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Review Article

Nudge Theory Can Be Used to Optimise Cardiac Surgery Inpatient Management

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Nudge theory has influenced the behaviour of millions of individuals across the world; however, the potential power of this approach has yet to be fully utilised in the field of inpatient cardiac surgery. The nudge theory also presents multiple nonalert choice architecture modifications that may be employed. Choice architecture is already influencing decisions made in hospitals every day, whether it has been deliberately designed to promote beneficial behaviours or not. Decision making for cardiac surgery inpatients is already subject to inherent choice architectures, which may be amenable to nudges. The types of choices to which nudges may be employed in the inpatient surgical setting are numerous and may be relevant to medical officers, nursing staff, allied health staff, and patients. Through the strategic development and robust evaluation of choice architecture modification, using the principles of the nudge theory, further optimisation of cardiac surgery inpatient management may be achieved.

1. Introduction

The nudge theory is a behavioural economics concept that suggests that small, subtle changes to the environment or the way information is presented can influence people's behaviour and decision making without necessarily restricting their choices or using coercion [1]. It is based on the idea that people often make decisions without fully considering all of the available information and that certain nudges can help guide them towards choices that are in their best interest or align with their goals. As described in the book "Nudge: Improving Decisions about Health, Wealth, and Happiness," nudges may be considered as changes in choice architecture, the presentation of choices, which promote beneficial behaviours without the restriction of choice. For example, placing healthy food options at the eye level in a cafeteria is a nudge, making it more likely that people will choose healthy options without having to consciously consider the decision. The nudge theory is from the domain of economics, namely behavioural economics, in which the author Professor Richard Thaler was awarded the 2017 Nobel Prize for this work [1] and has influenced the behaviour of millions of individuals across the world; however, the potential power of this approach has yet to be fully utilised in the field of inpatient cardiac surgery [2]. Despite seemingly relating to a disparate field, the theory is highly relevant to inpatient surgical management. Choice architecture is already influencing decisions made in hospitals every day, whether it has been deliberately designed to promote beneficial behaviours or not [3, 4].

2. Nudge Theory and Kahneman's Systems Thinking

Nudge theory is related to Kahneman's systems thinking and heuristics in that they all involve understanding how people make decisions and how their behaviour can be influenced [5]. Heuristics are mental shortcuts or rules of thumb that people use to make decisions quickly and efficiently. They are often based on past experiences and can be useful

Table 1: Examples of possible nudges relevant to cardiac surgery inpatients.

Types of nudges	Examples
Default option	Aim: reduce opioid-related constipation Nudge: when an opioid is ordered on an electronic medical record, PRN aperients are also ordered by default, unless cancelled by the medical officer
Social proof	Aim: improve adherence to institutional targets for discharge summary completion Nudge: sign placed in strategic location stating that "90% of cardiac surgery interns achieve discharge summary distribution within 24 hours of separation"
Salience modification	Aim: improve frequency with which blood glucose level charts are reviewed Nudge: change the colour of the tab on the electronic medical record that opens the blood glucose level recordings (e.g., to a bright colour)
Increasing friction	Aim: reduce patient and staff consumption of sugar-sweetened beverages Nudge: move vending machines away from the ward and doctors' office to the front of the hospital
Reducing friction	Aim: improve communication with patient relatives regarding discharge plans Nudge: include next of kin name and phone number on the header or the opening page for each patient in an electronic medical record or patient folder (as opposed to requiring navigation of several pages to locate such contact details)

in situations where quick decisions are necessary. However, heuristics can also lead to biases and errors in judgment, especially in complex or unfamiliar situations. Kahneman's systems thinking, also known as the dual-process theory, proposes that humans have two modes of thinking: System 1, which is fast, intuitive, and automatic and responsible for many of our daily decisions; and System 2, which is slower, more deliberate, and more effortful and can be involved in complex decision making. Kahneman's system thinking recognizes that heuristics are an important part of human decision making and that they can sometimes lead to errors, but it can also be harnessed to make positive changes through nudges. The nudge theory, therefore, can be seen as a way to leverage heuristics and System 1 thinking to guide people towards better decisions without relying on complex, effortful System 2 thinking.

