Supplemental Digital Content

Appendix A: Search Terms

PubMed

(ICU[tiab] OR "Intensive Care Units"[Mesh] OR "Intensive care unit*"[tiab] OR "critical care unit*"[tiab] OR CCU[tiab]) AND

("readmission*"[tiab] OR "re-admission*"[tiab] OR "re admission*"[tiab])

AND

("machine learning*"[tiab] OR "deep learning*"[tiab] OR "Decision Support Systems, Clinical"[Mesh] OR "Artificial Intelligence"[Mesh] OR "Mathematical Concepts"[Mesh] OR "Models, Statistical"[Mesh] OR "Forecasting"[Mesh] OR "model*"[ti] OR "predict*"[ti])

NOT (“pediatric*”[ti])

Filters: Full text, 2010-2021, English

Web of Science

TS=("Intensive care unit*" OR "ICU*" OR "Critical care unit*" OR "CCU*")

AND

TS=("readmission*" OR "re-admission*" OR "re admission*")

AND

TS=("model*" OR "prediction*" OR "machine learning*" OR "deep learning*" OR "clinical decision support*")

AND

PY=(2010 OR 2011 OR 2012 OR 2013 OR 2014 OR 2015 OR 2016 OR 2017 OR 2018 OR 2019 OR 2020 OR 2021)

NOT TI=(“pediatric*”)

Language English

Cochrane

#1 MeSH descriptor: [Intensive Care Units] explode all trees 3711

#2 ("intensive care unit" OR "ICU" OR "CCU" OR "critical care unit"):ti,ab,kw (Word variations have been searched) 26223

#3 MeSH descriptor: [Decision Support Systems, Clinical] explode all trees 392

#4 MeSH descriptor: [Mathematical Concepts] explode all trees 27044

#5 ("machine learning" OR "deep learning" OR "model" OR "prediction"):ti,ab,kw (Word variations have been searched) 196428

#6 ("readmission" OR "re-admission" OR "re admission"):ti,ab,kw (Word variations have been searched) 7457

#7 ("pediatric"):ti (Word variations have been searched) 14377

#8 (#1 OR #2) AND (#3 OR #4 OR #5) AND (#6) NOT (#7) with Cochrane Library publication date Between Jan 2010 and Apr 2021 100

Embase/Medline

('intensive care unit*':ti,ab,kw,exp OR 'icu*':ti,ab,kw,exp OR 'ccu*':ti,ab,kw,exp OR 'critical care unit*':ti,ab,kw,exp) AND (('readmission*' OR 're-admission*' OR 're admission*') NEAR/12 ('intensive care unit*' OR 'icu*' OR 'ccu*' OR 'critical care unit*')) AND ('readmission*':ti,ab,kw,exp OR 're-admission*':ti,ab,kw,exp OR 're admission*':ti,ab,kw,exp) AND ('model*':ti,ab,kw,exp OR 'prediction and forecasting*':ti,ab,kw,exp OR 'clinical decision making*':ti,ab,kw,exp OR 'clinical decision support system*':ti,ab,kw,exp OR 'machine learning*':ti,ab,kw,exp OR 'artificial intelligence*':ti,ab,kw,exp) AND (2010:py OR 2011:py OR 2012:py OR 2013:py OR 2014:py OR 2015:py OR 2016:py OR 2017:py OR 2018:py OR 2019:py OR 2020:py OR 2021:py) AND ('article'/it OR 'conference paper'/it OR 'review'/it)

Supplemental Table 1: Summary of characteristics and performance of studies reporting intensive care unit readmission prediction models.

