Additional File 10

All case descriptions have been paraphrased to support the responsible use of MIMIC-III data.

Case A: Chronic Disability and an In-Stay Depression

Case A comprises 306 gold events across a 3-week admission. The record describes roughly three decades of C5 quadriplegia, an Individual-level risk factor that Stage2 resolves to a year-only [APPROX] date some thirty years before admission, and a marked deterioration in ventilatory status during the stay. The note itself states the sequence, attributing the patient's depressed mood to that deterioration, so the link is explicit rather than inferred by us. Depression is documented as a diagnosis: pharmacotherapy for situational depression is started during the admission, and psychiatry is consulted on the 11th hospital day. The symptoms recorded are suicidal thoughts and refusal of food; at discharge the note records restored hope, concentration and sleep, and continuation of an SSRI. Several symptoms are therefore attested only through their documented reversal, an implicit form of expression that an extraction system keyed to symptom mentions alone would miss.

What makes this case instructive is where the onset falls. The background risk factor begins decades before admission, whereas the depressive episode emerges during the hospital stay, making their temporal relationship difficult to recover from the narrative alone. Only a calendar-anchored representation places them on one ordered chain while preserving that separation. The distinction is also fragile in exactly the way our error analysis predicts: had the onset been tagged [PRE ADM] rather than resolved to the admission interval, the clinically salient fact that this depression arose during the stay would disappear from the timeline entirely. This is the same boundary that accounts for the largest class of temporal disagreements in Additional File 8.

Case B: Depression Across All Three WHO Risk Levels

Case B contains 494 gold events spanning a 1.5-month admission after an intentional overdose. It is the only case in our sample with documented risk factors across all three WHO levels. At the individual level, the record describes long-standing alcohol misuse across the past medical history, social history, and discharge diagnoses. At the Family & Community level, it notes limited social support, poor self-care, and the recent loss of a living arrangement with a relative. At the Structural level, it identifies multiple social stressors and a lack of insurance coverage. These links are stated directly in the record, which cites them as reasons for involving psychiatry and social work. The associated symptoms and behaviors include the presenting overdose, two earlier suicide attempts by different means, a discharge diagnosis noting multiple attempts, and a documented reduction in suicidal intent during the admission.

This case highlights two important features of the reconstruction. First, the structural risk factors are exactly the kind of information that a fixed clinical schema might omit, even though they are central to the explanation recorded by the care team. This illustrates the need for the open-vocabulary representation described in the Introduction. Second, the record contains an unresolved contradiction: psychiatry documents that the patient was not currently depressed during the admission, while depression remains listed among the discharge diagnoses.

Case C: A Risk Cascade Under an Unsettled Diagnosis

Case C contains 227 gold events spanning a 12-day admission and includes four documented risk factors, only one of which the source explicitly links to the diagnosis. The record identifies more than two decades of alcohol misuse as clinically relevant to the patient's diagnosis. It also documents childhood sexual abuse by a caregiver, job loss attributed to drinking, and living alone after the end of a relationship about a year before admission. Because the note does not connect these latter factors directly to the disorder, we treat them as co-documented rather than causal. Bipolar disorder appears as an established diagnosis, supported by mood-stabilizing treatment at admission, repeated overdose-related hospitalizations, a prior psychiatric admission after a suicide attempt, and multiple presentations following suicide threats.

What distinguishes this case is that the record later revises its own clinical interpretation. During the admission, psychiatry questions whether the bipolar diagnosis is accurate and considers whether long-term alcohol use may have contributed to a misdiagnosis. Most background risk factors are undated and therefore tagged [PRE ADM], whereas this diagnostic reconsideration is placed within the admission interval. Temporal anchoring makes the progression visible: long-standing background factors, an established diagnosis, and then in-stay doubt about that diagnosis. The case also shows that uncertainty is not only temporal; it also concerns causality and diagnosis. Finally, it demonstrates the limits of surface matching. During screening, a statement about episodic drinking was incorrectly matched to an eating-disorder symptom term and was removed after clinician review, illustrating why lexical overlap alone cannot support reliable qualitative interpretation.