Appendix A: Terms used to search on bibliographic databases

PubMed	(((((decision support system*[Title/Abstract] OR CDSS*[Title/Abstract])) AND Nurs*[Title/Abstract]) AND (patient*[Title/Abstract] OR decision*[Title/Abstract] OR Care*[Title/Abstract] OR outcome*[Title/Abstract] OR Effect*[Title/Abstract] OR evalua*[Title/Abstract])))
CINAHL	TI((decision support*) OR CDSS* OR DSS*) AND TI(Nurs*) AND TI(patient* OR decision* OR outcome* OR effect* OR Evaluat*)
Cochrane	Decision support OR CDSS* OR DSS* in Record Title AND Nurs* in Title Abstract Keyword AND Decision* OR patient OR outcome* OR effect* OR Evaluat* in Title Abstract Keyword
Embase	(Decision support* or CDSS or DSS*).ti. and Nurs*.ab. and (Decision* or patient* or outcome* or effect* or Evaluat*).ab.
Scopus	(TITLE (decision AND support* OR cdss* OR dss*) AND TITLE-ABS-KEY (nurs*) AND TITLE-ABS-KEY (decision* OR patient* OR outcome* OR effect* OR evaluat*))
Web of Science	TI=(Decision support* OR CDSS* OR DSS*) AND TS=(NURS*) AND TS=(decision* OR patient OR outcome* OR effect* OR evaluat*)

Appendix B(i): Risk of bias assessment for included randomized controlled trials[a]

	Author, year	Randomization process	Deviations from intended interventions	Missing outcome data	Measurement of the outcome	Selection of the reported result
1	Thoma-Lurken et al., 2018	Some concerns	Low	Low	Low	Some concerns
2	Geurts et al., 2017	Some concerns	Low	Low	Some concerns	Low
3	Cortez et al., 2016	Low	Some concerns	Low	Some concerns	Some concerns
4	McDonald et al., 2016	Some concerns	Some concerns	Low	Low	Low
5	Dallaire & Cossi, 2015	Low	Some concerns	Low	Low	Some concerns
6	Bakken et al., 2014	Low	Some concerns	Low	Low	Low

[a] Assessment based on Cochrane risk of bias tool (RoB 2)

Appendix B(ii): Risk of bias assessment for included quasi-experimental studies [a]

S. No.	Author, year	a	b	c	d	e	f	g	h	i
1	McLead et al., 2020	Yes	Yes	Yes	Yes	Yes	Not applicable	Yes	Yes	Yes
2	Tang et al., 2019	Yes	Unclear	Unclear	Yes	Yes	Not applicable	Yes	Unclear	Unclear
3	Reynolds et al. 2019	Yes	No	Yes	No	Yes	No	Yes	Unclear	Yes
4	Mahabee-Gittens et al., 2018	Yes	Yes	Yes	No	Yes	No	Yes	Yes	Yes
5	Dehgani Soufi et al., 2018	Yes	Unclear	Yes	Yes	Yes	Not applicable	Yes	Yes	Yes
6	Chunmei et al., 2018	Yes	Unclear	Unclear	Yes	No	Not applicable	Yes	Unclear	Unclear
7	Boltin et al., 2018	Yes	Yes	Yes	No	No	Not applicable	Yes	No	No
8	Topaz et al., 2018	Yes	Yes	Yes	Yes	Yes	Not applicable	Yes	Yes	Yes
9	Kihlgren et al., 2016	Yes	Yes	Yes	No	Yes	No	Yes	Unclear	Yes
10	Bennett et al., 2016	Yes	Unclear	Yes	Yes	Yes	Not applicable	Yes	Yes	Yes
11	Ajay et al., 2016	Yes	Unclear	Unclear	No	No	No	Yes	Yes	Yes
12	Febretti et al., 2016	Yes	No	Yes	Yes	No	Not applicable	Yes	Yes	Yes
13	Harless DS, 2016	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes
14	Lytle et al., 2015	Yes	Unclear	Yes	Yes	Yes	Not applicable	Yes	Yes	Yes
15	Bowles et al., 2015	Yes	Yes	Yes	Yes	Yes	Not applicable	Yes	Yes	Yes
16	Vetter, MJ, 2015	Yes	Yes	Yes	Yes	Yes	Not applicable	Yes	Unclear	Yes
17	Horner & Coleman, 2014	Yes	Yes	Yes	Yes	Yes	Not applicable	Yes	Unclear	Yes
18	Olsho et al., 2014	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