Author/ Model Type	**Cohort Type and Description**	**Sample Size** (number of events [%])	**Outcome Definition**	**AUROC** % (95% CI)	**Sensitivity** % (95 % CI)	**Specificity** % (95% CI)	**Static vs Dynamic Data**
Multicenter Studies							
Rojas 2018 [14] GBM	Multicenter Retrospective Mixed SICU/MICU	Internal Development: 24,885 ICU admissions (2,834 [11%]) External Validation: 42,303 ICU admissions (3,458 [8%])	ICU readmission during index hospitalization OR Ward cardiac arrest	76 (75-78)	28 (NR)	95 (NR)	Static
Ouanes 2012 [15] Logistic Regression	Multicenter Retrospective General ICU	3,462 Patients (102 [3%])	ICU readmission during index hospitalization OR In-hospital ward mortality	74 (68-79)	NR	NR	Static
VanDiepen 2014 [16] Logistic Regression	Multicenter Retrospective Postoperative CICU	10,799 Patients (479 [4%])	ICU readmission during index hospitalization	80 (NR)	NR	NR	Static
Verma 2019 [17] Logistic Regression	Multicenter Prospective Postoperative CICU	805 Patients (37 [5%])	ICU readmission	78 (NR)	NR	NR	Static
Badawi 2012 [18] Logistic Regression	Multicenter Retrospective General ICU	704,963 Patients Readmission (17,874 [3%]) Death (6,492 [0.9%])	ICU readmission during index hospitalization OR Post-discharge mortality	Readmission 71 (NR) Death 92 (NR)	Readmission (decreasing with patient severity) 0-99 Death 23-98	Readmission (increasing with patient severity) 3-99 Death 34-99	Static
Fialho 2012 [19] Fuzzy modeling + Sequential forward selection	Multicenter Retrospective Mixed SICU/MICU	1,028 Patients	ICU readmission	72 (68-76)	68 (66-70)	73 (70-76)	Static
Chiu 2020 [29] Logistic Regression	Multicenter Retrospective Postoperative CICU	13,631 Patients (578 [4%])	ICU readmission during index hospitalization OR Ward cardiac arrest	≤ 6 hours 84 (83-85) ≤ 12 hours 82 (81-82)	≤ 6 hours 74 (NR) ≤ 12 hours 69 (NR)	≤ 6 hours 80 (NR) ≤ 12 hours 80 (NR)	Static

			OR In-hospital ward mortality	≤ 24 hours 78 (77-79)	≤ 24 hours 71 (NR)	≤ 24 hours 72 (NR)	
Kastrup 2013 [42] Logistic Regression	Multicenter Retrospective Mixed SICU/MICU	7,175 Patients (596 [8%])	ICU readmission OR Post-discharge mortality	58 (56-61)	55 (NR)	59 (NR)	Static
Single Center Studies							
Magruder 2015 [20] Linear regression	Single center Prospective SICU	452 Patients	ICU readmission	81 (NR)	NR	NR	Static
Caballero 2015 [21] Dynamic Linear Models with Logistic Transformation	Single Center Retrospective Mixed SICU/MICU	11,643 Patients (NR)	ICU readmission within 24 hours, 48 hours, or index hospitalization	≤ 24 hours 93 (NR) ≤ 48 hours 94 (NR) Hospitalization 92 (NR)	≤ 24 hours 90 (NR) ≤ 48 hours 91 (NR) Hospitalization 91 (NR)	≤ 24 hours 88 (NR) ≤ 48 hours 94 (NR) Hospitalization 92 (NR)	Dynamic
Lin 2019 [22] RNN + LSTM	Single Center Retrospective Mixed SICU/MICU	48,393 ICU admissions (11,290 [23%])	ICU readmission during index hospitalization OR ICU readmission within 30 days of hospital discharge OR In-hospital mortality OR Mortality within 30 days of hospital discharge	79 (78-80)	85 (NR) 80 (NR)	53 (52-56) 62 (60-64)	Dynamic
Venugopalan 2017 [23] Logistic Regression + ANN + CRF	Single Center Retrospective Mixed SICU/MICU	32,331 Patients (7,787 [24%])	ICU readmission within 30 days	NR	NR	NR	Dynamic
Xue 2019 [24] Logistic Regression	Single Center Retrospective Mixed SICU/MICU	1,170 Patients (310 [26%])	ICU readmission within 30 days	64 (NR)	57 (NR)	66 (NR)	Dynamic
Desautels 2017[25] GBM	Single Center Retrospective Neuro ICU	46, 759 ICU admissions (5708 [12%])	ICU readmission within 48 hours OR In-hospital mortality within 48 hours	71 (NR)	60 (NR)	66 (NR)	Dynamic
Lee 2015 [26] Logistic Regression	Single Center Retrospective	1,190 Patients (96 [8%])	ICU readmission during index hospitalization	ICU readmission	ICU readmission	ICU readmission	Static

