Literaturstelle	Studientyp	Teilnehmer	Intervention/ Kontrolle	Endpunkte/ Ergebnisse	Bewertung der Qualität/ Kommentar	Schlussfolgerung	LoE nach Oxford
Ahmed S, Leurent B, Sampson EL. Risk factors for incident delirium among older people in acute hospital medical units: a systematic review and meta-analysis. Age Ageing 2014; 43(3): 326-33.	Systematisches Review	11 Studien, 2338 Patienten (davon 411 Patienten mit Delir / 1927 Kontrollen)	"Medline via Pubmed und Web of Science database (1987-2013). Newcastle-Ottawa Scale zu Bewertung, Meta-Analyse"	"In pooled analyses, dementia (OR 6.62; 95% CI (confidence interval) 4.30, 10.19), illness severity (APACHE II) (MD (mean difference) 3.91; 95% CI 2.22, 5.59), visual impairment (OR 1.89; 95% CI 1.03, 3.47), urinary catheterisation (OR 3.16; 95% CI 1.26, 7.92), low albumin level (MD -3.14; 95% CI -5.99, -0.29) and length of hospital stay (OR 4.85; 95% CI 2.20, 7.50) were statistically significantly associated with delirium." und andere	nur ältere Patienten ab 55. Lebensjahr, nur medical/geriatric setting or acute medical setting	RF für Delir: Basisfaktoren, Behandlungsassoziierte Faktoren, psychologische und soziale Faktoren, Umwelteinflüsse und iatrogene Faktoren	1a
Pisani MA, Murphy TE, Araujo KL, Slattum P, Van Ness PH, Inouye SK. Benzodiazepine and opioid use and the duration of intensive care unit delirium in an older population. Critical care medicine 2009; 37(1): 177-83.	prospektive Kohortenstudie	309 Patienten ab 60 Jahre, medical intensive care unit, "Mean age of the patients was 75 years; 58% received fentanyl, 55% received lorazepam, and 32% received haloperidol."	77% Delir; Delirmonitoring mit CAM-ICU	In the entire cohort, more patients with baseline dementia (40%) received haloperidol than did patients without baseline dementia (26%).	monozentrisch, Delir Risikofaktor als sekundäres Endziel, Kein Consortdiagramm; indirekte Aussage zu Delirhäufung in dementen Patienten über Haloperidolbedarf, Studiendaten bereits 2007 veröffentlicht -->	Demenz als Risikofaktor für Delir	2b
Pisani MA, Murphy TE, Van Ness PH, Araujo KL, Inouye SK. Characteristics associated with delirium in older patients in a medical intensive care unit. Archives of internal medicine 2007; 167(15): 1629-34.	prospektive Kohortenstudie	304 Patienten ab 60 Jahre, medical intensive care unit, Mean age of the patients was 75 years; siehe oben	77% Delir; Delirmonitoring mit CAM-ICU	"Of the 304 patients, delirium occurred in 214 (70.4%) within 48 hours of ICU admission. Of the 214 delirious patients, 152 (71.0%) were delirious on the day of ICU admission; A history of dementia (IQCODE score >3.3) had the strongest association with delirium. Also associated with delirium were receipt of benzodiazepines before ICU admission, creatinine level greater than 2	nur ältere Patienten ab 60; kein CONSORT	Alter in den Gruppen (Delir/kein Delir) nicht signifikant unterschiedlich, aber im Risikomodell: Demenz, Benzodiazepine, erhöhte Kreatinin-Werte und erniedrigter arterieller pH deutliche RF für ICU	1b
Van Rompaey B, Elseviers MM, Schuurmans MJ, Shortridge-Baggett LM, Truijen S, Bossaert L. Risk factors for delirium in intensive care patients: a prospective cohort study. Critical care (London, England) 2009; 13(3): R77	prospektive Kohortenstudie	N = 523 "All consecutive patients with a minimum age of 18 years and a stay of at least 24 hours in the intensive care unit were included when reaching a Glasgow Coma Scale of at least 10. None of the patients was intubated at the time of the assessments. All patients were able to communicate with the nurse researchers." multizentrisch	"A total population of 523 patients was screened for delirium and associated risk factors. The overall incidence of delirium was 30%. Of 155 delirious patients, 75% were delirious on the first day of inclusion, and more than 90% after the third day." Einteilung der RF in: patient characteristics, chronic pathology, acute illness and environmental factors	"The significant factors in the different domains were studied using the Nagelkerke R2. The significant risk factors in the domain of the patient characteristics were responsible for 20% of delirium. The predisposing cognitive impairment, the only risk factor in the domain of the chronic diseases, was responsible for 2% of delirium. The risk factors in the domain of the acute illness were responsible for 48% of delirium and the fourth domain with factors related to the environment for 53% of delirium."	Delir nach "Neelon and Champagne Confusion Scale" -> nicht der Goldstandard für Delir, keine Begründung, warum dieser Score; CONSORT fehlt	RF für Delir: Basisfaktoren, Behandlungsassoziierte Faktoren, psychologische und soziale Faktoren, Umwelteinflüsse und iatrogene Faktoren	1b

Riker RR, Shehabi Y, Bokesch PM, et al. Dexmedetomidine vs midazolam for sedation of critically ill patients: a randomized trial. JAMA : the journal of the American Medical Association 2009; 301(5): 489-99.	RCT	68 Zentren in 5 Ländern ab 18 Jahre, für mindestens 3 Tage invasive Beatmung geplant, Ausschlusskriterien nach Fachinfos der Studienmed. 420 eingeschlossene, 375 randomisierte Patienten ausgewertet: 194 Patienten in der Dex-Gruppe, 103 in der Midazolam-Gruppe	multizentrische RCT, doppelblind, Phase IV "Dexmedetomidine (0.2-1.4 µg/kg per hour [n=244]) or midazolam (0.02-0.1 mg/kg per hour [n=122]) titrated to achieve light sedation (RASS scores between −2 and 1) from enrollment until extubation or 30 days." primärer Endpunkt: Dauer der Einhaltung des Ziel-RASS (-2 bis +1)	"There was no difference between dexmedetomidine and midazolam in time at targeted sedation level in mechanically ventilated ICU patients. At comparable sedation levels, dexmedetomidine-treated patients spent less time on the ventilator, experienced less delirium, and developed less tachycardia and hypertension. The most notable adverse effect of dexmedetomidine was bradycardia."	Halb soviele Pat in Midazolam-Gruppe randomisiert, deutlich weniger Drop-outs in Midazolam-Gruppe;	im Vergleich zu Dex unter Midazolam mehr Delirien und längere Beatmungsdauer; keine Unterschiede hinsichtlich LOS oder Mortalität; WICHTIG: in der Studie wird der light-sedation bzw. no-sedation approach gewählt --> d.h. Midazolam nach Ziel-RASS -2 bis +1 titriert!	1b
Pandharipande P, Cotton BA, Shintani A, et al. Prevalence and risk factors for development of delirium in surgical and trauma intensive care unit patients. The Journal of trauma 2008; 65(1): 34-41.	prospektive Kohortenstudie	142 Patienten gescreent, 100 eingeschlossen, 3 drop-outs --> 45 surgical ICU, 52 trauma ICU "Enrollment criteria included (1) all patients 18 years or older, (2) requiring mechanical ventilation (MV) for greater than 24 hours and (3) admitted to the SICU or TICU at Vanderbilt University Medical Center (VUMC). Patients were excluded who had significant baseline neurological diseases or intracranial neurotrauma that would confound the evaluation of delirium, inability to understand English, significant hearing loss and moribund patients not expected to survive > 24	"We found the prevalence of delirium to be 70% in the combined surgical and trauma ICU patients with 73% of surgical and 67% of trauma patients having delirium. Surgical patients had a median (IQR) duration of delirium of 3 (0–4) days, while that for the trauma ICU patients was 1(0 to 4) days."	"In the multivariable analyses, adjusting for previous cognitive status and clinically relevant covariates at baseline, midazolam exposure [Odds ratio (OR) 2.75 (CI 1.43–5.26, p = 0.002)] was the strongest independent predictor of transitioning to delirium."	Kleine Kohorte, nur ein Zentrum, keine Nachverfolgung; keine Aussage zu Outcome-Parametern, keine Gegenüberstellung der Patienten mit Delir und ohne Delir bezüglich Basischarakteristika, keine Begründung für Kovariaten in der Regression	in Trauma- und chirurgischen Patienten ist die Gabe von Midazolam, Fentanyl und Morphin unabhängiger Risikofaktor für das Auftreten eines Delirs.	2b
Ouimet S, Kavanagh BP, Gottfried SB, Skrobik Y. Incidence, risk factors and consequences of ICU delirium. Intensive care medicine 2007; 33(1): 66-73.	prospektive Kohortenstudie	"820 consecutive patients admitted to ICU for more than 24 h" 764 ausgewertet	"Tools used were: the Intensive Care Delirium Screening Checklist for delirium, Richmond Agitation and Sedation Scale for sedation, and Numerical Rating Scale for pain. Risk factors were evaluated with univariate and multivariate analysis, and factors influencing mortality were determined using Cox regression."	"Delirium occurred in 31.8% of 764 patients. Risk of delirium was independently associated with a history of hypertension (OR 1.88, 95% CI 1.3-2.6), alcoholism (2.03, 1.2-3.2), and severity of illness (1.25, 1.03-1.07 per 5-point increment in APACHE II score) but not with age or corticosteroid use. Sedatives and analgesics increased the risk of delirium when used to induce coma (OR 3.2, 95% CI 1.5-6.8), and not otherwise. Delirium was linked to longer ICU stay (11.5+/-11.5 vs. 4.4+/-3.9 days), longer hospital stay (18.2+/-15.7 vs. 13.2+/-19.4 days), higher ICU mortality (19.7% vs. 10.3%), and higher	große Kohorte, mit sowohl Delir als auch Nicht-Delirpatieten, wenig drop-outs	RF für Delir: bekannte aHTN, Alkoholismus, höhere Krankheitsschwere, (Neben-)Wirkungen von Sedativa und Analgetika. Alter ist kein (!) RF für die Prävalenz eines Delirs	2b

Aizawa K, Kanai T, Saikawa Y, et al. A novel approach to the prevention of postoperative delirium in the elderly after gastrointestinal surgery. Surgery today 2002; 32(4): 310-4.	RCT	N=20 pro Gruppe	20 Pat. mit medikamentöser Delirprophylaxe mit Benzodiazepinen und Pethidin zur Nacht (zum Erhalt eines Schlaf-Wach-Rhythmus), gegen 20 Patienten ohne medikamentöse Delirprophylaxe	Delirreduktion durch Intervention (1/20 zu 7/20).	kleine Studiengruppe, Evidenz zu Benzodiazepinen und Delir widersprüchlich, Delirprophylaxe in der Regel mit Haloperidol, auch hier nur eine große RCT, die für Haloperidol bei älteren spricht, daher: es liegt keine Evidenz für eine pharmakologische generelle Delirprophylaxe vor (nur für ältere Patienten mit	keine pharmakologische Standardprävention für Delir	2b
Awissi DK, Begin C, Moisan J, Lachaine J, Skrobik Y. I-SAVE study: impact of sedation, analgesia, and delirium protocols evaluated in the intensive care unit: an economic evaluation. The Annals of pharmacotherapy 2012; 46(1): 21-8.	Ökonomische Evaluation	"With data from the I-SAVE (Impact of Sedation, Analgesia and Delirium Protocols Evaluated in the Intensive Care Unit: an Economic Evaluation) study, a prospective pre- and postprotocol design was used. Between the 2 periods, protocols for systematic management of sedation, analgesia, and delirium were implemented. Cost-effectiveness was calculated by associating the variation of cost and effectiveness measures (proportion of patients within targeted pain, sedation, and delirium goals). Total costs (in 2004 Canadian dollars), by patient, consisted of the sum of sedation, analgesia, and delirium drug acquisition costs during the ICU stay and the cost of the ICU stay."	604 in the preprotocol group and 610 in the postprotocol group, were included. The mean (SD) ICU length of stay and the duration of mechanical ventilation were shorter among patients of the postprotocol group compared with those of the preprotocol group (5.43 [6.43] and 6.39 [8.05] days, respectively; p = 0.004 and 5.95 [6.80] and 7.27 [9.09] days, respectively; p < 0.009). The incidence of delirium remained the same. The proportion of patients with Richmond Agitation and Sedation (RASS) scores between -1 and +1 increased from 57.0% to 66.2% (p = 0.001), whereas the proportion of patients with a numeric rating scale (NRS) score of 1 or less increased from 56.3% to 66.6% (p < 0.001). The mean total cost of ICU hospitalization decreased from $6212.64 (7846.86) in the preprotocol group to $5279.90 (6263.91) in the	"Establishing protocols for patient-driven management of sedation, analgesia, and delirium is a cost-effective practice and allows savings of nearly $1000 per hospitalization."	Übertragbarkeit von Kanada auf Deutschland (?)	Implementierung der Leitlinie und Umsetzung in patienten-zentrierten Protokollen sind auch ökonomisch sinnvoll	2b

Inouye SK, Bogardus ST, Jr., Charpentier PA, et al. A multicomponent intervention to prevent delirium in hospitalized older patients. The New England journal of medicine 1999; 340(9): 669-76.	RCT	"We studied 852 patients 70 years of age or older who had been admitted to the general-medicine service at a teaching hospital. Patients from one intervention unit and two usual-care units were enrolled by means of a prospective matching strategy."	"The intervention consisted of standardized protocols for the management of six risk factors for delirium: cognitive impairment, sleep deprivation, immobility, visual impairment, hearing impairment, and dehydration. Delirium, the primary outcome, was assessed daily until discharge."	"Delirium developed in 9.9 percent of the intervention group as compared with 15.0 percent of the usual-care group, (matched odds ratio, 0.60; 95 percent confidence interval, 0.39 to 0.92). The total number of days with delirium (105 vs. 161, P=0.02) and the total number of episodes (62 vs. 90, P=0.03) were significantly lower in the intervention group. However, the severity of delirium and recurrence rates were not significantly different. The overall rate of adherence to the intervention was 87 percent, and the total number of targeted risk factors per patient was significantly reduced. Intervention was associated with significant improvement in the degree of cognitive impairment among patients with cognitive impairment at admission and a reduction in the rate of use of sleep	große RCT, monozentrisch, CONSORT fehlt; gut gewähtes Bündel aus nicht-pharmakologischen Maßnahmen, sichere Evidenz	Anzahl und Dauer der Delirepisoden wurden durch Intervention gesenkt, primäre Prävention mit nicht-pharmakologischen Maßnahmen ist effektiv	2b
Needham DM, Korupolu R, Zanni JM, et al. Early physical medicine and rehabilitation for patients with acute respiratory failure: a quality improvement project. Archives of physical medicine and rehabilitation 2010; 91(4): 536-42.	Fall-Kontroll-Studie	57 Patienten, die mindestens für vier Tage beatmet wurden auf einer medical ICU , davon 27 vor der Einführung der Implementierung und 30 Patienten danach	"A multidisciplinary team focused on reducing heavy sedation and increasing MICU staffing to include full-time physical and occupational therapists with new consultation guidelines."	Endpunkt: "Sedation and delirium status, rehabilitation treatments, functional mobility." "Compared with before the quality improvement project, benzodiazepine use decreased markedly (proportion of MICU days that patients received benzodiazepines [50% vs 25%, P=.002]), with lower median daily sedative doses (47 vs 15 mg midazolam equivalents [P=.09] and 71 vs 24 mg morphine equivalents [P=.01]). Patients had improved sedation and delirium status (MICU days alert [30% vs 67%, P<.001] and not delirious [21% vs 53%, P=.003]). There were a greater median number of rehabilitation treatments per patient (1 vs 7, P<.001) with a higher level of functional mobility (treatments involving sitting or greater mobility, 56% vs 78%, P=.03). Hospital administrative data demonstrated that across all MICU patients, there was a decrease in intensive care unit and hospital length of stay by 2.1 (95% confidence interval: 0.4-3.8) and 3.1 (0.3-5.9)	kleines Kollektiv, kurze Laufzeit, methodisch gut aufgearbeitet	Nach Implementierung der "weniger Sedierungs"protokolle und der neuen Leitlinien waren die Patienten wacher und weniger delirant, die Funktionalität wurde verbessert	2b
Ouimet S, Riker R, Bergeron N, Cossette M, Kavanagh B, Skrobik Y. Subsyndromal delirium in the ICU: evidence for a disease spectrum. Intensive care medicine 2007; 33(6): 1007-13.	prospektive Kohortenstudie	600 Patienten wurden eingeschlossen und alle 8h mit ICDSC evaluiert, 537 wurden ausgewertet (die anderen drop-out wegen koma)	kein delir (ICDSC = 0; n = 169, 31.5%), subsyndromales delir (score = 1-3; n = 179, 33.3%), clinical delirium (score >or=4; n = 189, 35.2%)	ICU mortality rates were 2.4%, 10.6%, and 15.9% in these three groups, respectively. Post-ICU mortality was significantly greater in the clinical delirium vs. no delirium groups (hazard ratio = 1.67) after adjusting for age, APACHE II score, and medication-induced coma. Relative ICU length of stay was: no delirium < subsyndromal delirium < clinical delirium and hospital LOS: no delirium < subsyndromal delirium approximately clinical delirium. Patients with no delirium were more likely to be discharged home and less likely to need convalescence or long-term care than those with subsyndromal delirium or clinical	nur ein Studienzentrum, CONSORT fehlt, Nachbeobachtung auch über ICU-stay hinaus	Delireinteilung in Schweregrade ist sinnvoll, auch das subsyndromale Delir ist mit schlechterem Outcome assoziiert	1b

Prakanrattana U, Prapaitrakool S. Efficacy of risperidone for prevention of postoperative delirium in cardiac surgery. Anaesthesia and intensive care 2007; 35(5): 714-9.	RCT	126 Patienten zur elektiven CABG-OP wurden in einen der beiden Arme randomisiert	Risperdal zur Prävention eines postoperativen Delirs nach kardiochirurgischen Eingriffen; Intervention: 1mg Risperidon nach Aufwachen per os im Vergleich zu einer Placebo-Tablette (doppel-blind)	The incidence of postoperative delirium in the risperidone group was lower than the placebo group (11.1% vs. 31.7% respectively, P=0.009, relative risk = 0.35, 95% confidence interval [CI] = 0.16-0.77). Other postoperative outcomes were not statistically different between the groups.	perioperatives Setting, eingeschränkte Übertragbarkeit auf andere ICU-Patienten, kein CONSORT	keine pharmakologische Standardprävention für Delir	1b
Schweickert WD, Pohlman MC, Pohlman AS, et al. Early physical and occupational therapy in mechanically ventilated, critically ill patients: a randomised controlled trial. Lancet 2009; 373(9678): 1874-82.	RCT	von 818 geeigneten Patienten wurden 104 eingeschlossen und randomisiert, 49 in Interventionsgruppe, 55 in Kontrollgruppe	Frühe Physiotherapie und Mobilisierung durch Physiotherapeuten im Vergleich zu Standardprocedere während täglicher Sedierungspause	Endpunkt: Anzahl der Patienten, die zur Entlassung wieder funktionell eigenständig waren "Return to independent functional status at hospital discharge occurred in 29 (59%) patients in the intervention group compared with 19 (35%) patients in the control group (p=0.02; odds ratio 2.7 [95% CI 1.2-6.1]). Patients in the intervention group had shorter duration of delirium (median 2.0 days, IQR 0.0-6.0 vs 4.0 days, 2.0-8.0; p=0.02), and more ventilator-free days (23.5 days, 7.4-25.6 vs 21.1 days, 0.0-23.8; p=0.05) during the 28-day follow-up period than did controls. There was one serious adverse event in 498 therapy sessions (desaturation less than 80%). Discontinuation of therapy as a result of	Großteil möglicher Patienten nicht eingeschlossen, ITT-Auswertung	Frühmobilisierung und Physiotherapie verbessern funktionelles Outcome, reduzieren die Dauer eines Delir und die Dauer der mech. Ventilation.	1b
Shehabi Y, Grant P, Wolfenden H, et al. Prevalence of delirium with dexmedetomidine compared with morphine based therapy after cardiac surgery: a randomized controlled trial (DEXmedetomidine COmpared to Morphine-DEXCOM Study). Anesthesiology 2009; 111(5): 1075-84.	RCT	306 Patienten ab 60 Jahren wurden nach kardiochirurgischer OP randomisiert	kontinuierlich Dexmedetomidin versus Morphin; jeweils in möglicher Kombi mit Propofol nach Motor Activity Assessement Scale 2-4. doppelblind	Endpunkt: Delirprävalenz nach CAM-ICU; Ergebniss: "Of all sedation assessments, 75.2% of dexmedetomidine and 79.6% (P = 0.516) of morphine treatment were in the target range. Delirium incidence was comparable between dexmedetomidine 13 (8.6%) and morphine 22 (15.0%) (relative risk 0.571, 95% confidence interval [CI] 0.256-1.099, P = 0.088), however, dexmedetomidine-managed patients spent 3 fewer days (2 [1-7] versus 5 [2-12]) in delirium (95% CI 1.09-6.67, P = 0.0317). The incidence of delirium was significantly less in a small subgroup requiring intraaortic balloon pump and treated with dexmedetomidine (3 of 20 [15%] versus 9 of 25 [36%]) (relative risk 0.416, 95% CI 0.152-0.637, P = 0.001). Dexmedetomidine-treated patients were more likely to be extubated earlier (relative risk 1.27, 95% CI 1.01-1.60, P = 0.040, log-rank P = 0.036), experienced less systolic hypotension (23% versus 38.1%, P = 0.006),	hohe Qualität	Delirinzidenz nach Kardiochirurgie mit Morphin versus Dexmedetomidin in beiden Gruppen niedrig mit ca 10%. Aber unter Dex: kürzere Delirdauer, weniger Hypotensionen, weniger Vasopressorbedarf und mehr Bradykardien als mit Mo. In beiden Gruppe effektive Analgosedierung nach Ziel-MAAS	1b
Skrobik Y, Ahern S, Leblanc M, Marquis F, Awissi DK, Kavanagh BP. Protocolized intensive care unit management of analgesia, sedation, and delirium improves analgesia and subsyndromal delirium rates. Anesthesia and analgesia 2010; 111(2): 451-63.	Fall-Kontroll-Studie	610 vor Protokolleinführung, 604 nach Protokolleinführung; Erwachsene Patienten mit mindestens 24h ICU-Aufenthalt, Morbibunde ausgeschlossen, sowohl surgical als auch medical ICU patients	Ziel-gesteuerte Therapie nach Score: Pain-Assessment mit NRS, Sedation mit RASS, Delir mit ICDSC, nicht-pharmakologische Maßnahmen	Nach Implementierung bessere Analgesie, weniger Opioide verabreicht, bei vergleichbarer Sedierung kürzere mechanische Ventilation. Deutlich weniger medikamentös-induzierte Koma-Raten. Harte Outcome-Kriterien: LOS ICU und KH wurden reduziert, ebenso 30d Mortalität.	Wenn Analgesie, Sedierung und Delir vor Implementierung nicht systematisch korrekt erhoben wurden, ist eine vergleichende Beurteilung zurückhaltend zu beurteilen.	Ziel-gesteuerte Therapie mit individuellen Zielvorgaben und strikter Einhaltung der Therapie nach diesen Zielvorgaben verbessert das klinisch Outcome	2b

Wang W, Li HL, Wang DX, et al. Haloperidol prophylaxis decreases delirium incidence in elderly patients after noncardiac surgery: a randomized controlled trial*. Critical care medicine 2012; 40(3): 731-9.	RCT	457 Patienten über 65 Jahren, die nach einer nicht-kardiochirurgischen Operation auf der ICU aufgenommen wurden;	"Haloperidol (0.5 mg intravenous bolus injection followed by continuous infusion at a rate of 0.1 mg/h for 12 hrs; n = 229) or placebo (n = 228) was randomly administered from intensive care unit admission."	"The incidence of delirium during the first 7 days after surgery was 15.3% (35/229) in the haloperidol group and 23.2% (53/228) in thecontrol group (p = .031). The mean time to onset of delirium and the mean number of delirium-free days were significantly longer (6.2 days [95% confidence interval 5.9-6.4] vs. 5.7 days [95% confidence interval 5.4-6.0]; p = .021; and 6.8 ± 0.5 days vs. 6.7 ± 0.8 days; p = .027, respectively), whereas the median length of intensive care unit stay was significantly shorter (21.3 hrs [95% confidence interval 20.3-22.2] vs. 23.0 hrs [95% confidence interval 20.9-25.1]; p = .024) in the haloperidol group than in the control group. There was no significant difference with	Bolus + kontinuierliche Infusion über 12h? Schema 3x0,5mg? low-dose gering sedierend, RASS nach Bolus? Beurteilung nur zum Ende der Applikation des Prüfpräparates	Low-dose Haloperidol iv schützt ältere nicht-kardiologische ICU-Patienten vor Delir!	1b
Hatta K, Kishi Y, Wada K, et al. Preventive effects of ramelteon on delirium: a randomized placebo-controlled trial. JAMA psychiatry 2014; 71(4): 397-403.	RCT	67 Patienten zwischen 65 und 89 Jahren, neu auf einer medical ICU aufgenommen, in der Lage orale Medikamente einzunehmen	33 Patienten oral ramelteon 8m/g zur Nacht über 7 Tage im Vergleich zu einer Placebo-Tablette; Endpunkt: Delir nach DSM-IV	T-test, relatives Risiko, Kaplan-Meier und log-rank test zeigen eine Reduktion der Incidenz eines Delirs durch die Gabe von Ramelteon im Vergleich zu Placebo.	Ramelteon ist ein Melatonin-Analogon (nur in den USA zugelassen), Melatonin in D zugelassen	Ramelteon	1b
van den Boogaard M, Schoonhoven L, van Achterberg T, van der Hoeven JG, Pickkers P. Haloperidol prophylaxis in critically ill patients with a high risk for delirium. Critical care (London, England) 2013; 17(1): R9	Fall-Kontroll-Studie	ICU patients vor und nach Einführung des Delirium Präventions Protokolls; ausgewertet 299 Vergleichpatienten mit retrospektiv erhobenem Delirrisiko und 177 evaluierte PAtienten nach Intervention, die auf Grund eines hohen Delirrisikos eine HAloperidolprophylaxe erhalten haben. Delirrisiko in beiden Gruppen gleich verteilt.	Einführung eines Delirium prevention protocolls, nach dem Patienten mit einem höheren Risiko für ein Delir (nach Predeliric-Score) eine Prophylaxe mit low-dose Haloperidol erhalten im Vergleich zu Vergleichspatienten vor der Einführung des Delirium prevention Protokolls.	Delir nach CAM-ICU; "Haloperidol prophylaxis resulted in a lower delirium incidence (65% vs. 75%, P = 0.01), and more delirium-free-days (median 20 days (IQR 8 to 27) vs. median 13 days (3 to 27), P = 0.003) in the intervention group compared to the control group."v "Haloperidol was stopped in 12 patients because of QTc-time prolongation (n = 9), renal failure (n = 1) or suspected neurological side-effects (n = 2)."	kein gematchtes Design; viele Patienten wurden auch aus der Vergleichsgruppe ausgeschlossen, 59 Patienten haben trotz Risikos kein Haloperidol erhalten; nur medical ICU-patients	Patienten mit hohem Delirrisiko profitieren von low-dose Haldol bezüglich Delirinzidenz, Dauer und Mortalität	2b
Shehabi Y, Bellomo R, Reade MC, et al. Early goal-directed sedation versus standard sedation in mechanically ventilated critically ill patients: a pilot study*. Critical care medicine 2013; 41(8): 1983-91.	RCT	mechanische Ventilation für mindestens 24h, multicenter (6ICUs), Pilotstudie	early-goal-directed-sedation Protokoll mit Ziel-RASS +1 bis -2 innerhalb der ersten 12h nach Aufnahme bzw. Intubation (n=21) versus Standardsedierung (n=16)	"Delivery of early goal-directed sedation was feasible, appeared safe, achieved early light sedation, minimized benzodiazepines and propofol, and decreased the need for physical restraints."	Feasibility und Safety Prüfung; RCT bezüglich Outcome steht noch aus	Früher Verzicht auf tiefe Sedierung ist sicher durchführbar	1b
Al-Qadheeb NS, Balk EM, Fraser GL, et al. Randomized ICU trials do not demonstrate an association between interventions that reduce delirium duration and short-term mortality: a systematic review and meta-analysis. Critical care medicine 2014; 42(6): 1442-54.	Systematisches Review	17 RCTs, die eine medikamentöse oder nicht-medikamentöse Intervention zur Delirtherapie im Vergleich zu Kontrollen oder Standardverfahren untersucht haben; zur Metaanalyse 2849 Patienten ausgewertet	Studien mit medikamentöser und nicht-medikamentöser Therapie eines Delirs; mit den Endpunkten Delir und Mortalität (<45Tage)	"Across 13 studies that reported mortality, meta-regression revealed that delirium duration was not associated with reduced short-term mortality (p = 0.11)."	Cochrane-Standard	Systematic Review zur Mortalität Delirreduzierender Maßnahmen	1a
Girard TD, Kress JP, Fuchs BD, et al. Efficacy and safety of a paired sedation and ventilator weaning protocol for mechanically ventilated patients in intensive care (Awakening and Breathing Controlled trial): a randomised controlled trial. Lancet	RCT	n = 168 je Gruppe (Intervention versus Kontrolle), multicenter, 336 mechanisch ventilitierte Patienten auf einer von 4 ICUs.	täglicher SAT und SBT (Intervention) versus täglicher SBT allein (Kontrolle); primärer Endpunkt: "breathing without assistence"	kürzere Dauer der mechanischen Beatumung, weniger tief sedierte Patienten; kürzere ICU und KH LOS und verbesserte 1 Jahres Mortalität unter SAT/SBT Kombination	Intention-to-treat Auswertung; Patienten mit SAT/SBT waren generell weniger tief sediert bzw. waren nicht übersediert, positive Effekte maßgeblich dadurch beeinflusst	SAT reduziert Mortalität, wenn Pat. Sediert (reduziert auch Coma, aber nicht Delir)	1b

Colombo R, Corona A, Praga F, et al. A reorientation strategy for reducing delirium in the critically ill. Results of an interventional study. Minerva anestesiologica 2012; 78(9): 1026-33.	Fall-Kontroll-Studie	medical, surgical ICU patients; Erhebungsphase Kontrollgruppe in der ersten Jahreshälfte, dann Einführung der Intervention und erhebung der Interventionsgruppe in der zweiten Jahreshälfte; Ausschluss von Patienten mit vorbestehendem kognitivem Defizit, Demenz, Psychosen und Einschränkungen nach Schlaganfall	170 Kontrollpatienten: Visiten mit NRS, CAM-ICU und RASS, täglich SAT/SBT: Interventionsgruppe (144 Patienten): zusätzlich seit dem Tag der Aufnahme auf die ICU Reorientierungsstrategien (Ansprache mit Vornamen, regelmäßige Informationen zur Station/Krankenhaus/Krankheitsverlauf etc., Gedächtnisstimulation), darüberhinaus: kognitive Stiumlation, Uhr, Lesewaren und Musik wurden tagsüber angeboten, nachts Lärmreduktion; in beiden Gruppen Delirtherapie mit Haloperdiol bzw. Olanzapine	The delirium occurrence was significantly lower in (II-ph) 22% vs. 35% in (I-ph) (P=0.020). A Cox's Proportional Hazard model found the applied reorientation strategy as the strongest protective predictors of delirium: (HR 0.504, 95% C.I. 0.313-0.890, P=0.034), whereas age (HR 1.034, 95% CI: 1.013-1.056, P=0.001) and sedation with midazolam plus opiate (HR 2.145, 95% CI: 2.247-4.032, P=0.018) were negative predictors.	Delirscreening nur zweimal am Tag, kein randomisiert, kontrolliertes Design, selection bias wird durch Autoren diskutiert	Bündel aus Reorientierung, kognitiver Stimulation und Lärmreduktion in der Nacht schützt vor Delir	1b
Patel J, Baldwin J, Bunting P, Laha S. The effect of a multicomponent multidisciplinary bundle of interventions on sleep and delirium in medical and surgical intensive care patients. Anaesthesia 2014; 69(6): 540-9.	Fall-Kontroll-Studie	167 Prä-Intervention und 171 ICU-Patienten nach der Intervention;	Interventionsbündel aus nicht-pharmakologischen Maßnahmen: Lärm- und Lichtreduktion, Umgebungsbedingungen verbessert; Compliance mit der Intervention >90%	The bundle of interventions led to an increased mean (SD) sleepefficiency index (60.8 (3.5) before vs 75.9 (2.2) after, p = 0.031); reduced mean sound (68.8 (4.2) dB before vs 61.8 (9.1) dB after, p = 0.002) and light levels (594 (88.2) lux before vs 301 (53.5) lux after, p = 0.003); and reduced number of awakenings caused by care activities overnight (11.0 (1.1) before vs 9.0 (1.2) after, p = 0.003). In addition, the introduction of the care bundle led to a reduced incidence of delirium (55/167 (33%) before vs 24/171 (14%) after, p < 0.001), and less time spent in delirium (3.4 (1.4) days before vs 1.2 (0.9) days after, p = 0.021). Increases in sleep efficiency index were	kein Consort, Interventionsbündel unkonkret	Schlaffördernde Maßnahmen schützen vor Delir	2b
Wade D, Hardy R, Howell D, Mythen M. Identifying clinical and acute psychological risk factors for PTSD after critical care: a systematic review. Minerva anestesiologica 2013; 79(8): 944-63.	Systematisches Review	"Studies in general ICU settings with mixed-diagnosis patients (N.>30) were included. Risk of bias was assessed, with lower-risk studies given greater weight. No quantitative synthesis was possible due to heterogeneity, therefore ranges of estimates and frequencies of risk factors were examined."	systematische Reviews bis 2007 beschreiben zu geringe Studienlage zur Beurteilung von PTSD nach ICU, nach 2007 Zuwachs an Evidenz, bewertet wurden 13 Studien bis 2007 und 13 Studien seit 2008.	"There were more high quality studies in the latter period. The range of prevalence estimates from high-quality studies was similar; 8% to 27% (1997-2007) and 9% to 27% (2008-2012). Clinical risk factors consistently identified over the two periods were use of benzodiazepines, duration of sedation and mechanical ventilation. Psychological risk factors include stress and fear experienced acutely in ICU, and frightening memories of the admission."	Review verschiedener Studientypen	27% der ICU-Survivor erleiden eine PTSD; RF für eine post-ICU PTSD: Delir, Benzos, Länge der Sedierung, Angst	2a
Wilcox ME, Brummel NE, Archer K, Ely EW, Jackson JC, Hopkins RO. Cognitive dysfunction in ICU patients: risk factors, predictors, and rehabilitation interventions. Critical care medicine 2013; 41(9 Suppl 1): S81-98.	Systematisches Review	von 1008 Referenzen, 34 Studien eingeschlossen, nach Suche in Medline und Embase	davon sind 11 Studien mit ARDS Patienten, 20 Studien mit gemischter Studienpopulation (medical und surgical ICU patients) und 3 Studien mit Traumapatienten	RF für CI: vorbestehendes cognitives Defizit, genet. Disposition (Apolipo E4), vorbestehende Depression, Hypoxie und Hypotension, Sepsis, extreme BZ-Schwankungen, Delir, gestörter Schlaf	Nachbeobachtungszeitraum und Art der Erhebung der kognitiven Funktion waren in den verschiedenen Studien sehr variabel.	Cognitive Impairment als Langzeitfolge nach kritischer Erkrankung	2b

Ely EW, Girard TD, Shintani AK, et al. Apolipoprotein E4 polymorphism as a genetic predisposition to delirium in critically ill patients. Critical care medicine 2007;35:112-7.	prospektive Kohortenstudie	N = 59 (6 ausgeschlossen wegen persistierendem Koma/Tod) erwachsene ICU Patienten Auswertungskollektiv N = 53	Genetische Analyse von APOE4 als möglicher Faktor für die Delirdauer	89% delirante Patienten (Gesamtinzidenz) Mediane Delirdauer 4 Tage mit APOE4 (p = .05) ohne APOE3 2 Tage APOE4 7-fach erhöhte Odds einer verlängerten Delirdauer odds ratio [OR], 7.32; 95% confidence interval [CI], 1.82–29.51, p = .005); (propensity score adjusted OR, 4.90; 95% CI, 1.15–20.83; p = .03; principal components adjusted OR, 5.73; 95% CI, 1.48–22.2; p = .01)	Kleines Kollektiv Nur 12 Patienten waren APOE4 positiv Hohe Delirinzidenz (fast 90%) Keine Unterscheidung zwischen Sedation-Responsive and Sedation Unresponsive Delirium	APOE4 möglicher Risikofaktor für Delirlänge	2b
Ely EW, Shintani A, Truman B, et al. Delirium as a predictor of mortality in mechanically ventilated patients in the intensive care unit. JAMA : the journal of the American Medical Association 2004; 291(14): 1753-62.	prospektive Kohortenstudie	275 mechanisch ventilierte Erwachsene auf einer medical und Kardio-ICU; Delirscreening (CAM-ICU einmal täglich) und Sedierungstiefe gemessen an 2158 ICU-Tagen	primäres endziel: 6-Monats-Mortalität sekundär: LOS, ventilator-freie Tage und kognitives Outcome zum Zeitpunkt der Entlassung 183 Patienten mit Delir nach CAM-ICU, 41 Patienten ohne Delir	Von 275 Patienten waren 51 Patienten dauerhaft komatös und konnten nicht bezüglich Delir untersucht werden. Von den übrigen 224 Tagen entwickelten ein Delir nach CAM-ICU; "Delirium in the ICU was also independently associated with a longer post-ICU stay (adjusted HR, 1.6; 95% CI, 1.2-2.3; P =.009), fewer median days alive and without mechanical ventilation (19 [interquartile range, 4-23] vs 24 [19-26]; adjusted P =.03), and a higher incidence of cognitive impairment at hospital discharge (adjusted HR, 9.1; 95% CI, 2.3-	Observation; Geringe Anzahl an Nicht-Delirpatienten, Vergleich Gesamtsterblichkeitszahlen der ICU fehlt, Ursachen eines positiven CAM-ICU nicht erhoben/diskutiert; nur medical ICU, keine chirurgischen/Trauma-Patienten;"Immortal Time Bias" --> Klouwenberg et al. BMJ	Delir macht Mortalität hoch und post-ICU cognitive Impairment	2b
Girard TD, Jackson JC, Pandharipande PP, et al. Delirium as a predictor of long-term cognitive impairment in survivors of critical illness. Critical care medicine 2010; 38(7): 1513-20.	prospektive Kohortenstudie	von 187 eingeschlossenen Patienten, werden 126 Patienten nachverfolgt; ICU Patienten mit mechanischer Beatmung, 22 loss-to-follow up, 39 Patienten starben vor der 1 Jahres-Nachuntersuchung (Kollektiv aus [24])	Tägliches Delirscreening mittels CAM-ICU bis zum 28. ICU-Tag; kognitive Impairment wurden durch einen Neuropsychologen erhoben, der geblindet bezüglich des Krankheitsverlaufs war.	Nach 12 Monaten hatten 36% der Nachuntersuchten ein schweres kognitives Impairment	von 187 eingeschlossenen Patienten wurden 52 nach 1 Jahr nachuntersucht, Zeitpunkt der Verlegung, anstatt Erfüllen der Verlegungskriterien; keine Kontrollgruppe über kognitiven Verlauf von NIcht-ICU-Patienten	Delir macht long-term CI	2b
Vasilevskis EE, Morandi A, Boehm L, et al. Delirium and sedation recognition using validated instruments: reliability of bedside intensive care unit nursing assessments from 2007 to 2010. J Am Geriatr Soc. 2011 Nov;59 Suppl 2:S249-55. doi: 10.1111/j.1532-5415.2011.03673.x.	prospektive Kohortenstudie	N = 510 Patienten von März 2007-Mai 2010 der Vanderbilt University 34 Betten MICU und 27 Betten Cardio-ICU und 34 Betten SICU	Vergleich des Delir und Sedierungsmonitorings von trainierten Krankenschwestern im Vergleich zu hochtrainiertem Forschungspersonal.	CAM-ICU: kappa = 0.67, 95% confidence interval (CI) = 0.66-0.70 RASS: kappa = 0.66, 95% CI = 0.64-0.68	Qualitativ hochwertige Kohortenstudie, aber Single-Centre-Approach	CAM-ICU und RASS liefern auch in der Routine Ergebnisse, die verwendbar sind.	1b
Pandharipande PP, Girard TD, Jackson JC, et al. Long-term cognitive impairment after critical illness. The New England journal of medicine 2013; 369(14): 1306-16.	prospektive Kohortenstudie	821 eingeschlossene Patienten aus 2 Zentren, Erwachsene, medical oder surgical ICU mit respiratorischer Insuffizienz, kardiogenem Schock oder septischem Schock	Tägliches Delirscreening mittels CAM-ICU bis zum 30. ICU-Tag; kognitive Impairment wurden durch eine neuropsychologische Testbatterie (BRANS) erhoben	A longer duration of delirium was independently associated with worse global cognition at 3 and 12 months (P=0.001 and P=0.04, respectively) and worse executive function at 3 and 12 months (P=0.004 and P=0.007, respectively). Use of sedative or analgesic medications was not consistently associated with cognitive impairment	von 821 eingeschlossenen 74 drop-outs/loss-to-follow up, 311 verstorben, 382 nach 12 Monaten nachuntersucht	anhaltendes Delir macht long-term CI	1b
Aissaoui Y, Zeggwagh AA, Zekraoui A, Abidi K, Abouqal R. Validation of a behavioral pain scale in critically ill, sedated, and mechanically ventilated patients. Anesthesia and analgesia 2005; 101(5): 1470-6.	Diagnostikstudie	38 Patienten, ab 16 Jahre, nicht relaxierte Patienten mit erhaltener muskulärer Funktion, in Ruhe und während schmerzhafter Prozeduren	BPS Erhebung unabhängig von 2 geschulten Teams, in Ruhe und unter potentiell schmerzhaftem Procedere	360 Schmerzerhebungen in 30 Patienten (8drop-outs). "The intraclass correlation coefficient to evaluate inter-rater reliability was high (0.95). Validity was demonstrated by the change in BPS scores, which were significantly higher during painful procedures, with averages of 3.9 1.1 at rest and 6.8 1.9 during procedures (P 0.001), and by the principal components factor analysis, which revealed a large first-factor accounting for 65% of the variance in pain expression. The BPS	Referenzmethode, geblindete Erhebung des gleichen Scores (BPS) durch 2 unabhängige Teams	Validierung BPS, Vitalparameter allein nicht ausreichend	1b

Payen JF, Bosson JL, Chanques G, Mantz J, Labarere J. Pain assessment is associated with decreased duration of mechanical ventilation in the intensive care unit: a post Hoc analysis of the DOLOREA study. Anesthesiology 2009; 111(6): 1308-16.	Diagnostikstudie	30 mechanisch beatmete Patienten, die Analgetika und Sedativa erhalten;	BPS Erhebung zu drei festen Zeitpunkten täglich, durch gepaarte Evaluierer, gleichzeitig Erfassung von physiologischen Parametern, Schmerzerhebungszeitpunkte wurden eingeteilt in nicht-nozizeptiven, nozizeptive Prozeduren und in Ruhe	"Two hundred and sixty nine assessments were completed, including 104, 134, and 31 measurements in groups 1, 2 and 3, respectively. There was no difference in Ramsay scale scores between the three groups (Ramsay 4–6). Nociceptive stimulations (group 2) resulted in significantly higher BPS values than nonnociceptive ones (group 1, 4.9 vs. 3.5, p < .01), whereas the two groups had comparable BPS values before stimulation (3.1 vs. 3.0). A trend was found in group 2 between the dosage of sedation/analgesia and BPS: the higher the dosage, the lower BPS values and BPS changes to nociceptive stimulation. Group 3 had BPS values similar to group 2 at rest (3.2 vs. 3.2) and	keine eindeutige Referenzmethode	Validierung BPS	2b
Payen JF, Chanques G, Mantz J, et al. Current practices in sedation and analgesia for mechanically ventilated critically ill patients: a prospective multicenter patient-based study. Anesthesiology 2007; 106(4): 687-95; quiz 891-2.	prospektive Kohortenstudie	1381 erwachsene, mechanisch ventilierte Patienten von 44 ICUs in Frankreich wurden eingeschlossen und in der in der ersten Woche nach Aufnahme untersucht	an Tag 2, 4 und 6 des ICU-Aufenthaltes wurden Schmerzen, Sedierung, Analgetika, Sedativa und SChmerztherapie während des Prozedurenschmerzes erhoben.	"The observed rates of assessment on day 2 for sedation (43%) and analgesia (42%) were significantly smaller than that of use of sedatives (72%) and opioids (90%), also noted on days 4 and 6. The use of protocols/guidelines for sedation/ analgesia in the ICU reduced the proportion of patients who were treated, although not evaluated. A large proportion of assessed patients were in a deep state of sedation (40 –50%). Minor changes in the dosages of the main prescribed agents for sedation (midazolam, propofol) and analgesia (sufentanil, fentanyl, morphine, remifentanil) were found across 6 days of the patient's ICU stay. Procedural pain was specifically managed for	Datenerhebung im Rahmen einer Umfrage	Bedarf an Analgesie- und Sedierungsprotokollen nach wie vor vorhanden	2b
Arbour C, Gelinas C. Setting goals for pain management when using a behavioral scale: example with the critical-care pain observation tool.	Diagnostikstudie	Cardiac-Surgery	Vergleich CPOT gegen BPS/BPS-NI	CPOT-Skala 0-8	CPOT: empirische Festlegung des cut-offs	Vorteile CPOT	4
Gelinas C. Nurses' evaluations of the feasibility and the clinical utility of the Critical-Care Pain Observation Tool. Pain management nursing : official journal of the American Society of Pain Management Nurses 2010; 11(2): 115-25.	Diagnostikstudie	55 erwachsene ICU Patienten mit Trauma, internistischen Erkrankungen oder nach Operationen, die mechanisch ventiliert wurden. 30 waren zur Selbstbeurteilung in der Lage, die übrigen 25 waren dazu nicht in der Lage	51 ICU-Pfelgekräfte wurden in der Erhebung des CPOT; CPOT Erhebung in Ruhe und während potentiell schmerzhafter Ereignisse, anschließend Bewertung des CPOT durch die Pflegekräfte an Hand eines Fragebogens (33/51 Rücklauf)	"Overall, the feasibility and clinical utility of the CPOT were positively evaluated by the nurse participants. More than 90% of them supported that the directives about the use of the CPOT were clear and that it was simple to understand and easy to complete. Regarding its clinical utility, a little more than 70% of the nurses mentioned that the CPOT was helpful for nursing practice and recommended its use routinely. They acknowledged that the CPOT provided them with a common language and a standardized way to assess patients' pain. Half of the nurse participants supported that the CPOT had influenced their practice. On the other hand, six	gute Akzeptanz des CPOT durch die Pflege	Validierung CPOT	1b

Gelinas C, Arbour C. Behavioral and physiologic indicators during a nociceptive procedure in conscious and unconscious mechanically ventilated adults: similar or different? Journal of critical care 2009; 24(4): 628.e7-17.	Diagnostikstudie	357 ICU-Patienten von 4 Studienzentren, davon 144 wache Patienten, 113 komatöse Patienten	CPOT-Erhebund in Ruhe, während einer nozizeptiven Prozedur und 20 Minuten danach	Wache Patienten hatten höhere Werte im CPOT und häufigerer Blutdruckanstiege, CPOT im Vergleich mit selbsteingeschätzen Schmerzen sicher prädiktiv für Schmerzen, Vitalparameter allein nicht ausreichend zur Schmerzbewertung	CPOT Erhebung in wachen und komatösen Patienten, kein Vergleich zu wachen Patienten im Delir, die nicht in der Lage waren ihre Schmerzen selbst einzuschätzen	Validierung CPOT, Vitalparameter allein nicht ausreichend	2b
Gelinas C, Arbour C, Michaud C, Vaillant F, Desjardins S. Implementation of the critical-care pain observation tool on pain assessment/management nursing practices in an intensive care unit with nonverbal critically ill adults: a before and after study. Int J Nurs Stud 2011; 48(12): 1495-504.	Fall-Kontroll-Studie	Erwachsene Patienten mit mechanischer Ventilation für mindestens 24h, die nicht in der Lage waren, ihre Schmerzen verständlich zu äußern und bei denen die Motorik intakt war	Einführung des CPOT zur Schmerzerhebung als Fremdeinschätzungssore, theoretische und praktische Schulung (u.a. mit Beispiesfilmen) aller Pflegekräfte auf der Station; Interrater Reliabilität an Hand dreier Patientenvideos getestet; In der Postimplementationsphase wurden die Schmerzerhebung an Hand von 30 Krankenakten jeweils 3 Monaten und 12 Monate nach der Implementierung analysiert.	Interrater Reliabilität an Hand dreier Patientenvideos getestet; In der Postimplementationsphase wurden die Schmerzerhebung an Hand von 30 Krankenakten jeweils 3 Monaten und 12 Monate nach der Implementierung analysiert.	"Nurses' percentage of agreement when scoring patients with the CPOT by viewing the videotapes was high post-implementation of the tool (>87%). Reports of pain assessments were more frequently charted in the medical files in the post-implementation phase (10.5 to 12 assessments in a 24-hour period) compared with the pre-implementation phase (3 assessments in a 24-hour period). Interestingly, fewer analgesic and sedative agents were administered during the post-implementation phase."	Validierung CPOT	1b
Gelinas C, Harel F, Fillion L, Puntillo KA, Johnston CC. Sensitivity and specificity of the critical-care pain observation tool for the detection of pain in intubated adults after cardiac surgery. Journal of pain and symptom management 2009; 37(1): 58-67.	Diagnostikstudie	Postoperative kardiochirurgische ICU Patienten. Zunächst wach und intubiert (n=99/105), dann nach Extubation (n=105)	Erhebung des CPOT in Ruhe, während schmerzhafter Prozeduren und 20 Minuten nach schmerzhaften Prozeduren. Selbsteinschätzungen des Schmerzes wurden bei intubierten und extubierten Patienten erhoben.	"During the nociceptive exposure, the CPOT had a sensitivity of 86%, a specificity of 78%, a positive likelihood ratio (LR(+)) of 3.87 (1.63-9.23), and a negative LR (LR(-)) of 0.18 (0.09-0.33) and was effective for the screening of pain. It also showed good specificity (83% and 97%) but lower sensitivity (47% and 63%) during nonexposure conditions. The CPOT cutoff score was >2 during the nociceptive exposure. After extubation, patients' self-reports of pain intensity were associated with the positive CPOT cutoff score previously determined."	Diagnostische Studie mit hoher Qualität	Validierung CPOT	1b
Gelinas C, Ross M, Boitor M, Desjardins S, Vaillant F, Michaud C. Nurses' evaluations of the CPOT use at 12-month post-implementation in the intensive care unit. Nursing in critical care 2014.	Diagnostikstudie	38 ICU Schwestern	Ausfüllen eines Fragebogen zur Durchführbarkeit, Relevanz, Zufriedenheit des CPOT auf einer medical ICU	"The CPOT use was deemed feasible and relevant in daily practice as per the nurses' evaluations but did not allow an effective communication with other ICU care team members." CPOT wurde von ICU Pflegekräften als machbar, zufriedenstellend beurteilt	kleines Kollektiv, monozentrisch	Validierung CPOT	1b
Marmo L, Fowler S. Pain assessment tool in the critically ill post-open heart surgery patient population. Pain management nursing : official journal of the American Society of Pain Management Nurses 2010; 11(3): 134-40.	Diagnostikstudie	24 kardiologische PACU Patienten	Vergleich Critical-Care Pain Observation Tool (CPOT), adult Nonverbal Pain Scale NVPS), und Faces, Legs, Activity, Cry, and Consolability scale (FLACC) Erhebung während und nach schmerzhaften Ereignissen	"Both the CPOT and the NVPS demonstrated high reliability (Cronbach alpha coefficients 0.89). The NVPS and the CPOT were highly correlated for both raters (r>0.80, p=.00) (11 out of 12 times). Correlations between the two raters was generally moderate to high, but higher with the CPOT. There was more disagreement between raters in overall pain scores for the NVPS. When raters disagreed, it was most often in rating the face component on both scales. Disagreement	kleines Kollektiv, monozentrisch	Validierung CPOT	1b

Arroyo-Novoa CM, Figueroa-Ramos MI, Puntillo KA, et al. Pain related to tracheal suctioning in awake acutely and critically ill adults: a descriptive study. Intensive & critical care nursing : the official journal of the British Association of Critical Care Nurses 2008; 24(1): 20-7.	retrospektive Kohortenstudie	N = 755 ICUs (N = 695, 93%)	Endpunkt: (1) Schmerzwahrnehmung während verschiedener Phasen der Absaugung beschreiben (2) Folgende Faktoren in Bezug auf die Schmerzwahrnehmung analysieren: Alter, Diagnose, Geschlecht, Ethnizität, Analgesie (vor und während der Prozedur), Sedativa; (3) Physiologische Parameter	- Schmerz bei der Absaugung hat mehrere Dimensionen. - Jüngere Patienten geben einen höheren Schmerzscore an. - Chirurgische Patienten haben mehr Schmerz angegeben als internistische Patienten	Sekundäre Analyse. Große Kohorte	Vitalparameter allein nicht ausreichend	2b
Herr K, Coyne PJ, Key T, et al. Pain assessment in the nonverbal patient: position statement with clinical practice recommendations. Pain management nursing : official journal of the American Society of Pain Management	Leitlinie/ Positionspapier	Pain Assessment in nonverbalen Patienten, Empfehlungen der Task Force des ASPMN Boards of Directors.	Zur Schmerzerhebung bei älteren Patienten mit höhergradiger Demenz, Kindern und sedierten Patienten	N/A	N/A	Vitalparameter allein nicht ausreichend	5
Swischer CB, Schahr, Sinah, Hussein Baseline EEG-pattern on continuous monitoring 2014 J clin Neurophysiol	retrospektive Kohortenstudie	243 erwachsene ICU Patienten, die zwischen dem 01.01.-31.12.2007 ein mindestens 24 Stündiges EEG erhielten	Anhand der ersten 30 Mintuen des EEGs erfolgte eine Zuteilung in eine von 9 Kategorien: Krampfanfall, lateralisierte periodische Entladungen, generalisierte periodische Entladungen, fokal epileptiforme Entladungen, burst suppression, asymmetricscher Hintergrund, allgemeine Verlangsamung, generalisierte periodische Entladungen mit triphasischer Morphologie und normal Die Entwicklung von Krampfanfällen in zunächst "no seizures" klassifizierten Patienten wurde analysiert.	"Overall, 51 patients (21%) had nonconvulsive seizures at any timeduring cEEG monitoring. Notably, 112 patients had generalized slowing asthe initial EEG pattern, and none of these patients were noted to haveseizures. Seizure rates among the types of baseline EEGfindings were asfollows: lateralized periodic discharges (56%, n¼9), burst suppression(50%, n¼10), generalized periodic discharges (50%, n¼2), normal (33%,n¼3), focal epileptiform discharges (31%, n¼35), and asymmetricbackground (11%, n¼46)."	relativ große Kohorte, retrospektiv	Ausschluss eines non-konvulsiven Status mittels EEG	2b
Barr J, Fraser GL, Puntillo K, et al. Clinical practice guidelines for the management of pain, agitation, and delirium in adult patients in the intensive care unit. Critical care medicine 2013; 41(1): 263-306.	Leitlinie	"To revise the “Clinical Practice Guidelines for the Sustained Use of Sedatives and Analgesics in the Critically Ill Adult” published in Critical Care Medicine in 2002."; Gültig für "adult patients admitted to the ICU"; American College of Critical Care Medicine	Task force aus 20 multidisziplinären Experten, die streng nach Anleitung der Grade-Working-Group Empfehlungen zu Schmerzen, Agitation und Delir bei älteren kritisch Kranken erstellt haben.	"These guidelines provide a roadmap for developing integrated, evidence-based, and patient-centered protocols for preventing and treating pain, agitation, and delirium in critically ill patients. (Crit Care Med 2013; 41:263–306)"	methodisch höchste Qualität	EEG-Monitoring im non-konvulsiven Status	LL

Vasilevskis EE, Morandi A, Boehm L, et al. Delirium and sedation recognition using validated instruments: reliability of bedside intensive care unit nursing assessments from 2007 to 2010. Journal of the American Geriatrics	prospektive Kohortenstudie	510 ICU patients, medical und surgical ICU, 2007 bis 2010, monozentrisch, 2 Intensivstationen	vergleichende Messung von CAM-ICU und RASS durch klinisches Routinepersonal und durch Studienpersonal	6198 CAM-ICU Messungen und 6880 RASS Messungen; Referenzmessung durch geschult, trainierte und erfahrene Studienschwester, Sensitivität und Spefzifität für die Erhebungen der betreuenden Krankenschwester waren 0.81 (95% CI 0.78 -	Hinweis, dass die Implementierung an der Vanderbilt erfolgreich war; Übertragbarkeit auf andere Zentren ?	Delirmonitoring ist sicher, durchführbar und bewährt; auch vom klinischen Routine-Personal erhobene Scores sind valide	1b
Tipping CJ, Young PJ, Romero L, Saxena MK, Dulhunty J, Hodgson CL. A systematic review of measurements of physical function in critically ill adults. Critical care and resuscitation : journal of the Australasian Academy of Critical	Systematisches Review	11 Studien zur Frühmobilisation und Rehabilitation kritisch Kranker (Frühmobilisation als möglicher Stressor).	Ovid MEDLINE, Embase, CINAHL, Cochrane Library und PEDro	Endpunkte zur Beurteilung der körperlichen Funktion nicht eindeutig definiert	Thema: Frühmobilisation und Rehabilitation, Forschungsbedarf zur Beurteilung eines vergleichbaren Endpunktes	für eine Empfehlung zum klinischen Monitoring von Stress nicht geeignet/ausreichend, Evidenz zu gering	1a
Cuesta JM, Singer M. The stress response and critical illness: a review. Critical care medicine 2012; 40(12): 3283-9.	systematisches Review	Pathophysiologie von Stress bei kritisch Kranken	PubMed und Google Scholar	"For the clinician to individualize and optimize treatments in relation to the phase of the patient's critical illness, the molecular mechanisms underlining each stage will need to be determined using novel techniques such as real-time	Forschungsbedarf !!	Stress-Monitoring notwendig, 3 Phasen der Stressantwort, beantwortet Frage nach klinischem Stress-Monitoring nicht ausreichend	2a
Plaschke K, Fichtenkamm P, Schramm C, et al. Early postoperative delirium after open-heart cardiac surgery is associated with decreased bispectral EEG and increased cortisol and interleukin-6. Intensive care medicine	prospektive Kohortenstudie	114 erwachsene ICU-Patienten nach elektiver CABG-OP	Delir nach CAM-ICU, bilateraler BIS, Plasmaproben	"The results of the logistic regression analysis for bilateral BIS index as a predictor of ICU delirium showed a 27% sensitivity and 96% specificity with an overall accuracy of 76% (r 2 Nagelkerke = 0.137)."	niedriger BIS (durch tiefe Sedierung?) geht mit höherem Delirrisiko einher	für eine Empfehlung zum klinischen Monitoring von Stress nicht geeignet/ausreichend, Evidenz zu gering	2b
Nijjar PS, Puppala VK, Dickinson O, et al. