework methodology.

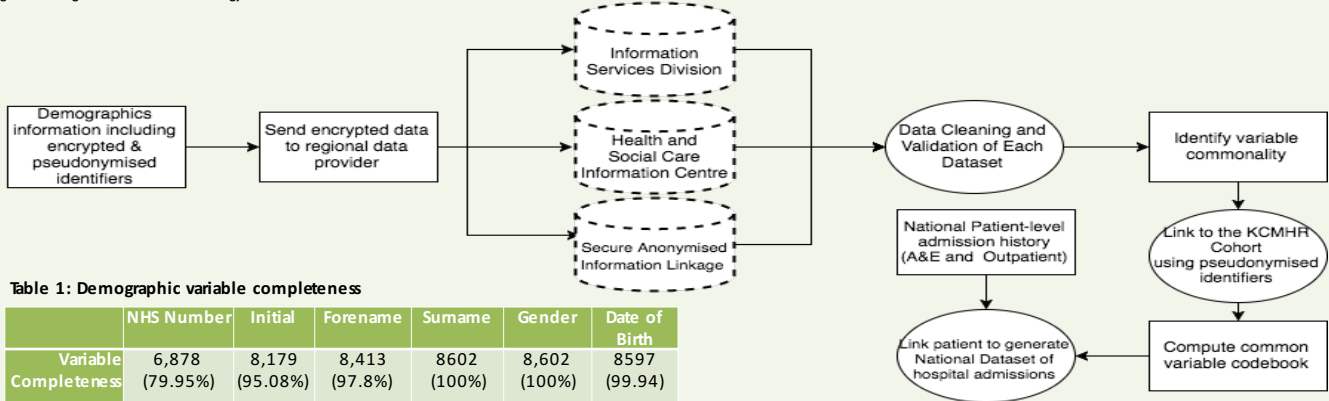


Table 1: Demographic variable completeness

	NHS Number	Initial	Forename	Surname	Gender	Date of Birth
Variable Completeness	6,878 (79.95%)	8,179 (95.08%)	8,413 (97.8%)	8602 (100%)	8,602 (100%)	8597 (99.94)
Missing Values	1,724 (20.05%)	423 (4.92%)	189 (2.2%)	0	0	5 (0.06)

## Results

- Overall matching rate is **76.66% (n=6,336)**. Scotland had a matching rate of 14.22% (n=1,223), Wales 8.13% (n=899) and England **60.7% (n=5,221)**.

### Outpatient

Advantages	Disadvantages
Consistent data format across England, making analyses uniform and consistent.	A median of 5 appointments per matched participant with 4,178 (86.86%) male and 632 (13.14%).
Basic demographics are provided as part of the EHR record.	87.57% of appointments were coded with a default ICD-10 code "Unknown and unspecified cause of morbidity".
Enables hospital trusts to be paid for treatments they perform.	Outpatient appointments are not linked to a GP referral, A&E visit or Admitted Patient Care Event.
Ability to identify appointment attendance and waiting times.	Poor recording of for waiting times, priority status and consultant speciality (<70%).

### Accident & Emergency

Advantages	Disadvantages
Multiple sources of A&E data are available as part of the dataset.	A median of 2 admissions per matched participant with 2,813 (88.13%) male and 379 (11.87%) female.
Ability to identify and distinguish between minor and serious admissions based on local coding.	A total of 5 A&E coding 'Reason for Admission' systems within England alone with variable completeness of 42.44%.
Overall able to identify hour and patterns of admission.	Date of admission present, however discharge date and/or time missing for 29.87% of admissions.
Enables hospital trusts to be paid for A&E contacts.	Mental health, alcohol or self-harm indicators and/or referral are not recorded within England.

## References

[1] N. T. Fear, M. Jones, D. Murphy, L. Hull, A. C. Hansen, B. Coler, L. Mahdi, J. Sundin, C. Woodhead, N. Jones, N. Greenberg, S. Landau, C. Darvidar, R. J. Rom, M. Hotopf, and S. Wessely. "What are the consequences of deployment to Iraq and Afghanistan on the mental health of the [UK] armed forces? A cohort study." *Lancet*, vol. 375, no. 9728, pp. 1788-1797, 2010.

[2] M. Hotopf, L. Hull, N. T. Fear, T. Browne, D. Horn, A. Hansen, M. Jones, D. Murphy, D. Bland, M. Bhatnagar, N. Greenberg, J. H. Hughes, A. R. Tate, C. Darvidar, R. Rom, and S. Wessely. "The health of [UK] military personnel who deployed to the 2003 Iraq war: a cohort study." *Lancet*, vol. 367, no. 9524, pp. 1731-1741, 2006.

## Conclusions

- We found a lack of coding accuracy, variable completeness and regional differences making it difficult to interpret data points. This is supported by NHS Digital, which state formal analyses due to lack of confidence in data recording and coding.
- A&E records are coded within A&E, time pressures, training and patient reporting all impact the quality of the records.
- Outpatient records yield little relevant information. Efforts should be made to improve the quality of the information collected.
- We can use Outpatient and A&E records in epidemiological research however we must be cautious of the quality, relevance of data points and accuracy of any coding.