	SICU		OR In-hospital mortality	69 (66-71) Combined 61 (58-63)	44 (NR)	73 (NR)	
Ng 2018 [27] Logistic Regression	Single Center Retrospective General ICU	4,632 Patients (964 [21%])	ICU readmission during index hospitalization OR In-hospital mortality OR Rapid response systems and medical emergency teams (MET) call	72 (70-73)	NR	NR	Static
Rosa 2015 [28] Logistic Regression	Single Center Prospective Mixed SICU/MICU	1,277 Patients (192 [15%])	ICU readmission within 48 hours OR 48-hour mortality	SWIFT 65 (61-70) SOFA 65 (60-69) TISS-28 67 (63-72)	SWIFT ≥ 7 88 (NR) SOFA ≥ 1 62 (NR) TISS-28 ≥ 10 82 (NR)	SWIFT ≥ 7 22 (NR) SOFA ≥ 1 57 (NR) TISS-28 ≥ 10 38 (NR)	Static
Barbieri 2020 [30] RNN	Single Center Retrospective General ICU	45,298 ICU admissions (5,495 [12%])	ICU readmission within 30 days	74 (74-74)	67 (66-69)	70 (69-71)	Dynamic
Li 2019 [31] Logistic Regression	Single Center Retrospective Postoperative CICU	2,042 Patients (80 [3%])	CICU readmission during index hospitalization	88 (NR)	NR	NR	Static
Hammer 2020 [32] Logistic Regression	Single Center Retrospective SICU	7,126 Patients (168 [2%])	ICU readmission during index hospitalization	78 (74-82)	74 (NR)	72 (NR)	Static
Jo 2015 [33] Logistic Regression	Single Center Retrospective MICU	343 Patients (33 [10%])	ICU readmission during index hospitalization	76 (66-86)	NR	NR	Static
Lee 2010 [34] Logistic Regression	Single Center Retrospective Non-postoperative Neuro ICU	753 Patients (58 [8%])	ICU readmission during index hospitalization	75 (66-83)	79 (NR)	59 (NR)	Static
Frost 2010 [35] Logistic Regression	Single Center Retrospective General ICU	14,952 Patients (896 [6%])	ICU readmission during index hospitalization	66 (NR)	NR	NR	Static
Zhou 2016 [36] Logistic Regression	Single Center Retrospective Mixed SICU/MICU	1,653 Patients (77 [5%])	ICU readmission during index hospitalization OR In-hospital mortality	61 (55-66)	58 (47-69)	58 (56-61)	Static

Martin 2019 [37] Logistic Regression	Single Center Retrospective SICU	3,109 Patients (141 [5%])	ICU readmission within 72 hours	71 (NR)	49 (NR)	92 (NR)	Static
Thomson 2018 [38] Logistic Regression	Single Center Retrospective Postoperative CICU	4,869 Patients (156 [3%])	ICU readmission during index hospitalization	NR	NR	NR	Static
Woldhek 2017 [39] Logistic Regression	Single Center Retrospective General ICU	19,750 ICU admissions (1,378 [7%])	ICU readmission within 24 hours, 48 hours, 72 hours, or at any point during index hospitalization	≤ 24 hours 68 (64-71) ≤ 48 hours 68 (65-70) ≤ 72 hours 68 (66-70) Hospitalization 70 (69-72)	NR	NR	Static
Yip 2013 [40] Logistic Regression	Single Center Retrospective General ICU	1,446 Patients (106 [7%])	ICU readmission during index hospitalization	NR	18 (12-26)	92 (90-93)	Static
Loreto 2020 [41] Multiple algorithms	Single Center Retrospective General ICU	9,926 Patients (658 [6.6%])	ICU readmission	81 (NR)	NR	91 (NR)	Static
Pakbin 2018 [43] Logistic Regression + XGBoost	Single Center Retrospective General ICU	46,467 Patients (9,872 [21%])	ICU readmission within 24 hours, 72 hours, 7 days, 30 days, or at any point during index hospitalization	≤ 24 hours 71 (69-73) ≤ 72 hours 74 (73-75) ≤ 7 days 75 (74-76) ≤ 30 days 73 (72-74) Hospitalization 81 (80-83)	NR	NR	Static
Klepstad 2019 [44] Linear Mixed Effect Model	Single Center Retrospective GI SICU	124 Patients (20 [16%])	ICU readmission OR Post-discharge mortality	NR	NR	NR	Dynamic
Taniguchi 2019 [45] Linear Regression	Single Center Prospective Mixed SICU/MICU	425 Patients (43 [10.1%])	ICU readmission OR Post-discharge mortality	71 (63-79)	NR	NR	Static
Haribhakti 2021 [46] Logistic Regression	Single Center Retrospective MICU	409 Patients (36 [9%])	ICU readmission	76 (68-84)	NR	NR	Static

