

Using Data Analytics to improve patient safety oversight in Mental Health and Learning Disability settings

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Introduction

Mental health care at all levels (i.e. community and inpatient) requires accurate behavioural data for both clinical, operational and governance purposes (Webber et al, 2011). Failures to oversee both incident frequency and the use of restrictive interventions such as restraint have been associated with poor patient outcome (including never events), staff injury and organisational failure (Mind, 2013; Huckshorn, 2006). In 2018, the legislative agenda in the form of the Mental Health Units (Use of Force) Bill has moved in step with these concerns.

The use of restraint in the UK mental health system is currently monitored through organisational submissions to the mental health minimum dataset, using a metric of restraint/1000 bed days. However, the variability in the data across organisations caring for patients with similar types of pathology indicates that in all probability this is not measured consistently (Mind, 2013).

Data capture with regard to the kind of clinical incidents that occur in mental health settings is complex. Clinical incidents are typically different from those that may occur in physical healthcare settings. There is high complexity when considerations of causation are made – for example, a typical incident may relate to both the distal and proximal component antecedents of current psychopathology, in combination with environmental, temporal, medical and interactional / interpersonal variables. This combination of historical and current clinical variables presents clinicians with a substantial challenge in the process of clinical formulation and the design of appropriate intervention on an individual level. At a system level (i.e. a ward, social care site, or hospital), the combination of multiply complex individual causation within a continuously interacting patient group presents clinicians and operational managers with significant challenge in overseeing systems in a manner that takes into account all variables. Given the legitimate concern regarding the frequency of physical restraint within the inpatient mental health system, there is a pressing need for tools that increase our understanding of the contextual relationship between care systems and violence risk in particular.

Project

A software platform for data capture on behavioural and patient safety related incidents has been designed and built. It allows for multi-level oversight of the behavioural and patient safety status of a large mental health organisation of 18 sites.

The basic functionality regarding data capture is achieved through the use of an electronic form coded in MS Sharepoint, that collects the following information:

- Incident nature and severity
- Incident time and location
- Incident duration (including granular duration of all physical restrictive interventions (restraints) used in each incident
- Principal nature of incident where multiple behaviours are observed in the same incident
- Staff present at time of incident
- Staff name and location on the body during all incidents where restrictive intervention was used.
- The requested and/or involuntarily administered status of oral and IM PRN medical response to incidents.
- The identity of all victims of violence (staff and other service users)
- Use and effectiveness of non-restrictive responses
- Nature and duration of restrictive response(s)
- Incident forms data are used to populate a Sharepoint list allowing full data interrogation, with multivariate data stored in MS Excel.

Data can be interrogated on a live basis in a granular manner, allowing for the same descriptive metrics to be outputted in graphical form at multiple levels - patient, sub-unit (eg ward), operational unit (eg hospital), and corporate unit (multiple sites). Graphical data is presented through the use of a bespoke behavioural dashboard. Data is used to automatically populate clinical reports, staff and patient facing quality dashboards, and to support governance risk monitoring at local and corporate levels. Critically, the information is accessible to clinicians on a live basis for use in informing routine clinical care.

A bespoke electronic body map tool was designed and built, allowing for data relevant to staff positioning on the body during all incidents where physical intervention is used to be collected and inputted into the dataset, pulling data down from the existing organisational MS Exchange platform.

The platform contains email notification functionality allowing for clinicians to be notified of incidents and restraints as soon as they are entered into the system. In addition, formal reviews of restrictive practice where their use is causing clinical concern are automatically sent to all involved clinicians following completion. This in particular supports clinician awareness of the rate of incidents and restrictive interventions in social health care sites where clinical input may be peripatetic.

The platform has been built as a clinician designed and led innovation in the absence of a bespoke tool that fully delivers on current regulatory and governance requirements of mental health and learning disability services. It supports compliance with current NHS contractual requirements regarding data oversight of incidents and restraint. (DoH, 2014). Further, it meets the upcoming additional requirements of the Use of Force (Mental Health Units) Act 2018. It is used routinely in the host organisation to populate clinical and governance reports.