3. Nudge Theory for Patients and Providers

Nudges may be inexpensive and effective means by which we can change behaviour. Accordingly, multiple international governments have established "Nudge units," the archetype of which was the *Behavioural Insights Team* established in the United Kingdom in 2010 [2]. In this setting, nudges have been investigated to address intention-action gaps (similar to evidence-practice gaps) for the promotion aspects of lifestyle modification, such as the diet and the physical activity, which clearly relate to cardiovascular health. The use of nudges in the inpatient setting is more limited but growing. In cardiology, the recent studies have focussed on the use of alerts to nudge clinicians towards evidence-based prescribing with demonstrated benefits [6], such as in the prescribing of anticoagulation for high-risk atrial fibrillation [7], persuasive behavioural nudges to improve statin adherence [8]. Another study demonstrated the effectiveness of the loss-aversion theory, with loss-framed financial incentives with personalized goal setting significantly increased the physical activity among ischemic heart disease patients using wearable devices [9]. One unique method was the implementation of patient activation tools delivered before clinic appointment to encourage patients to inquire about opportunities for medication optimisation from the physicians [10]. However, additional alerts come with downsides, such as physician burnout [11]. The nudge theory also presents multiple nonalert choice architecture modifications that may be employed.

Decision making for cardiac surgery inpatients is already subject to inherent choice architectures, which may be amenable to nudges. For example, the physical layout of a ward is a type of choice architecture that may influence which patients are seen first and last on a ward round each day. There are many types of nudges that may be employed to modify the choice architecture to promote beneficial behaviours. These changes may include the use of defaults, modifications to salience, and social proof heuristics (see Table 1). Lifestyle modification can be encouraged from the hospital system by improving the food culture and providing a default healthy diet [12], whilst risk factor modification to improve the control of blood sugar levels by constant reminder messages to take medications has proven to be effective [13]. A common inpatient nudge is to provide patients with heart cushions in the postoperative period to remind of the need to protect the sternal wound. To prevent recurrent emergency department presentation with predictable postoperative chest pain, patient counselling can be modified using loss-aversion techniques for pain relief to say that to prevent the loss of a pain-free state, patients can take regular paracetamol in the early postoperative period regardless of whether they are in pain or not. To ensure an adequate postoperative follow-up, prior to discharge, clerical staff could call to ascertain when the patient's next outpatient clinic appointment with their regular cardiologist is scheduled and provide this information to the patient, with a standing order that all discharge summaries are coped to the patient's regular cardiologist. Patient groups for which it may be challenging to use the nudge theory include low socioeconomic groups, migrants or patients who do not speak the native language, and patients from diverse geographical locations [14].

The types of choices to which nudges may be employed in the inpatient surgical setting are numerous and may be relevant to not just the patients but also medical officers, nursing staff, and allied health staff. Nudges for providers aim to help the providers make more informed decisions and to ensure that the patients receive the best possible care. These might include adding prompts to electronic health records to encourage adherence or displaying feedback on how often certain treatments are being ordered compared to recommended best practices.

Underpinning the nudge theory is the using of behavioural and environmental cues to improve the frequency of desirable outcomes; however, nudges may also be prone to misuse. The nudge theory also suffers from a lack of standardisation, as nudges are inherently contingent on the environments in which they are employed. Therefore, research examining nudges needs to consider this potential limitation with regards to the standardisation of environments.

4. Conclusion

It can be seen that choice architectures already influence decisions in cardiac surgical inpatient management, and that nudges have the potential to promote beneficial behaviours. However, nudges should be carefully evaluated to monitor for potential unintended adverse effects, such as alert fatigue. Through the strategic development and robust evaluation of choice architecture modification, using the principles of the nudge theory, further optimisation of cardiac surgery inpatient management may be achieved.

Data Availability

Data used to support the findings of this study are available from the corresponding author upon request.

Conflicts of Interest

The authors declare that there are no conflicts of interest.

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