Overview of the intensive care unit readmission models development and performance. **CICU** cardiac intensive care unit; **ICU** intensive care unit; **MICU** medical intensive care unit; **SICU** surgical intensive care unit, **AUROC** area under the receiver operating characteristic curve; **NR** not reported; **CI** confidence interval; **SWIFT** Stability and Workload Index for Transfer; **SOFA** sequential organ failure assessment; **TISS-28** simplified Therapeutic Intervention Scoring System; **GBM** gradient boosting machine; **LSTM** long short-term memory; **RNN** recurrent neural network; **ANN** artificial neural network; **CRF** conditional random fields.

Supplemental Table 2: Summary of methodology, validation, and sensitivity analyses of studies reporting intensive care unit readmission prediction models.

Author/ Model Type	Data source	Predictor variables	Predictor selection method	Validation/ Imputation method	Calibration	ICU readmission reasoning	ICU readmission timing	Inclusion criteria	Exclusion criteria
Multiple Center Studies									
Rojas 2018 [14]	MIMIC	Demographics, vital signs, lab values, medications, ICU interventions, diagnostic tests, ICD-9 codes, nursing documents	Clinical experience	Internal and external validation/NA	Not reported	Not collected.	Within 72 hours deemed early. Later than 72 hours deemed late.	Adult patients in ICU and transferred to medical-surgical ward	Facility transfer, death in ICU, withdrawn treatment, missing discharge disposition
Ouanes 2012 [15]	NA	Demographics, chronic disease severity, acute disease severity, nursing workload, discharge time	Clinical relevance and availability	Internal validation by bootstrap sampling/NA	Hosmer-Lemeshow	Not stated.	Within 7 days.	ICU patients discharged to a ward in the same hospital	Facility transfer, ICU LOS < 24 h, death in ICU, withdrawn treatment
VanDiepen 2014 [16]	APPROACH	Demographics, medical, angiographic, surgical, postoperative information	NA	Internal validation by bootstrapping/NA	Hosmer-Lemeshow	Not stated.	No timing described	CABG or valvular surgery and discharged alive	Noncardiovascular surgeries, cardiac or pulmonary transplant, isolated ventricular assist device, ECMO
Verma 2019 [17]	NA	Demographics, medical, angiographic, surgical,	Model previously identified	Previously internally validated. Article describes external validation/NA	Hosmer-Lemeshow	Not stated.	No timing described	Cardiac surgery and discharged to cardiac	Noncardiovascular surgeries, cardiac or pulmonary transplant,

