SUPPLEMENTARY MATERIALS

Table S1. Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) Checklist

SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
TITLE			
Title	1	Identify the report as a scoping review.	1
ABSTRACT			
Structured summary	2	Provide a structured summary that includes (as applicable): background, objectives, eligibility criteria, sources of evidence, charting methods, results, and conclusions that relate to the review questions and objectives.	2
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of what is already known. Explain why the review questions/objectives lend themselves to a scoping review approach.	3-4
Objectives	4	Provide an explicit statement of the questions and objectives being addressed with reference to their key elements (e.g., population or participants, concepts, and context) or other relevant key elements used to conceptualize the review questions and/or objectives.	4
METHODS			
Protocol and registration	5	Indicate whether a review protocol exists; state if and where it can be accessed (e.g., a Web address); and if available, provide registration information, including the registration number.	NA
Eligibility criteria	6	Specify characteristics of the sources of evidence used as eligibility criteria (e.g., years considered, language, and publication status), and provide a rationale.	5-6
Information sources*	7	Describe all information sources in the search (e.g., databases with dates of coverage and contact with authors to identify additional sources), as well as the date the most recent search was executed.	6
Search	8	Present the full electronic search strategy for at least 1 database, including any limits used, such that it could be repeated.	5 (Figure 1)
Selection of sources of evidence†	9	State the process for selecting sources of evidence (i.e., screening and eligibility) included in the scoping review.	5-6 (Figure 2)
Data charting process‡	10	Describe the methods of charting data from the included sources of evidence (e.g., calibrated forms or forms that have been tested by the team before their use, and whether data charting was done independently or in duplicate) and any processes for obtaining and confirming data from investigators.	5-6
Data items	11	List and define all variables for which data were sought and any assumptions and simplifications made.	6-7

SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
Critical appraisal of individual sources of evidence§	12	If done, provide a rationale for conducting a critical appraisal of included sources of evidence; describe the methods used and how this information was used in any data synthesis (if appropriate).	NA
Synthesis of results	13	Describe the methods of handling and summarizing the data that were charted.	6
RESULTS			
Selection of sources of evidence	14	Give numbers of sources of evidence screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally using a flow diagram.	7
Characteristics of sources of evidence	15	For each source of evidence, present characteristics for which data were charted and provide the citations.	Supplementary material, Table S2
Critical appraisal within sources of evidence	16	If done, present data on critical appraisal of included sources of evidence (see item 12).	NA
Results of individual sources of evidence	17	For each included source of evidence, present the relevant data that were charted that relate to the review questions and objectives.	8-9
Synthesis of results	18	Summarize and/or present the charting results as they relate to the review questions and objectives.	10
DISCUSSION			
Summary of evidence	19	Summarize the main results (including an overview of concepts, themes, and types of evidence available), link to the review questions and objectives, and consider the relevance to key groups.	11-14
Limitations	20	Discuss the limitations of the scoping review process.	14
Conclusions	21	Provide a general interpretation of the results with respect to the review questions and objectives, as well as potential implications and/or next steps.	13-14
FUNDING			
Funding	22	Describe sources of funding for the included sources of evidence, as well as sources of funding for the scoping review. Describe the role of the funders of the scoping review.	15

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Table S2. Scoping review results

