Supplemental material

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Supplement Table 1. Study characteristics

Author (Country) Study type	Population	Age in years (median unless otherwise stated)	n	Reference standard	Model output	Delirium occurrence
Jauk 2020 (Austria) - **Prospective multi-centre cohort**	Patients in surgical or internal medicine wards of a public hospital	71 (IQR: 57-80)	4765	ICD10 F05 or F10.4	Delirium risk during hospital stay manually-checked free-text patient summaries.	1.5%
Jauk 2022 (Austria) – **Prospective single-centre cohort**	Patients in trauma surgery wards of one hospital	60 (Range: 18-95)	93	A senior physician's estimation of delirium risk	Not stated directly in text but likely same as former deployment study above.	1.2%
Sun 2022 (Germany) **Prospective multi-centre cohort**	Patients in surgical wards of three hospitals	66.0, 61.3, and 64.8 for the three hospitals (among retrospective data)	17944	CAM-ICU	Delirium before and after surgery	9.2%, 3.0%, and 3.0% for three hospitals
Kramer 2017 (Austria) **Retrospective multi-centre cohort**	Patients in psychogeriatric and internal medicine wards of Austrian hospital network	Patients without delirium, ~75 (IQR: ~58 - -81) Patients with delirium ~80 (~75 – 83)	9221	ICD-10 code F05	Delirium risk during hospital stay	24.1%
Bishara 2022 (United States) **Retrospective multi-centre cohort**	Patients ≥18 years undergoing operative procedure requiring anaesthesia in two non-trauma adult hospitals	73.8 (SD: 15.0) for delirium cohort and 59.2 (15.2) for non-delirium cohort	24885	Nursing Delirium Screening Scale (Nu-DESC) score >2 or positive CAM-ICU	Delirium during the first seven postoperative days	5.3%
Cano-Escalera 2022 (Spain) **Prospective single-centre cohort**	Patients admitted to internal medicine and neurology wards at a university hospital	84.4 (SD: 7.8)	170	CAM	Delirium risk during hospital stay	Admittance reason is delirium for 22.94%
Coombes 2021 (United States) **Retrospective single-centre cohort**	Patients admitted to ICU at a single Boston hospital from 2001 to 2012.	<30 = 4.6%; 30-39 = 5.3%; 40-49 = 10.6%; 50-59 = 17.3%; 60-69 = 20.8%; 70-79 = 20.7%; 80-89= 15.3%; 90+ = 5.4%	48451	ICD-9 codes	Delirium risk during hospital stay	3,850 of 48,541 patients developed delirium (8.6%)
Corradi 2018 (United States) **Retrospective single-centre cohort**	Patients admitted to medical, surgical and intensive care wards in a Chicago hospital between 2021 and 2015	Mean 63.2 (SD 17.7): years for training dataset; 63.4 years (SD: 17.6 for validation dataset	64038	CAM	Delirium occurring at least 48 h into a hospital stay.	5.4% for training dataset; 5.5% for testing dataset

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Davoudi 2017 (United States) **Retrospective single-centre cohort**	All patients ≥18 years admitted to a hospital in Florida.	56 (25%-75%: 43 – 68)	51457	ICD-9 codes	Delirium occurring at any time during hospital stay identified using the ICD-9-CM codes.	3.1%
Gutheil 2022 (Austria) **Retrospective multi-centre cohort**	Patients admitted to 26 Austrian acute geriatric care facilities	NR	63031	ICD-9 codes	Delirium during hopsital stay	2.0%
Halladay 2018 (United States) **Retrospective multi-center cohort**	Veterans ≥65 years admitted to a VA medical center for congestive heart failure, acute coronary syndrome, community-acquired pneumonia, and chronic obstructive pulmonary disease.	Mean 75.95 (SD: 8.61) in training cohort; 75.43 (8.55) in validation cohort	39377	Presence of (1) delirium, (2) change in mental status, (3) disoriented, (4) confused, (5) unarousable, (6) lethargic, and (7) obtunded.	Delirium risk during hospital stay	8.5% for training dataset; 7.0% for testing dataset
Hu 2022 (China) **Retrospective single-center cohort**	Surgical patients in a University hospital who underwent general anaesthesia.	68 (IQR: 65.0 - 73.3) for training and 68.0 (64.0 - 72.0) testing cohorts	531	CAM	Post-operative delirium	21.3% for training dataset; 30.5% for testing dataset
Jauk 2018 (Austria) **Retrospective multi-centre cohort**	Inpatients diagnosed with delirium at an Austrian hospital network between 2012 and 2016; Control group of randomly selected patients added to the data set	NR	29568	ICD-10 code F05	Delirium risk during hospital stay	4596 of 29568 (15.5%)
Ji 2018 (China) **Prospective single-centre pilot**	Non-cardiac surgical ICU patients aged 65 or more at one hospital	Mean: 77.05 (SD: 7.38)	134	Ten-point rating scale based on Richmond Agitation-Sedation Scale and CAM-ICU	Delirium risk during hospital stay	11.9%
Kurisu 2022 (Japan) **Secondary analysis of multi-centre trial**	Patients with advanced cancer receiving antipsychotics or trazedone at 14 inpatient palliative care units during September 2015 to May 2016	Mean 73.2 (SD: 11.16) for remitters; 71.7 (SD: 11.39) for non-remitters	668	Delirium Rating Scale-Revised-98 (DRS-R-98) score <10	Delirium on day 3 of hospital stay	Only patients with delirium diagnosis included (100%)

