National state of patient safety 2024: Prioritising improvement efforts in a system under stress

Technical Appendix

1. Collating and analysing Patient Safety Incident Response Plan data using topic modelling

National Health Service (NHS) organisations are required to produce a Patient Safety Incident Response Plan (PSIRP) to set out how it will learn from patient safety incidents to continually improve the quality and safety of care.

Data on patient safety priority issues, planned responses and anticipated improvement routes were collected from the 'Local Focus' sections of the publicly available PSIRPs as of 12 July 2024 . These were organised for each NHS trust in a MS Excel sheet, alongside the corresponding Integrated Care System (ICS), NHS region and trust type (Acute, Ambulance, Community, Mental Health or Specialist). Some trusts used unconventional formats, or omitted information, or did not have publicly available PSIRPs, resulting in missing or incomplete data.

The data were analysed using BERTopic, a state-of-the-art topic modelling technique. BERTopic converts data into vectors (numerical representations of words with a particular feature). PubMedBERT, a model fine-tuned for biomedical and clinical texts, was used to cluster these vectors into topics, based on their semantic similarity. Separate BERTopic models were built to extract patient safety priority issues, responses and improvement routes. The analysis was carried out using Python in Google Collaboratory.

An example of the output is provided in Table 1. Topics were ranked by 'Count', indicating the total number of data belonging to each topic. Topic content was inferred from 'Representation', which lists the 10 most frequent words, and 'Bigram', which shows the most common pairs of consecutive words within the data of each topic. After manually reviewing the topics, similar ones were merged where appropriate. The most prevalent topics, which were recognisably centred around a common theme, were included in the final report. See Figure 1 for the overall methodology flow.

Further work is planned to explore differences, and extract additional insights, by care setting, region and ICS.

Figure 1: Overall flow of the Topic Modelling

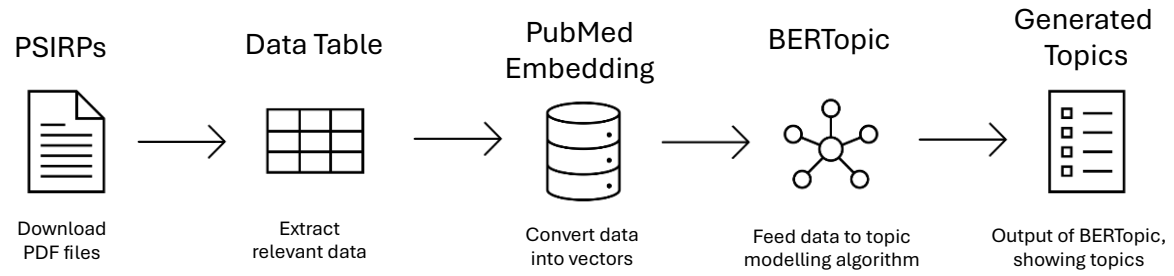

Table 1: Extract from the Topic Modelling Output for Local Patient Safety Priority Issue

Topic	Count	Name	Representation	Representative_Docs	Priorities_Bigram
0	33	0_deteriorating_sepsis_identify_recognise	['deteriorating', 'sepsis', 'identify', 'recognise', 'failure', 'recognising', 'treat', 'early', 'critically', 'detection']	['recognising managing deteriorating patients patient ill health collapses urgent deterioration clinical condition including diabetic emergencies', 'recognition deteriorating patientdelay escalation', 'suboptimal escalation response deteriorating patient', 'significant harm death direct result failure recognise andor treat deteriorating patient', 'early recognition reliability managing acutely unwelldeteriorating patient', 'patient deterioration including sepsis systemic failure identify act sepsis systemic failure identify deteriorating patient act appropriately', 'overly rapid correction hyponatraemia', 'delays recognising treating deteriorating patient', 'delays recognising escalating treating deterioration areas including maternity', 'events involving failure identify act sepsis failure identify deteriorating patient act appropriately', 'failure recognise	['deteriorating patient', 'failure identify', 'failure recognise', 'deteriorating patients', 'including sepsis', 'identify deteriorating', 'care deteriorating', 'recognition deteriorating', 'treat deteriorating', 'patient deterioration', 'sepsis systemic', 'systemic failure', 'identify act', 'act sepsis', 'patient act', 'act appropriately', 'delays recognising', 'respond deteriorating', 'deterioration critically', 'critically unwell']

	escalate respond deteriorating patient patient sepsis', 'failure identify deteriorating patient failure rescue including sepsis identification response', 'escalation care deteriorating patients', 'delayed recognition deteriorating patient lp08', 'delay failure recognise manage adult patient presenting emergency department signs sepsis', 'prevention deterioration critically unwell patients contributing harm', 'failure recognise prevent deterioration critically unwell patients potential wider learning', 'delays treat deteriorating patient', 'failure recognise deteriorating patient', 'addressing care deteriorating patient improve early detection effective treatment']

2. Survey of patient safety priorities among the public, NHS workers and social care workers

We partnered with YouGov to conduct a survey that asked participants to rank patient safety priorities from one to 10 (one being the most important topic). Three separate, but identical, surveys were conducted on members of the public, NHS workers, and social care workers. The topics participants were asked to rank were:

