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Protocol. Effectiveness of Different Nudging Strategies to Influence Prescribers' Behavior in Reducing Opioid Prescriptions Across Diverse Healthcare Settings: A Systematic Scoping Review

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ADMINISTRATIVE INFORMATION

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Conflicts of interest - The authors declare that they have no known competing financial interests or personal relationships that could influence the work reported in this paper.

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Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 19 February 2024 and was last updated on 19 February 2024.

INTRODUCTION

Review question / Objective This systematic scoping review aims to map the evidence in the literature on the effectiveness of various nudging strategies in influencing prescriber behavior toward reducing opioid prescriptions across diverse healthcare settings. Hence the research question is as follows:

1. What nudging strategies have been used in healthcare settings to influence prescribers' behavior toward reducing opioid prescriptions?
2. How effective are different nudging strategies in reducing the number of opioid prescriptions among healthcare providers?

Rationale The persistent high rates of opioid prescriptions in regions like North America and Europe, despite increased awareness of the opioid crisis, signal a concerning trend that may extend beyond these areas. Opioids, while effective for pain relief, carry significant risks such as addiction and other serious side effects, which contribute to a public health burden. The existence of a large quantity of prescribed yet unused opioids raises issues regarding their potential misuse and the challenges of disposal. Current methods to change prescribing habits, including guidelines and educational initiatives, have seen limited success. This has led to a growing interest in applying behavioral economic strategies, or "nudges," to promote better prescribing practices without impinging on clinicians' autonomy. These nudges

have been recognized for their innovation and effectiveness in various sectors and are gaining traction in healthcare to enhance guideline adherence among healthcare professionals. However, the specific impact of nudges on opioid-prescribing patterns remains unclear. This study aims to assess the effectiveness of nudging strategies in reducing opioid prescriptions by systematically reviewing the evidence available in the literature.

Condition being studied The study focuses on evaluating the effectiveness of behavioral economic strategies, specifically nudging, to influence and potentially reduce opioid prescription rates.

METHODS

Search strategy Search will be conducted by a university library's information specialist based on the terms (and synonyms of the terms): Nudging, Default, behavioral economics, behavioral change, choice design, choice architecture, choice behavior, inappropriate prescribing, opioid, opioid analgesics, opiates, medical decision-making, medication optimization, physician, health care worker, health professional, doctor, clinician, nurse team, prescriber OR provider, interventionist, clinical practice and consumer behavior. And reference articles:

Ancker JS, Gossey JT, Nosal S, Xu C, Banerjee S, Wang Y, Veras Y, Mitchell H, Bao Y. Effect of an Electronic Health Record "Nudge" on Opioid Prescribing and Electronic Health Record Keystrokes in Ambulatory Care. *J Gen Intern Med.* 2021 Feb;36(2):430-437. doi: 10.1007/s11606-020-06276-1. Epub 2020 Oct 26. PMID: 33105005; PMCID: PMC7878599.

Bernstein AN, Nourian A, Strother M, Lobo A, Devarajan K, Richman D, Hill MV, Conrad L, Magagna A, Viterbo R, Greenberg R, Chen D, Smaldone M, Correa A, Uzzo R, Kutikov A. Harnessing choice architecture in urologic practice: Implementation of an opioid-sparing protocol grounded in cognitive behavioral theory. *Urol Oncol.* 2022 Mar;40(3):95-102. doi: 10.1016/j.urolonc.2021.10.011. Epub 2021 Dec 6. PMID: 34876350.

Chiu AS, Jean RA, Hoag JR, Freedman-Weiss M, Healy JM, Pei KY. Association of Lowering Default Pill Counts in Electronic Medical Record Systems With Postoperative Opioid Prescribing. *JAMA Surg.* 2018 Nov 1;153(11):1012-1019. doi:

10.1001/jamasurg.2018.2083. PMID: 30027289; PMCID: PMC6583068.