Authors, year	Country	Setting (number of sites)	Clinical area	CDSS	Platform	CDSS aim	Study design	Baseline patient complexity	Intervention duration	CDSS users	Study phases	Pharmacist participation	Training before intervention	Informative report to patients	Follow-up	Primary outcome	Results
Blum MR, et al. **2021** [1]	Switzerland	hospital (multicentric)	geriatrics	rule-based	web-based software	prescriptive appropriateness	RCT	polymedicated	19-24 months	multidisciplinary team	intervention	yes	no	no	yes	number of (re)-hospitalizations	outcome non-achieved
Qu J, et al. **2021** [2]	China	hospital (multicentric)	cardiology	guidelines	smartphone-based application	medication review	RCT	NA	13-18 months	multidisciplinary team	intervention	no	yes	no	no	prescription rate of drugs of interest	outcome non-achieved
Mastriani A, et al. **2021** [3]	USA	hospital (monocentric)	pediatrics	digital checklist	integrated into a vital sig monitor	disease management	pre-post intervention study	need for resuscitation	≤ 6 months	multidisciplinary team	pre-post CDSS implementation	no	no	no	no	percent of vital signs documented	outcome only partially achieved
Menon S, et al. **2021** [4]	USA	hospital (monocentric)	pediatrics	guidelines	integrated into EHR	AKI detection	pre-post intervention study	chronic kidney disease	≤ 6 months	multidisciplinary team	pre-post CDSS implementation	no	yes	no	yes	AKI progression	outcome achieved
Wasylewicz ATM, et al. **2021** [5]	The Netherlands	hospital (monocentric)	hospitalized patients with feeding tube	guidelines	NA	medication error detection	pre-post intervention study	need for feeding tube	≤ 6 months	pharmacist	pre-post CDSS implementation	yes	yes	no	no	number of feeding tube-related medication errors	outcome achieved
Bourdeaux C, et al. **2020** [6]	The United Kingdom	hospital (monocentric)	nephrology	guidelines	web-based software	AKI detection	pre-post intervention study	NA	7-12 months	multidisciplinary team	pre-post CDSS implementation	yes	yes	no	no	AKI progression	outcome achieved
Lee V, et al. **2020** [7]	Canada	hospital (monocentric)	pediatrics	predictive models	smartphone-based application	risk score assessment	pre-post intervention study	NA	≤ 6 months	nurse	pre-post CDSS implementation	no	yes	no	no	time to administration of intravenous antibiotics	outcome achieved
Holland WC, et al. **2020** [8]	USA	emergency department (monocentric)	substance use disorder	rule-based	integrated into EHR	disease management	pre-post intervention study	opioid use disorder	7-12 months	clinician	pre-post CDSS implementation	no	yes	no	no	prescription rate of drugs of interest	outcome achieved