		postoperative information						surgical ward	isolated ventricular assist device, ECMO
Badawi 2012 [18]	eICU	Demographics, medical, angiographic, surgical, postoperative information	Clinical experience, log-likelihood differences in readmissions or death	Internal validation/Multiple imputation	Hosmer-Lemeshow	Not stated.	Within 48 h	ICU patients > 16	DNR or care withdrawal, facility transfer, death in ICU, ICU LOS <4 h
Fialho 2012 [19]	MIMIC II	Vital signs, lab values	Routine collection, independence, quantity	Ten-fold cross-validation/Last-observation-carried forward	Hosmer-Lemeshow	Not stated	24 h - 72 h	ICU patients > 15	LOS > 24 h, missing data
Chiu 2020 [29]	NA	Postoperative vital signs	Warning score previously identified	Internal and external validation/Removed	Hosmer-Lemeshow	Not stated.	Within 24 h	Adults with major cardiac surgery	Missing values, outliers, death in surgery or ICU
Katsrup 2013 [42]	NA	Vital signs, lab values, administrative data	Warning score previously identified	Article describes external validation/Mean imputation or removed	Hosmer-Lemeshow	Not stated	Within 7 days	All ICU patients	Death in ICU, facility transfer
Single Center Studies									
Magruder 2015 [20]	NA	Demographics, administrative data, comorbidities, procedures	NA	No validation/NA	Not reported	Collected.	No timing described	CABG or aortic valve replacement	NR
Caballero 2015 [21]	MIMIC II	Demographics, disease, symptoms, treatments, vital signs, chronic disease	Most discriminant variables by $\chi 2$ test	Internal five-fold cross-validation/Regularized expectation maximization	Not reported	Not stated.	Within 30 days and at any time	>18 in ICU	Death in ICU
Lin 2019 [22]	MIMIC III	Lab values, chronic diseases, demographics	NA	3x3 nested cross-validation/Last-observation-carried-forward	Not reported	Not stated.	Within 30 days	> 18 in ICU	NR

Venugopalan 2017 [23]	MIMIC II	Vital signs, lab values, administrative data, ICD-9 codes, comorbidities	Clinical experience	Internal five-fold cross-validation/Cluster expectation maximization, copula function fit	Not reported	Not stated.	Within 30 days	ICU patients readmitted after discharge	< 12 hours of data
Xue 2019 [24]	MIMIC II	Demographics, vital signs, lab values, medications, comorbidities	NA	Internal ten-fold cross-validation/Imputation method as independent variable	Not reported	Not stated.	Within 48 h	ICU patients > 16	ICU visits other than general and neurosciences ICU, missing critical data, indeterminate discharge time
Desautels 2017[25]	MIMIC III	Demographics, vital signs, lab values, GCS	NA	No validation/Last-Observation-Carried-Forward	Not reported	Not stated.	Within 48 hours deemed early. Later than 48 hours deemed late.	Adult SICU patients	Cardiac, LOS < 48 h or > 30 d, death in ICU, discharge for palliative care, facility transfer, cadaveric donors
Lee 2015 [26]	NA	Demographics, lab values, medications, administrative data	APACHE II	Internal validation by bootstrapping/NA	H-statistic	Not stated.	No timing described	ICU patients discharged to wards in the same hospital	Death in ICU, facility transfer
Ng 2018 [27]	NA	Demographics, vital signs, lab values, administrative data, procedures	NA	No validation/Missing data separately categorized	Hosmer-Lemeshow	Not stated.	Within 48 hours of discharge	ICU patients > 18	ICU LOS < 24 h
Rosa 2015 [28]	NA	Administrative data, lab values, vital signs, interventions	SWIFT, SOFA, TISS-28	Internal validation/NA	Hosmer-Lemeshow	Not stated.	Within 30 days of discharge	ICU admission	Death in ICU, death within 30 days of discharge
Barbieri 2020 [30]	MIMIC III	Demographics, administrative data, ICD-9, procedures,	NA	Internal validation/NA	Not reported	Collected.	No timing described	Adults who underwent cardiac valvular replacement	Congenital valvular disease, death in surgery or ICU, missing data