[a] Assessment based on The Joanna Briggs Institute critical appraisal tools

a. Is it clear in the study what is the 'cause' and what is the 'effect' (i.e. there is no confusion about which variable comes first)?
b. Were the participants included in any comparisons similar?
c. Were the participants included in any comparisons receiving similar treatment/care, other than the exposure or intervention of interest?
d. Was there a control group?
e. Were there multiple measurements of the outcome of both pre and post the intervention/exposure?
f. Was follow up complete and if not, were differences between groups in terms of their follow up adequately described and analyzed?
g. Were the outcomes of participants included in any comparisons measured in the same way?
h. Were outcomes measured in a reliable way?
i. Was appropriate statistical analysis used?

Appendix B(iii): Risk of bias assessment for included observational study [a]

	Telford et al., 2018
Were the criteria for inclusion in the sample clearly defined?	Yes
Were the study subjects and the setting described in detail?	Yes
Was the exposure measured in a valid and reliable way?	Yes
Were objective, standard criteria used for measurement of the condition?	Unclear
Were confounding factors identified?	No
Were strategies to deal with confounding factors stated?	No
Were the outcomes measured in a valid and reliable way?	Yes
Was appropriate statistical analysis used?	Yes

[a] Assessment based on The Joanna Briggs Institute critical appraisal tools.

Appendix C: Variables reported in included studies (green: positive effect, red: negative effect, yellow: no significant effect, white: no baseline data to compare)

Author	Nurses' decision making	Care delivery	Patient outcome	Key findings
Ajay et al., 2016.	Compliance: prescription for HTN and DM management	Screening	Impact on blood pressure Impact on DM	A mobile DSS was used to screen and manage hypertension (HTN) and diabetes mellitus (DM). The DSS resulted in increased screening and diagnosis (3152 and 450 new diagnoses for HTN and DM, respectively). Patients were followed up for 18 months. A major improvement was observed in the first three months for both disease groups. Additionally, 73% of all prescriptions agreed with DSS recommendations.
Bakken et al., 2014	Diagnosis Implementation of care plan			A mobile DSS was used to diagnose and manage obesity, tobacco use, and depression in adults and children. It was found to improve all four diagnoses. In terms of care planning, use of DSS led to a higher mean number of plan items for obesity and paediatric depression. There were no significant differences in the mean number of plan items for tobacco use and adult depression.
Barken et al., 2017	Influence of TM setting			When telemedicine nurses used a computerized DSS for management of patients with chronic obstructive pulmonary disease, their compliance with system recommendations depended on multiple factors. These included patients' comorbidities, extended clinical information and their own judgement.
Bennett et al., 2016	Triage prioritization	Pain assessment Pain management Management of patients with potential neutropenic sepsis.		The impact of a triage DSS on triage prioritization, pain assessment, pain management and management of potential neutropenic sepsis was measured. The DSS significantly improved triaged prioritization (60.5% pre vs 85.2% post), pain assessment (35% pre vs 97.7% post), and appropriate analgesic administration for pain management (26.6% pre vs 78.5% post). However, on time administration of antibiotics for sepsis decreased from 11.5% pre-DSS to 5.6% post DSS.

Author	Nurses' decision making	Care delivery	Patient outcome	Key findings
Boltin et al., 2018	Time taken to make decision Compliance: Nurses' agreement with triage decision			A simulated mass casualty incident was managed by mobile triage DSS. The entire triage process took 5 minutes, 34 seconds with the use of DSS. There is no baseline (pre-implementation) data available. Overall, nurses agreed with the system 91.6% of the time when it came to choosing exposure level and 84.3% of the time when selecting an action.
Bowles et al., 2015	Rate of referral		30 and 60 days readmission rate	A DSS that identifies patients at risk of poor discharge outcomes and recommends referral for post-acute services was tested. There was a significant improvement in 30-day readmission among the intervention group, with 58% relative reduction in high-risk group and 33% in high and low-risk combined. 60-day readmission also improved by 50% in high-risk patients and 37% in high and low risk combined. The site of post-acute care referral for all high risk and low risk varied between the control and experimental periods but was not statistically significant.
Chunmei et al. 2018	Accuracy of nursing diagnosis		Risk incidents	DSS increased the diagnostic accuracy of nursing assessments by 22%. System implementation also resulted in 35 fewer falls and 23 fewer pressure injuries in a year.
Ciqueto Peres et al., 2015	Compliance: Agreement with nursing diagnosis recommendation			Nurses used a DSS to help them select nursing diagnoses. Their agreement with DSS recommendation was statistically significant, but was mainly affected by the nurses' education, experience, unit, and year of encounter.
Cortez et al., 2016	Documentation of evidence-based practice			The effect of DSS on oncology evidence-based practice (EBP) was evaluated using nursing documentation as a data source. The average EBP was 27% at baseline in both intervention and control groups. Participating nurses were first educated about EBP guidelines and DSS, which increased average EBP rate (37%). Once the DSS was implemented, average EBP rate decreased to 26%.