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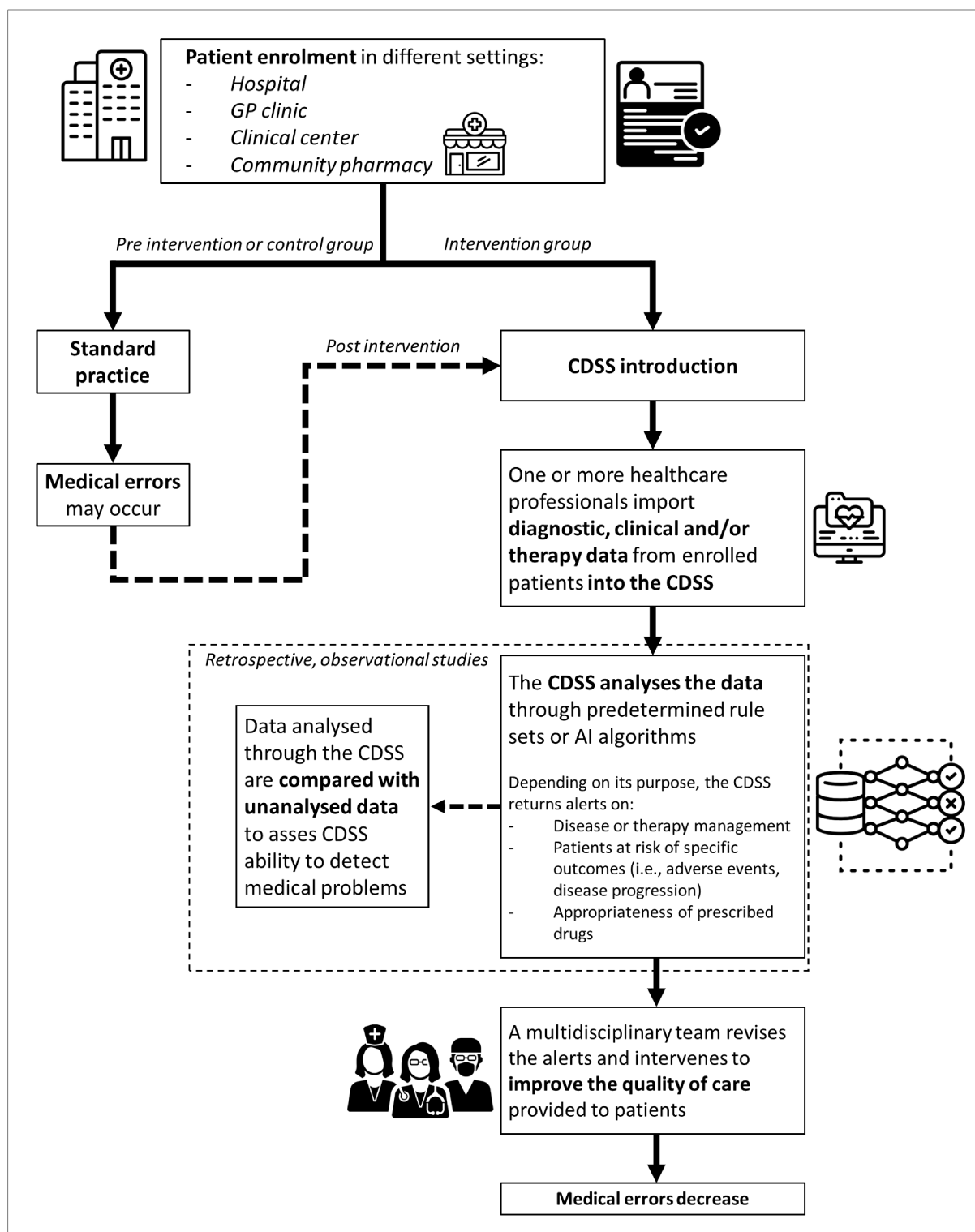| Study	Country	Setting	Field	Type	Integration	Function	Study design	Condition	Duration	User	Implementation					Outcome measure	Outcome result
Murphy ME, et al. **2020** [9]	Ireland	GP clinic (multicentric)	diabetology	rule-based	web-based software	disease management	RCT	diabetes	NA	GP	intervention	no	yes	no	no	impact on glycemic control	outcome non-achieved
Tao L, et al. **2020** [10]	China	hospital (monocentric)	hospitalized patients	AI-based	integrated into EHR	diagnosis	retrospective, observational study	NA	> 24 months	researcher	pre-post CDSS implementation	no	no	no	no	diagnosis accuracy	outcome achieved
Moja L, et al. **2019** [11]	Italy	hospital (monocentric)	hospitalized patients	rule-based	integrated into EHR	prescriptive appropriateness	RCT	comorbidities	13-18 months	clinician	intervention	no	no	no	no	resolution rate of medical problems identified	outcome non-achieved
Bean DM, et al. **2019** [12]	The United Kingdom	hospital (monocentric)	cardiology	rule-based	integrated into EHR	risk score assessment	retrospective, observational study	comorbidities	> 24 months	researcher	intervention	no	no	no	no	risk score assessment	outcome achieved
McDonald EG, et al. **2019** [13]	Canada	hospital (multicentric)	geriatrics	rule-based	web-based software	deprescription	pre-post intervention study	comorbidities	7-12 months	multidisciplinary team	pre-post CDSS implementation	yes	no	yes	yes	proportion of appropriate or inappropriate prescriptions	outcome achieved
Halpin KL, et al. **2019** [14]	USA	emergency department (monocentric)	pediatrics	rule-based	integrated into EHR	disease management	retrospective, observational study	adrenal insufficiency	19-24 months	clinician	pre-post CDSS implementation	no	no	no	no	prescription rate of drugs of interest	outcome only partially achieved
Campbell NL, et al. **2019** [15]	USA	hospital (multicentric)	neurology	rule-based	integrated into EHR	deprescription	RCT	comorbidities	≤ 6 months	pharmacist	intervention	yes	no	no	no	delirium duration and severity	outcome non-achieved
Seal KH, et al. **2019** [16]	USA	hospital (monocentric)	substance use disorder	guidelines	NA	disease management	RCT	high risk of opioid use disorder	19-24 months	multidisciplinary team	intervention	no	yes	yes	no	feasibility of the intervention and patients' satisfaction	outcome non-achieved
Stipelman CH, et al. **2019** [17]	USA	hospital (monocentric)	infectious diseases	rule-based	integrated into EHR	risk score assessment	pre-post intervention study, retrospective	NA	> 24 months	multidisciplinary team	pre-post CDSS implementation	no	yes	no	no	risk score assessment	outcome achieved
Choi KS, et al.	South Korea	hospital (monocentric)	nephrology	rule-based	integrated into CPOE	medication review	retrospective, observati	chronic kidney disease	≤ 6 months	multidisciplinary team	intervention	yes	no	no	no	proportion of appropri	outcome achieved

