

Interface Design and Human Factors Considerations for Model-Based Tight Glycemic Control in Critical Care

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Abstract

Introduction:

Tight glycemic control (TGC) has shown benefits but has been difficult to implement. Model-based methods and computerized protocols offer the opportunity to improve TGC quality and compliance. This research presents an interface design to maximize compliance, minimize real and perceived clinical effort, and minimize error based on simple human factors and end user input.

Method:

The graphical user interface (GUI) design is presented by construction based on a series of simple, short design criteria based on fundamental human factors engineering and includes the use of user feedback and focus groups comprising nursing staff at Christchurch Hospital. The overall design maximizes ease of use and minimizes (unnecessary) interaction and use. It is coupled to a protocol that allows nurse staff to select measurement intervals and thus self-manage workload.

Results:

The overall GUI design is presented and requires only one data entry point per intervention cycle. The design and main interface are heavily focused on the nurse end users who are the predominant users, while additional detailed and longitudinal data, which are of interest to doctors guiding overall patient care, are available via tabs. This dichotomy of needs and interests based on the end user's immediate focus and goals shows how interfaces must adapt to offer different information to multiple types of users.

Conclusions:

The interface is designed to minimize real and perceived clinical effort, and ongoing pilot trials have reported high levels of acceptance. The overall design principles, approach, and testing methods are based on fundamental human factors principles designed to reduce user effort and error and are readily generalizable.

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Abbreviations: (BG) blood glucose, (GUI) graphical user interface, (ICU) intensive care unit, (SPRINT) specialized relative insulin nutrition titration, (STAR) stochastic targeted, (TGC) tight glycemic control

Keywords: critical care, glycemic control, graphical user interface, human factors, intensive care, intensive care unit, intensive insulin therapy, stochastic targeted, tight glycemic control, user interface

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