Montoy JCC, Coralic Z, Herring AA, Clattenburg EJ, Raven MC. Association of Default Electronic Medical Record Settings With Health Care Professional Patterns of Opioid Prescribing in Emergency Departments: A Randomized Quality Improvement Study. *JAMA Intern Med.* 2020 Apr 1;180(4):487-493. doi: 10.1001/jamainternmed.2019.6544. PMID: 31961377; PMCID: PMC6990860.

Talat U, Schmidtke KA, Khanal S, Chan A, Turner A, Horne R, Chadborn T, Gold N, Sallis A, Vlaev I. A Systematic Review of Nudge Interventions to Optimize Medication Prescribing. *Front Pharmacol.* 2022 Jan 25;13:798916. doi: 10.3389/fphar.2022.798916. PMID: 35145411; PMCID: PMC8822212.

Wang SY, Groene O. The effectiveness of behavioral economics-informed interventions on physician behavioral change: A systematic literature review. *PLoS One.* 2020 Jun 4;15(6):e0234149. doi: 10.1371/journal.pone.0234149. PMID: 32497082; PMCID: PMC7272062.

Participant or population Healthcare professionals, particularly prescribers who are involved in the administration of opioid medications.

Intervention Not applicable.

Comparator Not applicable.

Study designs to be included Systematic scoping review.

Eligibility criteria Studies were selected for inclusion based on several criteria: (a) interventions carried out in clinical settings aimed at prescribers; (b) behavioral interventions described as nudging; (c) studies with a randomized controlled trial, quasi-experimental, or longitudinal (before-after) design; and (d) original research articles written in English and published in peer-reviewed journals.

Information sources Seven electronic databases: PubMed, PsycINFO, SocIndex, CINAHL, Cochrane Library, Web of Science, and Embase.

Main outcome(s) The extracted data encompassed various study characteristics, including: (a) author(s); (b) year of publication; (c) objectives and aims of the study; (d) population

and sample size; (e) design of the study; (f) underlying logic of the effect; (g) types of nudges applied; (h) implementation medium (e.g., physical or digital platforms); (i) specific details of implementation (e.g., clinical settings, hospitals, emergency departments, etc.); (j) geographic location of the study; (k) duration of the study; and (l) primary outcomes and findings. The coding of the data was aligned with the type of nudging strategy applied, the specific objective targeted by the nudge, and the medium utilized for the implementation of the nudges.

Quality assessment / Risk of bias analysis This review aims to provide a comprehensive overview of the available evidence without focusing on the quality of the studies because it is a systematic scoping review. And only articles in English are screened. Hence there will be an Anglo-European bias in the selection.

Strategy of data synthesis The strategies used in the included studies were systematically classified based on the categorization established in the seminal work of Thaler and Sunstein (2008). These nudge categories encompass a range of implementation techniques, which are accessible to choice architects, including increasing the salience of information or incentives (IS), understanding mapping (UM), default choices (DF), providing feedback (PF), error reduction (ER), and structuring complex choices (SC).

Furthermore, building on Daniel Kahnemans (2011) definitions of System 1 and System 2, the nudging interventions were categorized according to two independent dimensions to create four quadrants. These dimensions are:

1. Synchronous vs. Asynchronous: A strategy is defined as synchronous when its implementation aligns with the timing of the decision or behavior that it aims to influence. In contrast, an asynchronous strategy is not bound by specific timing and can be executed at any moment.
2. Active vs. Passive: An intervention is considered active if it necessitates direct action from the targeted clinician for its completion. Conversely, a passive strategy does not require any action from the clinician.

Thus, asynchronous, and passive strategies are characterized by their independence from the clinician's actions and timing, whereas synchronous and active strategies demand the clinician's involvement in concurrence with the presentation of the nudge.

Subgroup analysis Not applicable.

Sensitivity analysis Not applicable.

Language restriction Yes, English.

Country(ies) involved Sweden.

Keywords Nudging; Choice architecture; Prescriber Behavior change; Opioid Prescriptions; Healthcare professionals; Healthcare settings.

Contributions of each author

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