2019 [18]							onal study									ate or inappropriate prescriptions	
Muth C, et al. **2018** [19]	Germany	GP clinic (multicentric)	geriatrics	rule-based	NA	medication review	RCT	polymedicated	NA	multidisciplinary team	intervention	no	yes	no	no	prescription rate of drugs of interest	outcome non-achieved
Bond SE, et al. **2017** [20]	Australia	hospital (multicentric)	infectious diseases	guidelines	web-based software	prescriptive appropriateness	pre-post intervention study	NA	19-24 months	multidisciplinary team	pre-post CDSS implementation	yes	yes	no	no	proportion of appropriate or inappropriate prescriptions	outcome achieved
Berrevoets MAH, et al. **2017** [21]	The Netherlands	hospital (monocentric)	infectious diseases	guidelines	NA	antimicrobial prescription	RCT	infectious disease	> 24 months	clinician	pre-post CDSS implementation	yes	yes	no	no	proportion of appropriate or inappropriate prescriptions	outcome achieved
Shah AC, et al. **2019** [22]	USA	hospital (monocentric)	hospitalized patients with general anesthesia	rule-based	integrated into EHR	anesthesia management	pre-post intervention study	need for general anesthesia	≤ 6 months	clinician	pre-post CDSS implementation	yes	no	no	no	compliance with epidural infusion initiation	outcome achieved
Hulyalkar M, et al. **2017** [23]	USA	hospital (monocentric)	pediatrics	digital checklist	NA	disease management	pre-post intervention study	children	≤ 6 months	researcher	intervention	no	no	no	no	risk score assessment	outcome achieved
Lipatov K, et al. **2022** [24]	USA	emergency department (monocentric)	infectious diseases	AI-based	NA	disease management	retrospective observational study	infectious disease	> 24 months	clinician	pre-post CDSS implementation	no	no	no	no	risk score assessment	outcome non-achieved
Fried TR, et al. **2017** [25]	USA	hospital (monocentric)	geriatrics	rule-based	integrated into EHR	prescriptive appropriateness	RCT	polymedicated (excessive)	13-18 months	clinician	intervention	no	no	yes	no	patient-clinician medication-related communication	outcome only partially achieved
Kercsmar CM, et al. **2019** [26]	USA	clinical center (multicentric)	respiratory diseases	guidelines	NA	asthma management	RCT	asthma	> 24 months	multidisciplinary team	intervention	no	yes	no	no	asthma control	outcome achieved

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Study	Country	Setting	Department	Type	Platform	Function	Design	Population	Duration	Team	Role					Outcome measure	Outcome
Spat S, et al. 2017 [27]	Austria	hospital (monocentric)	diabetology	rule-based	smartphone-based application	disease management	noncontrolled intervention study	diabetes	NA	multidisciplinary team	intervention	no	yes	no	no	impact on glycemic control	outcome achieved
Webster R, et al. 2021 [28]	Australia	GP clinic (multicentric)	cardiology	rule-based	smartphone-based application	medication review	RCT	comorbidities	NA	multidisciplinary team	intervention	yes	yes	no	no	proportion of appropriate or inappropriate prescriptions	outcome non-achieved
Kharbanda EO, et al. 2018 [29]	USA	clinical center (multicentric)	pediatrics	predictive models	integrated into EHR	hypertension recognition	RCT	children	19-24 months	multidisciplinary team	intervention	no	no	no	yes	hypertension recognition	outcome achieved
Elliott LS, et al. 2017 [30]	USA	community pharmacy (monocentric)	chronically ill patients	rule-based	web-based software	medication review	RCT	high risk drugs	7-12 months	pharmacist	intervention	yes	no	no	no	number of (re)-hospitalizations	outcome achieved
Kim K, et al. 2018 [31]	USA	community pharmacy (NA)	chronically ill patients	rule-based	web-based software	prescriptive appropriateness	RCT	polymedicated	NA	pharmacist	intervention	yes	no	yes	no	proportion of appropriate or inappropriate prescriptions	outcome achieved
Kessler S, et al. 2021 [32]	USA	hospital (NA)	chronically ill patients	AI-based	web-based software	medication review	retrospective, observational study	polymedicated (excessive)	13-18 months	multidisciplinary team	intervention	yes	no	no	no	number of (re)-hospitalizations	outcome achieved
Tamblyn R, Aet al. 2019 [33]	Canada	hospital (multicentric)	hospitalized patients with surgery	rule-based	integrated into EHR	medication review	RCT	comorbidities	> 24 months	multidisciplinary team	intervention	yes	no	no	yes	proportion of adverse drug events	outcome only partially achieved
Mainous AG 3rd, et al. 2018 [34]	USA	GP clinic (multicentric)	hematology	rule-based	integrated into EHR	disease management	quasi experimental design	NA	≤ 6 months	GP	pre-post CDSS implementation	no	yes	no	no	number of appropriate ferritin tests order	outcome achieved
Winata S, et al. 2021 [35]	Australia	hospital (monocentric)	geriatrics	rule-based	integrated into EHR	deprescription	pre-post intervention study	NA	≤ 6 months	multidisciplinary team	pre-post CDSS implementation	yes	yes	no	no	proportion of appropriate or inappropriate prescriptions	outcome non-achieved