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Li 2022 (China) **Prospective single-centre cohort**	Patients aged ≥70 years admitted to internal medicine wards at a University hospital from March 2016 to January 2017.	84 (IQR: 79-87)	740	CAM	Delirium from 24 hours after admission to to discharge or up to 14 days.	13.6%
Lucini 2020 (Canada) **Retrospective multi-centre cohort**	Inpatients admitted to one of 15 ICUs in Alberta between January 1, 2014 and June 30, 2016.	58 (IQR: 45-69)	10475	Richmond Agitation-Sedation Scale score (RASS) and Intensive Care Delirium Screening Checklist score (ICDSC)	Delirium during ICU stay	53.6%
Menzenbach 2022 (Germany) **Prospective single-centre cohort**	Surgical patients recruited during preoperative evaluation between 3rd September 2018 and 2nd October 2019 at a University hospital's anesthesiology and standard care units.	Mean: 72.3 (SD: 7.3)	978	CAM-ICU, CAM, 4AT, DOS	Post-operative delirium during 5-day stay	22.2% in training cohort; 25.7% in validation cohort.
Mufti 2019 (Canada) **Retrospective, single-centre cohort**	Patients undergoing cardiac surgery at one hospital between January 2006 and December 2012.	Mean 72.0 (SD 10.0) for delirium cases; 66.0 (SD 11.0) for non-delirium cases	5584	Richmond Agitation-Sedation Scale (RASS) & CAM-ICU	Delirium during the hospital stay	11.4%)
Netzer 2020 (Austria) **Retrospective, single-centre cohort**	Patients admitted to two geropsychiatric wards in one hospital between March and October 2019.	NR	318	DOSS, CAM, ICD 10	Delirium risk during hospital stay	3.7%
Oh 2018 (South Korea) **Retrospective, single-centre cohort**	Patients selected from mixed medical/surgical ICU of a University hospital between November 2016 and December 2016.	Mean age 63.9 (SD 20.9) years for delirium cases; 63.2 (SD 18.0) years for non-delirium cases.	94	DSM-5 and CAM-ICU	Delirium during ICU stay	41.5%
Oosterhoff 2021 (United States) **Retrospective, multicentre cohort**	Geriatric patients undergoing operative hip fracture fixation entered into the American College of Surgeons National Surgical Quality	66.6% of participants ≥ 80 years	28207	CAM-ICU	Delirium within 30 days following hip fracture surgery as defined by the Hip Fracture Targeted ACS-NSQIP files	28.5%

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	Improvement Program database (ACS NSQIP) from 2016 through 2019.					
Racine 2021 (United States) **Prospective, multi-centre cohort**	Older adult (>70) patients without dementia undergoing major elective non-cardiac surgery between June 2010 and August 2013 in two Harvard-affiliated academic medical centres.	76.6 (mean) SD 5.2	560	CAM	Delirium risk during hospital stay	24%
Son 2022 (South Korea) **Prospective, single-centre cohort**	Patients admitted to a long-term care facility between August 10 and August 25 2020	72.6 (mean) SD 13.1	33	Short CAM	Missing	6.4%
Sun 2021 (Germany) **Retrospective, multi-centre cohort**	Inpatients of four hospitals with HER data from 2004 to 2020; from 2009 to 2020; from 2014 to 2020; and from 2009 to 2020.	61.3, 66.0, 66.4, and 64.8 years for the four hospitals	858	ICD10 F05	Missing	46%, 40%, and 58% and 57%
Veeranki 2019 (Austria) **Retrospective multi-centre cohort**	Inpatients at a hospital network.	NR	24,972	ICD10 F05	Missing	Missing
Veeranki 2018 (Austria) **Retrospective, single centre cohort**	Patients at a hospital network a date of admission between 2012 and 2017	NR	3800	ICD10 F05	Missing	Missing
Wang 2020 (China) **Retrospective, single site cohort**	Patients with primary cranial nerve disease undergoing decompression surgery at one hospital between July 2007 and June 2018.	Mean age 59.2 (SD 10.2) for no delirium, 61.0 (SD 11.7) for delirium cohort	912	DSM-5	Delirium risk during hospital stay	24.2%
Wong 2018 (United States) **Retrospective single-site cohort**	Adult patients with non-ICU hospital stays and discharged from a academic health institution between	36.2% were older than 64 years		CAM-ICU & Nu-DESC	Delirium risk during hospital stay	4.8%