		medications, vital signs							
Li 2019 [31]	NA	Demographic variables, medical history, hemodynamic parameters, surgical variables, postoperative complications	NA	Internal validation by leave-one-out cross-validation/Removed	Hosmer-Lemeshow	Collected.	Within 10 days	SICU admission	Death in ICU, care withdrawal, American Society of Anesthesiologists physical status classification VI
Hammer 2020 [32]	NA	Demographics, vital signs, medications, procedures, mobility, neurological values, lab values	Literature review	Internal validation by bootstrapping/Multiple imputation with chained equations	Brier Score	Readmission directly related to initial admission	No timing described	ICU patients > 18	Death in ICU, facility transfer, ICU elective admission, DNR, declaration, deaths in ward, lack of intubation for > 48 h
Jo 2015 [33]	NA	Demographics, vital signs, lab values, procedures, administrative data	NA	No validation/NA	Reliability Diagram	Not stated.	No timing described	Neurological ICU patients	Unrelated to surgical procedures, brain tumor, spinal disease
Lee 2010 [34]	NA	Demographics, vital signs, APACHE score	APACHE II	Internal validation by bootstrapping/NA	Not reported	Not stated.	Within 72 hours deemed early. Later than 72 hours deemd late	ICU patients > 15 transferred to general ward	Withdrawn care, facility transfer, death in ICU
Frost 2010 [35]	NA	Demographics, administrative data, comorbidities	Restricted to previously identified predictors	No validation/NA	Reliability Diagram	Readmission related to infection accounted for 9% of all readmission	Within the same hospitalization	ICU patients	Death in ICU, care withdrawal
Zhou 2016 [36]	NA	Lab values	Hypothesis testing:	Internal validation/NA	Not reported	Collected.	Within 72 h	SICU patients	Planned readmission,

			recurrent infection markers						death, hospital discharge within 72 h
Martin 2019 [37]	NA	Demographic, lab values, vital signs, medications	Routine collection	Internal validation by bootstrapping/Removed	Not reported	Not stated.	Majority within 2 weeks	ICU patients > 18 undergoing cardiac surgery	Discharge home
Thomson 2018 [38]	NA	Administrative data, comorbidities	Routine collection	No validation/Multiple imputation	Hosmer-Lemeshow	Not stated.	Within 24, 48, 72 h	ICU patients > 18	ICU LOS < 4 h. Death in ICU. Death after discharge. Care withdrawal. Facility transfer.
Woldhek 2017 [39]	NA	Demographics, administrative data, comorbidities, lab values, vital signs	Restricted to previously identified predictors	No validation/No missing variables	Hosmer-Lemeshow	Not stated.	No timing described	ICU patients	Death in ICU
Yip 2013 [40]	NA	Demographics, lab values, comorbidities, vital signs	Hypothesis testing: eosinophilia	Internal and external validation/NA	Not reported	Not collected.	Within 72 hours deemed early. Later than 72 hours deemed late.	Adult patients in ICU and transferred to medical-surgical ward	Facility transfer, death in ICU, withdrawn treatment, missing discharge disposition
Loreto 2020 [41]	NA	Demographics, administrative data, comorbidities, intervention, lab values	Characteristics available at admission	Ten-fold cross-validation/Varies based on algorithm	NA	Collected but not reported.	No timing described	Adult patients in ICU	Death in ICU
Pakbin 2018 [43]	MIMIC III	Demographics, administrative data, ICD-9, procedures, medications, vital signs	NA	Five-fold cross-validation/Mean imputation for continuous variables and Zero imputation for Boolean variables	Not reported	Not stated.	Within 24 hours, 72 hours, 7 days, 30 days, same hospitalization	Adult patients in ICU	NA

Klepstad 2019 [44]	NA	Demographics, vital signs, comorbidities	Warning score previously identified	NA/Removed	Not reported	Not stated.	No timing described	ICU patients	Death in ICU, withdrawn treatment, facility transfer, missing data
Taniguchi 2019 [45]	NA	Demographics, comorbidities, administrative data, lab values, interventions	Warning score previously identified	Article describes external validation/NA	Hosmer-Lemeshow	Not stated.	No timing described	Adult patients in ICU	ICU LOS < 12 h, pregnancy, death in ICU, facility transfer, withdrawn treatment
Haribhakti 2021 [46]	NA	Demographics, comorbidities, administrative data, lab values, interventions	Clinical experience	Internal validation/Removed	Not reported	Not collected.	No timing described	Adult patients in ICU	Pregnancy, withdrawn treatment, death in ICU

Overview of the intensive care unit readmission models methodology, validation, and sensitivity analyses. **ICU** intensive care unit; **NA** not available; **NR** not reported; **SWIFT** Stability and Workload Index for Transfer; **SOFA** sequential organ failure assessment; **TISS-28** simplified Therapeutic Intervention Scoring System; **CABG** coronary artery bypass graft; **GBM** gradient boosting machine; **LSTM** long short-term memory; **RNN** recurrent neural network; **ANN** artificial neural network; **CRF** conditional random fields.