Author	Country	Setting	Specialty	Type	System	Intervention	Study design	Disease	Follow-up	User	Comparison					Outcome measure	Outcome
Reynolds EL, et al. **2020** [36]	USA	hospital (monocentric)	nephrology	rule-based	integrated into EHR	medication review	RCT	neuropathy	NA	clinician	intervention	no	no	yes	no	proportion of appropriate or inappropriate prescriptions	outcome non-achieved
Vijayakumar VK, et al. **2021** [37]	Norway	GP clinic (multicentric)	respiratory diseases	guidelines	web-based software	disease management	RCT	COPD	NA	GP	intervention	no	no	no	no	proportion of appropriate or inappropriate prescriptions	outcome only partially achieved
Gupta S, et al. **2019** [38]	Canada	hospital (multicentric)	respiratory diseases	guidelines	integrated into EHR	asthma management	pre-post intervention study	asthma	19-24 months	clinician	pre-post CDSS implementation	no	yes	yes	no	asthma control	outcome achieved
Pouliot JD, et al. **2018** [39]	USA	hospital (monocentric)	hospitalized patients with epidural anesthesia	guidelines	integrated into CPOE	medication review	retrospective, observational study	need for epidural anesthesia	≤ 6 months	clinician	pre-post CDSS implementation	no	no	no	no	proportion of appropriate or inappropriate prescriptions	outcome non-achieved
Heard KL, et al. **2019** [40]	The United Kingdom	hospital (monocentric)	infectious diseases	guidelines	integrated into EHR	antimicrobial prescription	retrospective observational study	infectious disease	≤ 6 months	pharmacist	pre-post CDSS implementation	yes	no	no	no	number of cases reviewed using the CDSS	outcome achieved
Wasylewicz ATM, et al. **2021** [41]	The Netherlands	hospital (monocentric)	hospitalized patients with feeding tube	guidelines	integrated into EHR	prescriptive appropriateness	pre-post intervention study	need for feeding tube	≤ 6 months	pharmacist	pre-post CDSS implementation	yes	yes	no	no	number of feeding tube related medication errors	outcome achieved
Aziz MT, et al. **2021** [42]	Pakistan	hospital (monocentric)	oncology	rule-based	integrated into CPOE	medication review	observational study	cancer	7-12 months	pharmacist	intervention	yes	yes	no	no	number of medication errors	outcome achieved

Abbreviation: CDSS, Clinical Decision Support System; RCT, Randomized Controlled Trial; HER, Electronic Health Record; AKI, Acute Kidney Injury; AI, Artificial Intelligence; CPOE, Computerized Provider Order Entry; NA, Not Applicable; GP, General Practitioner; COPD, Chronic Obstructive Pulmonary Disease

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Figure S3. Process steps for conducting effective studies with CDSSs

Abbreviations: GP, general practitioner; CDSS, clinical decision support system; AI, artificial intelligence

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