Discussion and Future Developments

The system currently yields to descriptive analysis, given its combined reporting, clinical and governance functionality. However, current proposals are to expose the data to relevant analytic tools in order to autonomously probe and determine patterns in the data, to support greater clinical utility.

It has been observed that as the dataset grows larger, patterns emerge visually (e.g. pareto type distributions). It is possible that formal analytics imposed upon such data at particular levels of granularity could support evidence based mental healthcare in inpatient services through elucidating variables that are associated with a greater risk of particular incidents (in terms of both temporal order of variables as well as simple association / correlation between variables).

Mental Health and Learning Disability services may therefore be able to predict likely resource and treatment need for individuals based on comparing individual behavioural data parameters with prototypes derived from large data sets. There may therefore be potential in the use of predictive analytics to predict times of increased resource need (and intervene proactively).

For example, patient safety might be enhanced if services were able to access a tool supporting the allocation of resource and prediction of demand based on a probabilistic output derived from actual

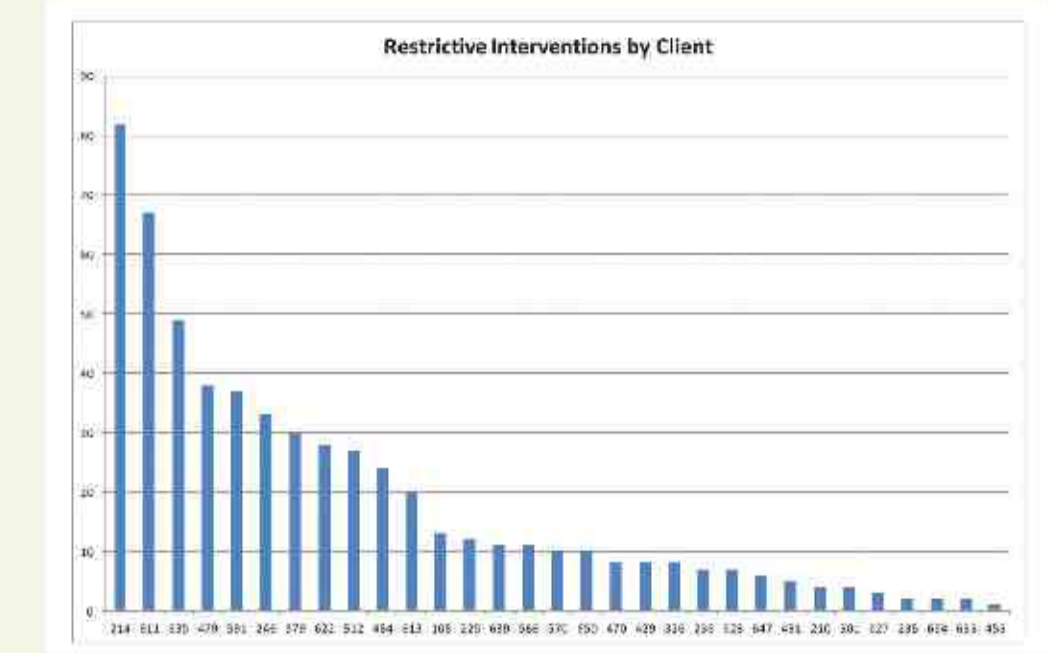
behavioural data. (eg outputs of the form "it is likely at a probability of X that a service will experience high demand at X time in X location given historical data"). Such output might also support the use of 'trigger signals' (based on past events, construed as patterns in behavioural data), that would prompt the preparation of additional resources. This may act in practical clinical operational terms as a live risk register, which may be particularly useful in mental health sites caring for people at high levels of acuity.

Additionally there is scope to integrate natural language processing technology to augment quantitative outputs with thematic outputs based on the incident narrative text that is also integrated into the system. This work is planned.

