

Project Details	
Project Code	MRC21PHBa Jones
Title	Using artificial intelligence to identify medicine safety risks
Research Theme	Population Health
Summary	There are 237 million medication errors in England each year and 28% harm patients. This project will use artificial intelligence (AI) to identify possible causes of medication errors reported in the NHS. The student will gain skills in AI & statistics for large data sets through training, and knowledge of NHS medicines safety via a placement. This project will suit students from a wide variety of backgrounds, e.g. computer science or a health profession.
Description	<p>There are 237 million medication errors in England per year. ~28% cause harm & cost the NHS >£98 million. The international cost is \$42 billion. There are many causes of errors & all need to be addressed to increase safety. One recognised cause in many settings is poorly written guidance for health professionals leading to difficulty finding relevant, unambiguous information. Our research has identified tools that improve guidance & increase safety. We have published this recently in the Journal of Patient Safety & BMJ Quality & Safety, two of the leading patient safety journals. This project will generate the data needed to target our tools at high-risk areas: 1) frequency of medication errors caused by poor quality guidance (by NHS sector & staff group) 2) types of guidance frequently implicated 3) types & severity of the associated errors. A systematic review & meta-analysis of professional guidance as a cause of medication errors will address these knowledge gaps using international literature with sub-group analysis of NHS data. There is no equivalent study available in this under-researched area. Next, the National Reporting & Learning System (NRLS), a database containing thousands of reports of NHS medication errors will be analysed. This is a rich data source but it is not coded to identify errors caused by guidance, so analysis of free text is required. Given the scale of the NRLS, automation is needed. Natural language processing (NLP, a subfield of artificial intelligence) has been used to analyse incident reports in safety-critical industries but it is not widely used in medicines safety. Because of the intrinsic nature of free text, research in these areas is still growing & presents different & interesting challenges. This project will use NLP & machine learning (ML) to identify relevant NRLS reports. The NRLS have confirmed that these data can be supplied for this project. Free text from NRLS reports will be manually annotated to identify a sub-set describing medication errors caused by poor quality information. This sub-set will be verified by an expert panel. Then, several algorithms will be trained & evaluated (by standard statistical approaches) on the sub-set. Finally, the best approach will be implemented in a pipeline to analyse the complete NRLS dataset & address the knowledge gaps outlined above. The transfer of the pipeline to different fields in medicines safety will be investigated. In addition to standard peer-reviewed publications (at least 3: meta-analysis, algorithm development & NRLS analysis), this project will create impact via two routes. We already have research links with the NHS Medicines Safety Officer (MSO) network. We will produce briefings for MSOs from different types of organisation, to explain our findings & recommended actions for local</p>

	implementation. These will be shared via the MSO network, especially their monthly teleconference. We will produce similar briefings for the publishers of the guidance most frequently involved in errors. We will arrange meetings with these publishers to share & explain our findings.
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