

## Appendix 2. Supplementary text PRISMA.

A frequently used approach to improve patient safety by determining contributing factors and developing recommendations, is root cause analysis (RCA). A number of analysis tools is brought together under the term RCA, for example fishbone diagrams, cause-effect charts and “five why’s”. A comprehensive RCA method that is frequently used in Dutch health care facilities is the Prevention and Recovery System for Monitoring and Analysis (PRISMA)-method. The PRISMA-method served as a basis for the World Health Organisation (WHO) to develop a conceptual framework for the international classification for patient safety. The PRISMA-method was originally developed to manage human error in the chemical process industry, but in the last decade, it was also applied in the transportation sector, as well as in healthcare (PRISMA-Medical). The method is based on the theory of system approach of Reason and the skill–rules–knowledge-based behavior model of Rasmussen and examines the relative contributions of latent factors (technical and organizational), active failures (human) and other factors (patient related and other) in order to facilitate the development and evaluation of system-based preventive strategies. The main goal of the PRISMA-method is to build a quantitative database of (unintended) events and process deviations, from which conclusions may be drawn to suggest optimal countermeasures.

The PRISMA-method consists of three main steps; incident description, cause classification and the translation to structural measures. In step one an incident or event description is carried out through the creation of a root causal tree. To construct a causal tree, the information from the interviews and EPR was used. At the top of each tree the presentation at the ED was placed. Just below the top event, all direct causes that can be identified are mentioned. They were retrieved by posing the question why the incident, in this case the ED

presentation, has happened. These direct causes often have their own causes, the indirect causes. By constantly asking “why” an event had taken place, relevant indirect causes were systematically exposed. When no further objective causes could be identified, the last indirect cause was considered as the root cause. The information from the interviews and EPR were assessed by two medically and PRISMA-trained researchers (RB, HM). The root causal trees of both researchers were compared and discussed with an a third PRISMA-trained investigator (BD) until consensus was reached. In step two, the identified root causes are classified. Root causes were classified using the Eindhoven Classification Model (ECM) as technical-, organisational-, human-, and patient-related factors [13,14]. The main categories can be subdivided into 20 subcategories (Table 3). In this study the ECM model was extended with disease-related factors following the recommendations of Fluitman et al [16]. In the final step, the PRISMA profile is made and prevention recommendations can be directed at the most frequently occurring root causes. An example of a root causal tree is displayed in Figure 1.