Author	Nurses' decision making	Care delivery	Patient outcome	Key findings
Dallaire & Cossi, 2015		Transfer to care site		Older adults who called emergency services were randomized to test a prehospital triage DSS. In the control group, all the patients were directly transported to the emergency department (ED), whereas in the intervention group, ambulance nurses were able to bypass ED for 20% of patients in favour of a geriatric ward or community emergency care centre.
Dehgani Soufi et al., 2018	Completeness of documentation			Completeness of nursing documentation of triage recommendations was 98.5% with computerized DSS, while that with paperbased method was 76.72%.
Febretti et al., 2016	Compliance: adding positioning in care plan			When nurses were asked to use a DSS that recommended positioning interventions for simulated end-of-life scenarios, 87% of participants chose to perform positioning as compared to 7.5% prior to DSS.
Geurts et al., 2017	Compliance: Oral rehydration CDSS recommendation	Number of Diagnostic tests	Length of stay	A nursing DSS to support rehydration planning for children presenting to emergency with acute gastroenteritis. Post implementation analysis showed improvement in compliance with evidence-based guidelines. The standardized use of oral rehydration solution (ORS) significantly increased from 52% to 65%. There was a non-significant reduction of laboratory tests (by 50%) with the use of DSS. Other outcome measures, including cost, length of stay, hospitalization and revisits, had no significant impact.
		Treatment		
		Cost	Follow up (revisit)	
Harless DS, 2015			Functional outcomes	For patients with lower back pain, nurse practitioners used a DSS to manage their functional outcomes. Findings did not demonstrate a significant difference in functional outcomes with the use of DSS.
Horner & Coleman, 2014	Compliance: EBP guidelines for maternity care			Evidence-based maternity care guidelines were embedded in a DSS called basic antenatal care information system (BACIS). The guidelines were categorized into nine antenatal conditions ranging from the first visit to multigravida. Nurses and midwives who used BACIS had statistically significant improvement in compliance for three out of nine items.

Author	Nurses' decision making	Care delivery	Patient outcome	Key findings
Kihlgren et al., 2016	Compliance: Triage			Municipal nurses used a DSS to triage older adults with deteriorating health in the community. Depending on patients' symptoms and vital parameters, the DSS recommended course of action. The correlation between nurse and DSS decisions were significant. DSS performance was also compared to the hospital triage system and found to be significantly similar.
Lytle et al., 2015	Compliance: fall risk assessment Documentation Care plan implementation		Fall safety reports	A DSS was implemented to improve the rate of completed fall risk assessments for at risk patients in 16 adult inpatient units. The implementation led to significant improvement in documentation of fall risk assessments, especially at the time of admission (from 92.7 to 98.8%) but decrease in care plan documentation (from 77.1 to 61.5%). Care plan alerts were tested in two units. Over a two month period, the DSS triggered 3,653 alerts of which 84 (2.2%) were acted on. All patients who had a fall pre- and post-implementation had risk assessment documented. No significant improvement was seen in the falls rate.
Mahabee-Gittens et al., 2018	Compliance: Nurses' behaviour towards caregiver education	Assistance provided to caregivers	Caregiver's willingness to quit	The DSS prompted nurses to *ask, advice, assist and arrange* caregivers to quit smoking. Nurses acted on these prompts 26% to 67% of the times as compared to baseline compliance of 5.7% to 23%. Change in nurses' behaviour was more significant in the first month of DSS implementation, after which the compliance decreased in ask, advice and arrange elements. 3.9% of nurses did not take any action regardless of DSS alerts. Among caregivers who were provided assistance to quit smoking, most were given written information (83.5%). 67% of caregivers who received advice on smoking cessation said they were interested in quitting in the next 30 days.
McDonald et al., 2016			Medication regimen complexity index Rate of hospitalization	A DSS to manage medication regimen complexity (MRC) was used by 82% of participating nurses on 42% of their patients. Those patients had significant improvement in their MRC threshold (reduction from over 8% to 4.5%) and hospitalization rate (17.9% with CDS vs 21.3% without CDS).
McLeod et al., 2020	Number of patients under triaged			

Author	Nurses' decision making	Care delivery	Patient outcome	Key findings
	Number of patients over triaged Time to make decision			The electronic Canadian Triage and Acuity Scale (eCTAS) was tested in seven emergency departments. Four sites had paper-based triage assessments pre-implementation. For these sites, median triage time increased by 74 seconds. For the three sites that used an electronic triage system pre-implementation, median triage time decreased by 30 seconds. The number of patients over-triaged decreased from 12% pre-implementation to 5% with eCTAS, and that for under-triaged decreased from 13% to 2%.
Olsho et al., 2014			Pressure injury incidents	A DSS called on-time was implemented in 12 nursing homes which identifies changes in patients' risk of pressure ulcers.. There were five core reports: nutrition, weight, priority, trigger summary and behaviour. Post-implementation, there was a 59% reduction in monthly pressure ulcer incidence. This impact was the most significant with the use of four out of five core reports.
Reynolds et al., 2019	Cognitive load	Medication errors		Of all medication dosage calculations performed using a pharmaceutical algorithm computerized calculator (pac2), 20% were flagged as high (above the safe dosage range) and 12% as low (below the safe range). However, not all flagged doses were actual errors. Overall, the number of voluntarily reported medication errors attributed to the administration stage was small (4 in NICU and 2 in PICU). There was no significant difference in cognitive load with or without pac2.
Tang et al., 2019	Variation in care plan Time to make decision			A cloud-based nursing care planning system (C-NCPS) was implemented in private nursing homes. This system facilitated admission staff in developing relevant care plans for incoming patients. Time required to make a decision about patient's care decreased significantly in post implementation phase, with 75% reduction in waiting time for supporting document, 77.8% reduction in time to search information and 42.8% reduction in time required to formulate nursing care plans. Additionally, consistency within care plans increased from 63% to 91%, and variations in care plans among junior and senior nurses decreased by 26% and 29%, respectively.

Author	Nurses' decision making	Care delivery	Patient outcome	Key findings
Telford et al., 2018			Time to achieve goal blood glucose Blood glucose after reaching goal Hypoglycaemic events	The mean time to achieve goal blood glucose in critically ill patients was found to be within the safe range (6.3 hours) with the use of computerized insulin infusion DSS. Moreover, blood glucose levels stayed within range (140-180 mg/dl) for 47.9% of patients after reaching the goal. One episode of mild hypoglycaemia was reported. Overall, the DSS was considered safe and effective in the study sample.
Thoma-Lurken et al., 2018	Variation in care plan			Nurses caring for dementia patients were provided with a DSS to support assessment for common problems. There was no significant difference in uniformity of problem assessment or mean number of solutions for those problems.
Topaz et al., 2018		First nursing visit	Rehospitalization Length of stay	A DSS for prioritizing patients referred to homecare agencies. This system allowed high-risk patient to receive their first homecare nursing visit one-half a day sooner. Moreover, rehospitalizations from homecare decreased by 9.4%.
Vetter, MJ, 2015	Accuracy of diagnosis			Nurse practitioners from home-based primary care practice used a DSS to generate primary and secondary diagnoses for their patients. As a result, most primary diagnoses were not reflective of the current, most significant reason for the clinical encounter. However, secondary diagnoses were accurately identified and coded.
Wouters et al., 2019	Factors affecting decision making			Twenty-four telephone triage nurses used electronic DSS at nine out-of-hours primary care centres. To reach a clinical decision, nurses gathered information, used their knowledge about diseases and tested hypotheses about the disease(s) of concern. They mainly used pattern recognition and intuition and created a mental image of the patient to compensate for the lack of visuals during telephone triage. The more senior triage nurses asked more questions beyond the required DSS questions during their interaction with patients.