Finally – historically, those with the most severe problems have often been distanced from the clinical information upon which decisions about their care are based. Future developments of this kind should support users of services (and, where appropriate, families and carers) to gain live access to their own data, to support their own recovery. This aspiration would benefit transparency in the mental health system by giving people an evidence based overview of their progress through the system, linking changes in outcomes with actual treatment provided, taking into account the nature of the physical and interpersonal environment in which treatment occurs.

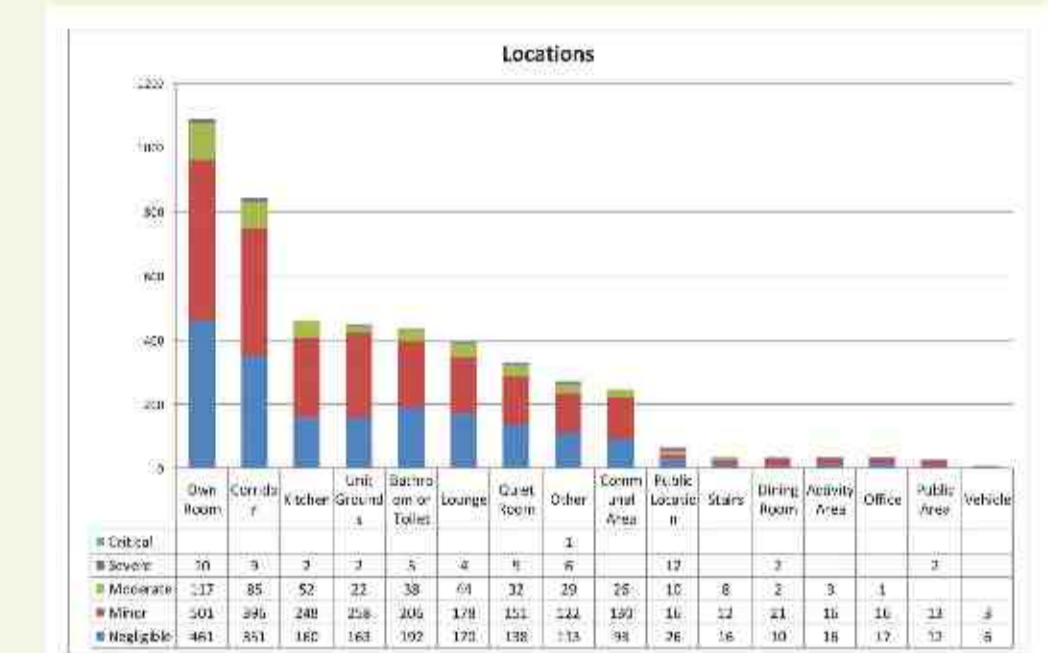
Total of All Restrictive interventions Used showing distribution

We can take a data driven approach to supporting people – high use of Restrictive Intervention over time occurs in a small number of people – therefore need for clinical responsibility re: resource and intervene (proactively and reactively)



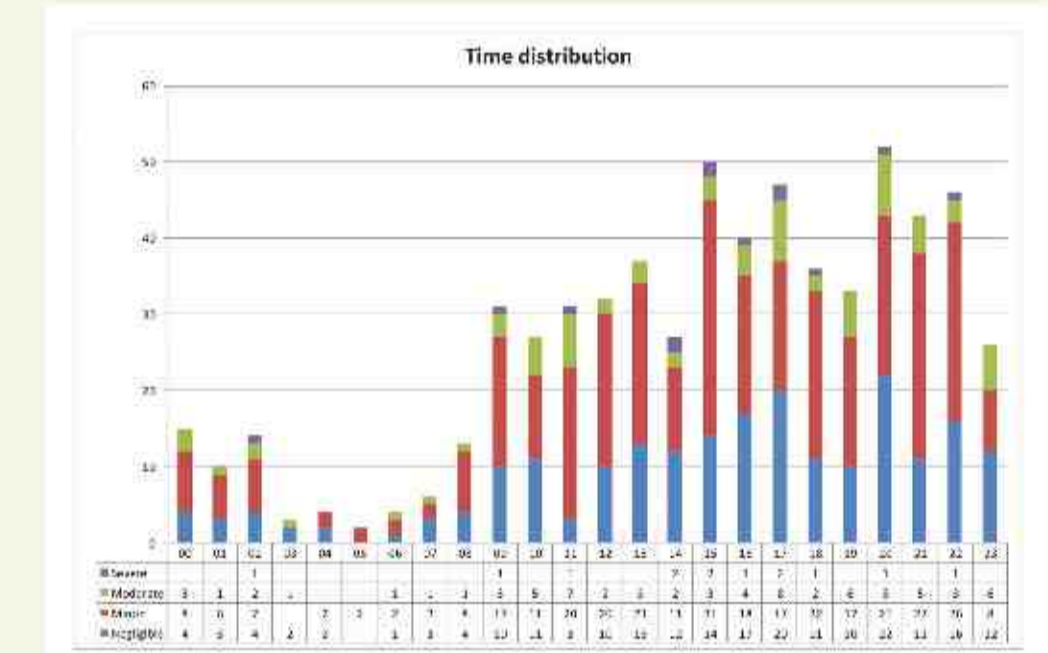
Location Dashboard – Local

Tells us where things are happening – by severity



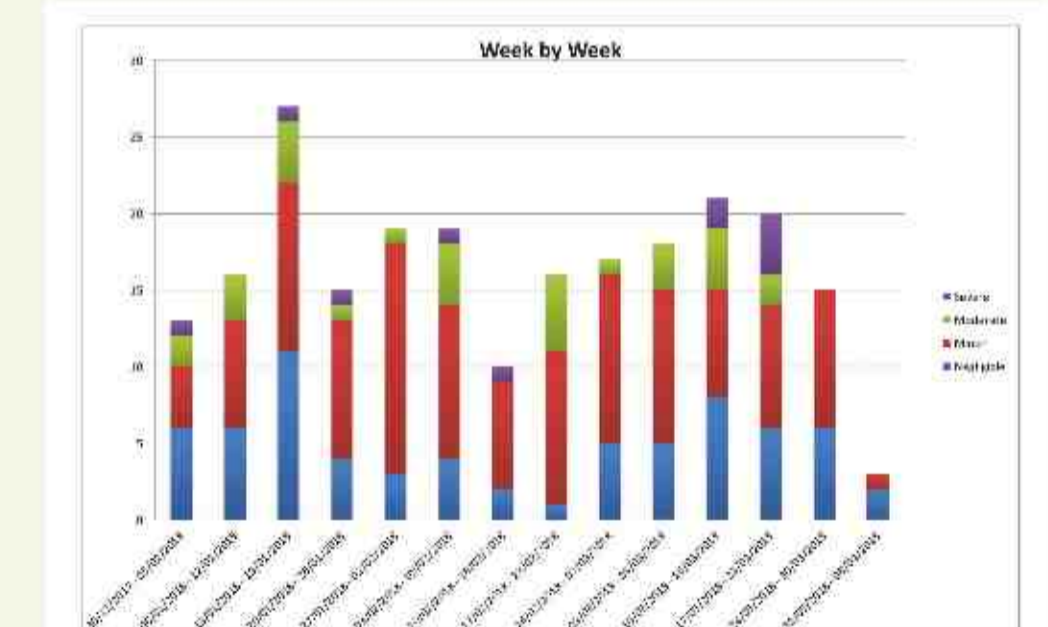
24HR Dashboard by Severity – Local

Live view of temporal pattern of incidents by severity



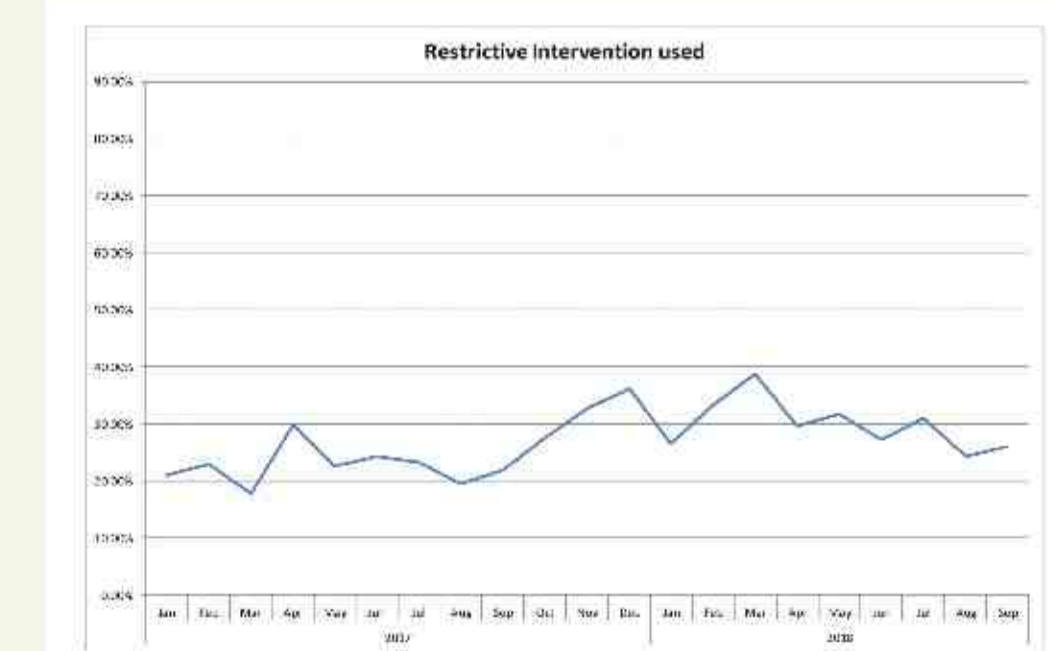
Weekly Dashboard by Type

Allows a live view of both frequency and type of incident by week at any level of granularity



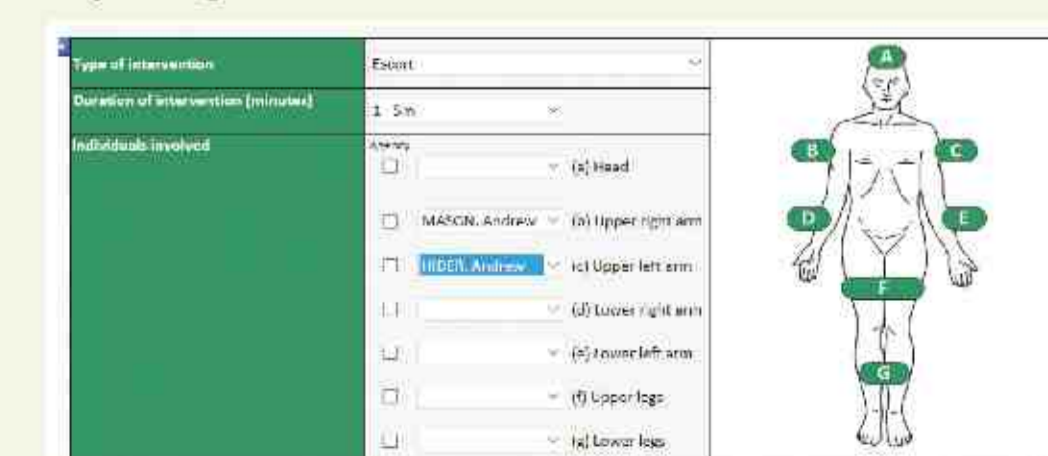
Restrictive Intervention Proportional Ratio

Example of Data for a Local System (Multiple Sites). Allows for granular oversight of percentage response to incidents that would be described as 'restrictive'.



Electronic Body Map, with staffing info

Easy oversight re: staff involved in Restrictive Intervention use



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7. Legislation reference : Mental Health Units (Use of Force) Bill 2017-19. <https://services.parliament.uk/bills/2017-19/mentalhealthunitsuseofforce.html> accessed 21/9/18