- **People in hospital**: for example, preventing hospital-acquired infections (e.g. MRSA), bed ulcers and other harm caused during someone's admission or stay in hospital.
- **People using primary care**: for example, when trying to access their GP, their experience during an appointment, or receiving the care they need (such as the correct medication or onward care) from their GP.
- **People receiving care at home**: for example, care provided to people in care/nursing homes, in their own home from district nurses, and on 'virtual wards' (virtual wards provide hospital-level care at home, such as tests and treatments, often using simple technology to monitor a person's recovery).
- **Mothers and babies:** including care before, during and after delivery, including psychological support for new parents.
- **People using mental health services**: including access to and care provided in community mental health services and inpatient units, for both children and adults.
- **People during transitions of care:** for example, when children transition to adult care, when people are discharged from hospital to home, or move from the care of a hospital specialist to a GP.
- **People waiting for urgent care:** for example, people waiting for ambulances, treatment in A&E, or an appointment with a cancer specialist following an urgent referral from a GP.
- **People on elective (non-urgent) waiting lists:** for example, people waiting for diagnostic tests, surgical procedures, or outpatient appointments.
- **People taking medication:** including making sure people receive the right medication, and any support they need to take it correctly.
- **People using digital services:** for example, supporting people to safely attend video consultations, or to use patient apps.

For each participant, the order in which these topics appeared was randomised to avoid bias in the results.

All surveys were conducted between June and July 2024. The survey on the general population can be considered representative of the population in England. The survey

on NHS workers can be considered representative of the NHS workers in England. The survey on social care workers is not representative of social care workers in England, and should be considered a survey on 418 social care workers (Table 2)

Table 2: Number of participants, time period in which the survey was conducted and population represented for each of the three surveys conducted.

	General public	**NHS workers**	**Social care workers**
Number	2,060	1,079	512 (418 in England)
Survey dates	21st June – 3rd July	19th June – 26th June	28th June – 11th July
Representation	Nationally (England)	NHS staff	Not representative, should be considered a survey of 418 social care workers

We also collected demographic information of participants to explore potential differences across these variables. A summary of the demographic variables collected for each survey is show in Table 3

Table 3: Demographic variables and categories within each variable for the general public, NHS workers, and social care workers surveys.

	General public	**NHS workers**	**Social care workers**
Age	18-24 25-34 35-44 45-54 55-64 65-74 75+ 85+	18 – 34 35 - 44 45 – 54 55+	18 – 34 35 – 55 55+
Ethnicity	White Mixed Asian Black Other	White BAME	
Gender	Male Female	Male Female	Male Female
Location	North East North West		North Midlands South

	Yorkshire and the Humber East Midlands West Midlands East of England London South East South West		England Scotland Wales Northern Ireland
Social Grade*	A,B C1 C2 D,E		A,B C1 C2 D,E
Self-reported level of disability	Limited a lot Limited a little Not disabled		
NHS work sector		Allied Health Professionals, Healthcare Scientists and Scientific & Technical staff Medical / Dental staff Ambulance staff (operational) Public Health / Health Improvement Commissioning managers / support staff Registered Nurses and Midwives Nursing or Healthcare Assistants Social care Wider Healthcare Team General managers Other occupational group	
Work industry		Advertising/Marketing/PR Aerospace Agriculture/Chemicals/Forest Products Automotive Computers/Electronics Construction Consumer Goods Education Energy/Mining Finance/Insurance/Real Estate Government/Military/Public Service Hospitality/Recreation Media/Publishing/Entertainment	Social Worker Care Worker Healthcare Assistant Health Visitor Other role

		Medical/Health Services Pharmaceuticals Retail Service Telecommunications/Networking Travel/Transportation Other Have never worked	
Organisation type		NHS hospital Private hospital/ clinic GP surgery/ health centre Walk-in centre Ambulance trust/ service Pharmacy Dentist Opticians Care home Community services Local Authority Other Clinical commissioning group Mental health trust / service School University Head Office	
Contact with patients		Yes, frequently Yes, occasionally No	
For how long have you been in your current organisation?		Up to 6 months More than 6 months up to a year More than a year up to 2 years More than 2 years up to 5 years More than 5 years up to 10 years More than 10 years up to 15 years More than 15 years up to 20 years More than 20 years Don't know	
***Social grade scoring :** https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/employmentandemployeetypes/bulletins/approximatedsocialgradeenglandandwales/census2021#:~:text=Social%20Grade%20has%20six%20possible,working)%20are%20the%20least%20common.			

While all potential differences in rankings across demographic variables were explored, only the most notable differences were included in the main report. A summary of

results across all demographic variables can be shared upon request. Please contact m.leis@imperial.ac.uk if interested.

Due to how the data collection process is conducted, some of these variables are too high-level to provide deep insights for specific groups. For example, in the general public survey, ethnicity was coded as White, Mixed, Asian, Black or Other. Within each one of these categories there are many sub-populations that may have different views and priorities on patient safety that we are not able to capture in this survey. This issue is exacerbated on the NHS workers survey as ethnicity is only coded as White or BAME.

Although the survey results allow us to understand prioritisation differences across broad demographic groups, cross sections between demographic variables is not possible (i.e. we are not be able to explore rankings across age and ethnicity, for example, and obtain reliable results).