

Analysis and Annotation of temporal information related to medications in EHRs

Jaya Chaturvedi¹, Natalia Viani¹, Sumithra Velupillai¹, Angus Roberts¹
¹King's College London

Introduction

Most of the information pertaining to the medications taken by a patient are mentioned only in the narrative text of many Electronic Health Records (EHRs) [1]. The need for extraction of medications and their temporal information (e.g., start/stop) in mental health records is increasing in the field of research.

Aim: To understand the different patterns of medication mentions in the free-text of EHRs.

Sample Text

Simple – Incomplete (Drug/Dose) ...is prescribed Citalopram 10mg.

Simple – Incomplete (Drug) ...has responded well to risperidone in the past.

Simple – Incomplete (Drug Category) Commence antidepressant medication...

Simple – Complete She was being treated with Paliperidone Palmitate 150mg im.

Complex – Dose combination ...treated with Quetiapine, gradually titrated up to a dose of 750mg.

Exact time reference She was started on olanzapine on 7/8/13.

Materials and Methods

- A random sample of 103 documents (73 for Schizophrenia and 30 for Depression patients) from the Clinical Records Interactive Search (CRIS) database [2] were manually annotated for medication information.
- Documents were pre-annotated with a rule-based application, CRIS-GATE-medication [2]
- All annotations were then categorised according to a typology of annotation complexity and completeness:

Simple - complete (included drug name, dosage, frequency, and route);

Simple – incomplete (attributes) (information only on specific attributes, subdivided by combinations);

Complex – Dose combination (more than one drug/dose mentioned within same text span).

- New attributes were defined to capture initiation and cessation time and were categorised into **vague** (referencing to the year), **exact** (exact date), and **null/unknown** (no information).

- Comparison of source of medication information being structured vs. unstructured:

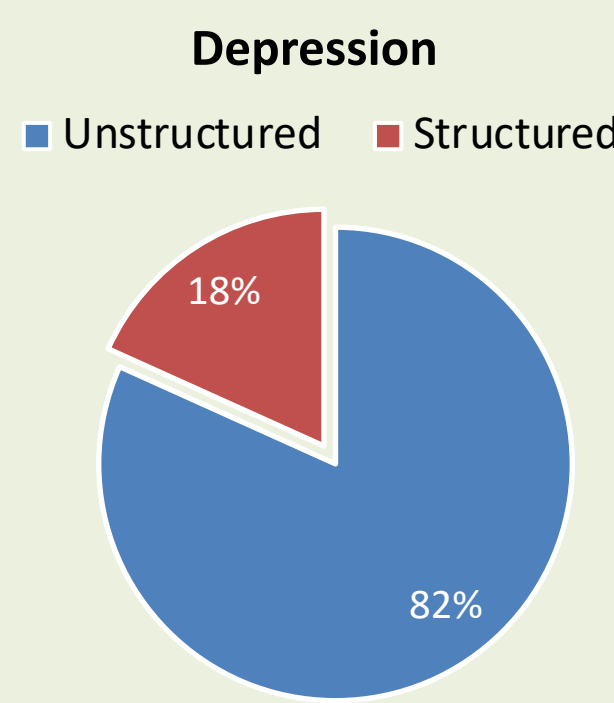
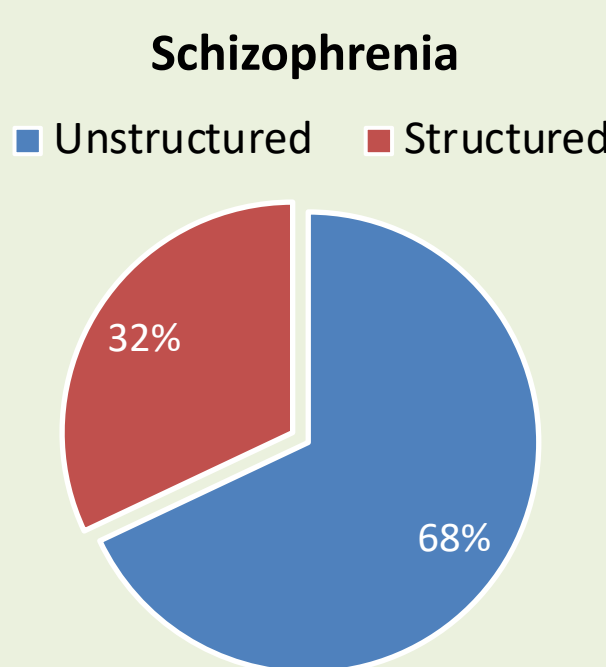
Unstructured - output of the CRIS-GATE application [2] referring to prescription events in the text (letters and case notes).