Supplemental Table 3: Intensive care unit readmission prediction model risk of bias.

Author	Risk of bias introduced by selection of participants	Concern that the included participants and setting do not match the review question	Risk of bias introduced by predictors or their assessment	Concern that the definition, assessment or timing of predictors in the model do not match the review question	Risk of bias introduced by the outcome or its determination	Concern that the outcome, its definition, timing or determination do not match the review question	Risk of bias introduced by the analysis	Overall judgement of risk of bias	TRIPOD Affidavit
Rojas 2018 [14]	Low	Low	Low	Low	Low	Low	Low	Low	No
Ouanes 2012 [15]	Low	Low	Low	Low	Low	Low	Low	Low	No
Van Diepen 2014 [16]	Low	Low	Low	Low	Low	Low	Low	Low	No
Verma 2019 [17]	Low	Low	Low	Low	Low	Low	Low	Low	No
Badawi 2012 [18]	Low	Low	Low	Low	Low	Low	Low	Low	No
Fialho 2012 [19]	Low	Low	Low	Low	Low	Low	Low	Low	No
Magruder 2015 [20]	Low	Low	Low	Low	Low	Low	Low	Low	No
Caballero 2015 [21]	Low	Low	Low	Low	Low	Low	Low	Low	No
Lin 2019 [22]	Low	Low	Low	Low	Low	Low	Low	Low	No
Venugopalan 2017 [23]	Low	Low	Unclear	Low	Low	Low	Low	Low	No
Xue 2019 [24]	Low	Low	Low	Low	Low	Low	Low	Low	No
Desautels 2017 [25]	Low	Low	Low	Low	Low	Low	Low	Low	No
Lee 2015 [26]	Low	Low	Low	Unclear	Unclear	Unclear	High	High	No
Ng 2018 [27]	Low	Low	Low	Unclear	Low	Low	Unclear	Low	No
Rosa 2015 [28]	Low	Low	Low	Low	Low	Low	Low	Low	No
Chiu 2020 [29]	Low	Unclear	Low	Low	Low	Low	Low	Low	No
Barbieri 2020 [30]	Low	Low	Unclear	Unclear	Low	Low	Low	Low	No
Li 2019 [31]	Low	Low	Low	Low	Low	Low	Unclear	Unclear	No
Hammer 2020 [32]	Low	Low	Unclear	Unclear	Low	Low	Low	Low	No
Jo 2015 [33]	High	High	Unclear	Unclear	Low	Unclear	Unclear	High	No
Lee 2010 [34]	Unclear	Unclear	Low	Low	Low	Unclear	High	High	No

Frost 2010 [35]	Low	Low	Low	Low	Low	Low	Unclear	Unclear	No
Zhou 2016 [36]	Low	Low	Low	Low	Low	Low	Unclear	Unclear	No
Martin 2019 [37]	Low	Low	Low	Low	Low	Low	Low	Low	No
Thomson 2018 [38]	Low	Low	Low	Low	Low	Low	Low	Low	No
Woldhek 2017 [39]	Low	Low	Low	Low	Low	Low	Low	Low	No
Yip 2013 [40]	Low	Low	Low	Low	Low	Low	Low	Low	No
Loreto 2020 [41]	Low	Low	Low	Low	Low	Unclear	Low	Unclear	No
Kastrup 2013 [42]	High	Low	Low	Low	Low	Low	Low	High	No
Pakbin 2018 [43]	High	Low	Low	Low	Low	Low	Low	High	No
Klepstad 2019 [44]	Low	Low	Low	Low	Low	Low	High	High	No
Taniguchi 2019 [45]	Low	Low	Low	Low	Low	Low	Low	Low	No
Haribhakti 2021 [46]	Low	Low	Low	Low	Low	Low	Low	Low	No

Articles were adjudicated according to PROBAST (Prediction model Risk Of Bias ASsessment Tool) criteria.