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	January 1, 2016, and August 31, 2017.		14227			
Xue 2021 (United States) **Retrospective single-site cohort**	Adults at a single academic medical center from June 1, 2012, to August 31, 2016.	54.4 (mean) (SD 16.8)	111888	CAM-ICU	Delirium risk during hospital stay	52.6%
Xue 2022 (China) **Retrospective single-site cohort**	Patients at one teaching hospital at risk of acute kidney injury after primary cardiovascular surgery.	62.3 (mean) (SD 11.06)	66	DSM-IV	Delirium during post-operative stay	29.1%
H Zhao 2021 (China) **Retrospective single-site cohort**	Patients ≥65 years at University hospital undergoing hip fracture repair surgery between June 1, 2018, and May 31, 2019.	79.3 (7.6) in delirium group; 80.0 (7.1) in non-delirium group	245	CAM	Delirium risk during hospital stay	12.2%
Y Zhao 2021 (United States) **Retrospective single-site cohort**	Retrospective cohort of patients admitted to ICU or emergency department at Boston hospital between 2008 and 2019	53.4% of the cohort were ≥65 years	10066	CAM-ICU or ICD codes	Delirium risk during hospital stay	8.1%
			5474	Delirium defined as a rapid change in consciousness characterized by reduced awareness, decreased attention and altered cognition.		
Amador 2022 (Brazil) **Retrospective single-centre cohort**	Patients admitted to three mixed medical and surgical ICUs from July 31 2016 to April 30 2019.	Development: 65 (IQR: 54-8), Validation: 65 (IQR: 53-80)	1069		Delirium during ICU stay	10.0% for training cohort; 11.0% for validation cohort
Castro 2022 (United States) **Retrospective cohort study**	All adults hospitalized with PCR-confirmed SARS-CoV-2 between June 1, 2020, and April 30, 2021, across six hospitals.	Mean: 62.7 (SD: 18.73)	5102	ICD10 F05	Delirium risk during hospital stay	14.0%
Castro 2021 (United States) **Retrospective**	Patients admitted to 3 hospitals, one academic medical	62.9	2907	ICD10 F05	Delirium risk during hospital stay	16.8%

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multi-centre cohort	center, 2 community hospitals.					
Hur 2021 (South Korea) **Retrospective single-centre cohort**	Critically ill patients admitted to ICUs of a single hospital from July 1, 2016, to August 31, 2019.	Mean: 65.4 (SD: 14.4) for cases and 61.1 (SD: 13.3) for control in training cohort; 65.3 (14.7) for cases and 59.7 (14.0) for control in internal validation cohort; 82.5 (59.7) for cases and 73.7 (52.3) for controls in external validation cohort	12409	CAM-ICU	Delirium within 24 hours of ICU admission	30.8%
Oosterhoff 2022 (International) **Retrospective multi-centre cohort**	Patients undergoing surgical hip fracture repair admitted to one of 67 participating hospitals and entered into the Australian and New Zealand Hip Fracture Registry (ANZHFR)	66% older than 80 in development cohort; 71% older than 80 in validation cohort.	6672	CAM, CAM-ICU, 3D-CAM, 4AT	Delirium during postoperative period	29% in training cohort; 39.0% in validation cohort
Jauk 2019 (Austria) **Prospective multi-centre cohort**	Patients admitted to hospitals in an Austrian hospital network between 2011 to 2018	NR	19904	ICD10 F05	Missing	6459 delirium cases and 13,445 randomly selected controls from internal medicine and surgical departments (32.5%)

Abbreviations: CI, Confidence interval; POD, Postoperative delirium; CAM-ICU, Confusion assessment method for the intensive care unit; CAM, Confusion assessment method; 4AT, 4 A's test; 3D-CAM; 3-Minute diagnostic confusion assessment method; Nu-DESC, Nursing-based delirium screening; ICD, International Classification of Diseases; DSM, Diagnostic Statistical Manual; NR=not reported; LOS=length of stay.