Structured – CRIS SQL query of a combination of 3 sources: structured fields in the dedicated medication form of health records, the JAC medication dispensing system, and the electronic FP10 prescription form.

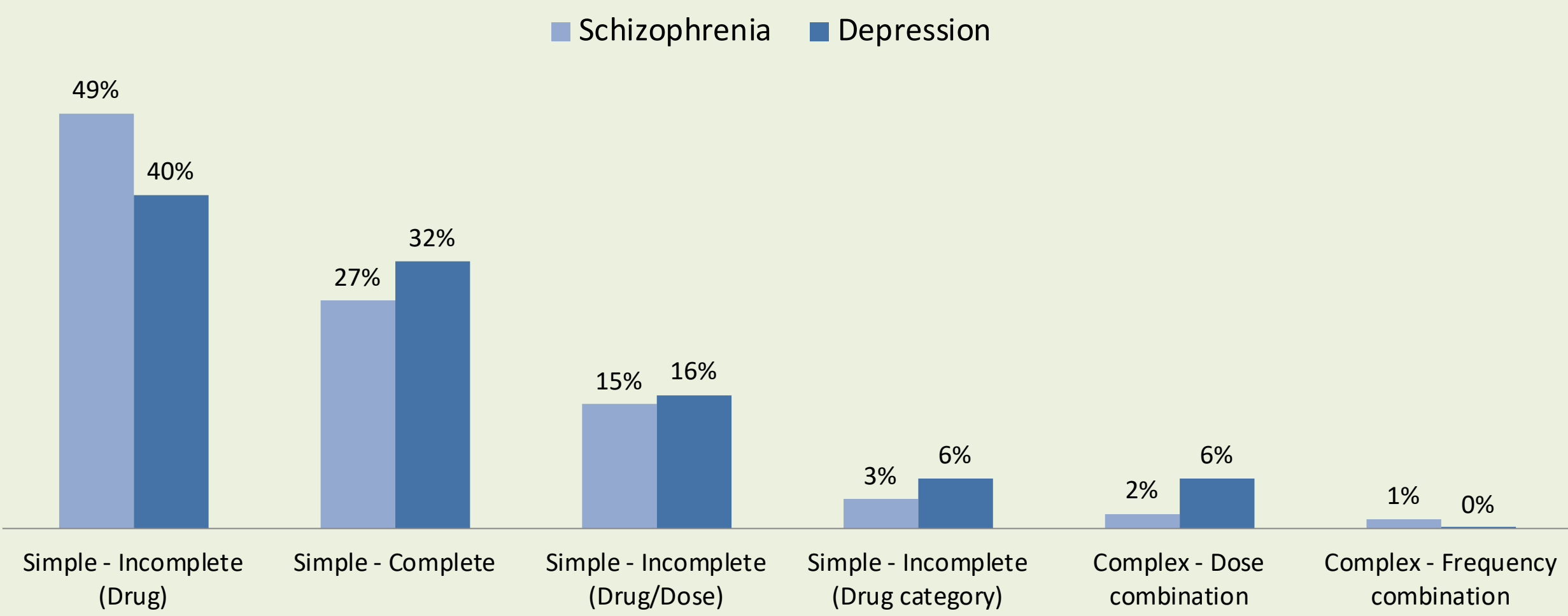
- These numbers were purely counting instances, and ignorant of any duplications.

Results

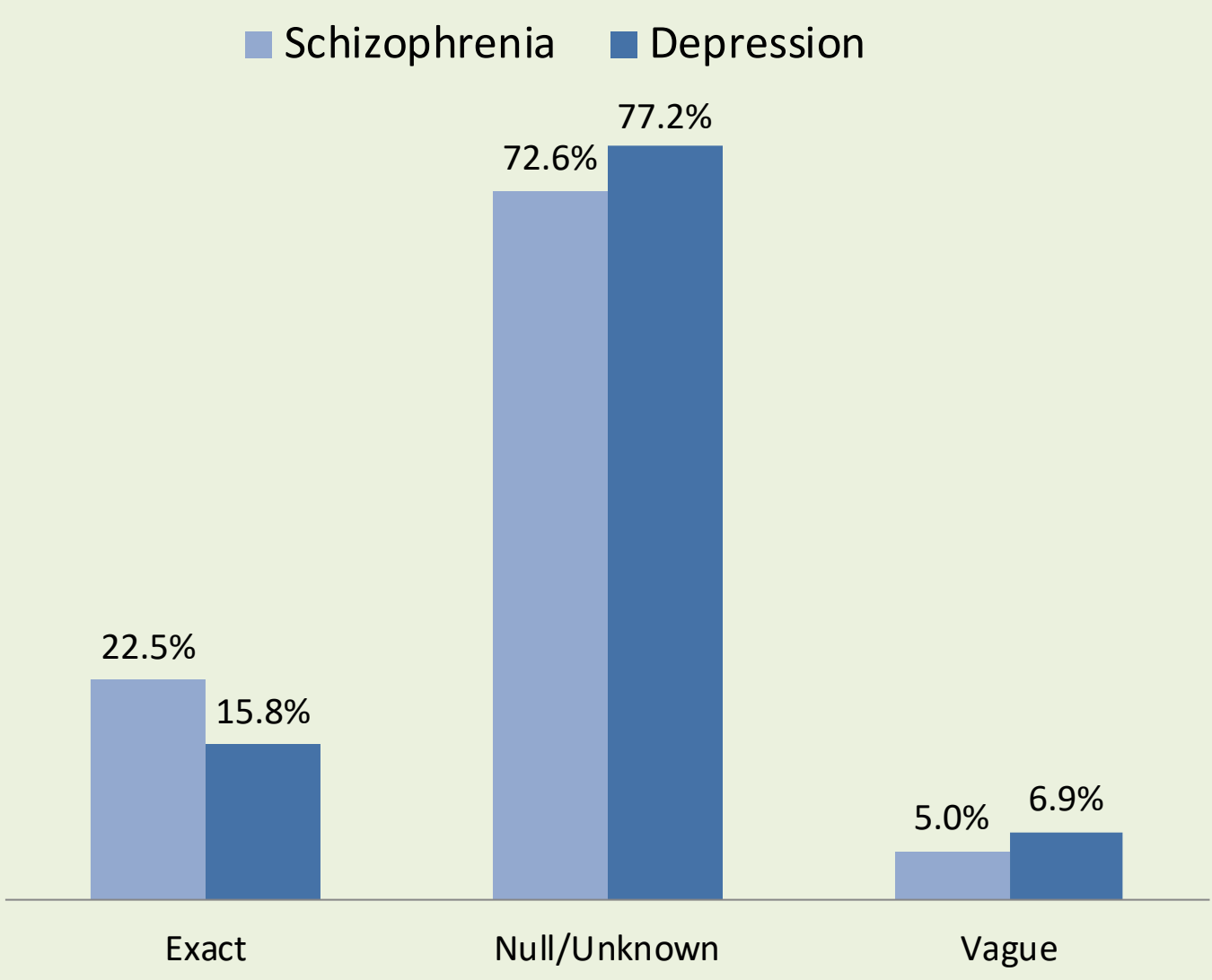
Source of Medication Information



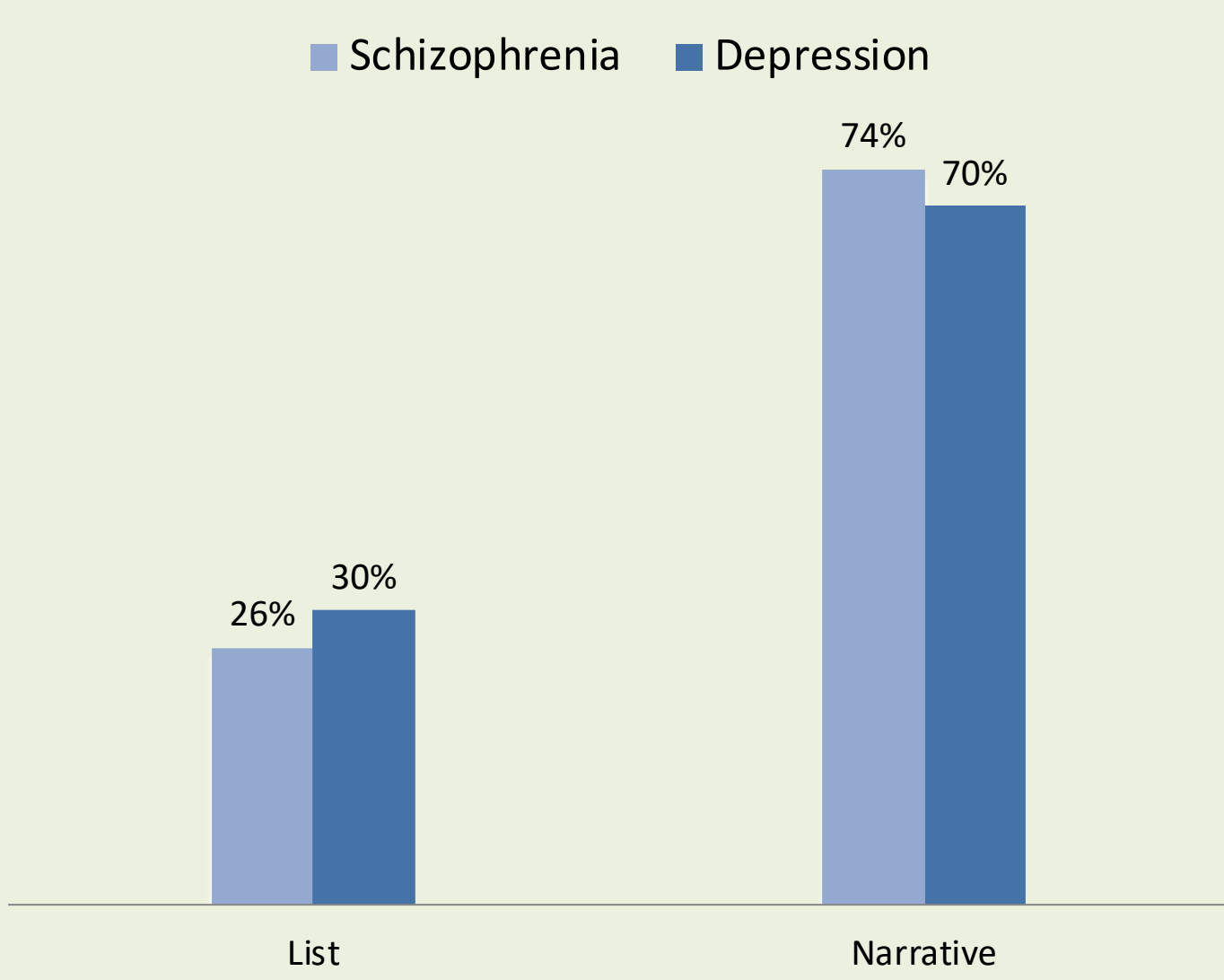
Annotation Type



Initiation Time Annotations



Medication mention - List/Narrative



Discussion and Conclusion

Extracting temporal information related to medications from EHR text is known to be a challenging task [1]. Our analysis shows that, for most drug mentions, exact temporal information is not available in the text. Moreover, with an average of 72% of the medication mentions from the random sample being in the narrative text, the analysis highlights the complexity in the way medications and related information are expressed in mental health records. This is an initial study on a small sample and will be extended to a larger dataset. Our goal is to develop an NLP algorithm that can ascertain time information related to medication mentions in EHRs.

References

- Meystre SM, Thibault J, Shen S, Hurdle JF, South BR. Automatically detecting medications and the reason for their prescription in clinical narrative text documents. Stud Health Technol Inform. 2010;160(Pt 2):944–8.
- Perera G, Broadbent M, Callard F, *et al.* Cohort profile of the South London and Maudsley NHS Foundation Trust Biomedical Research Centre (SLaM BRC) case register: current status and recent enhancement of an Electronic Mental Health Record-derived data resource. BMJ Open 2016;6e008721.

P1T869N45R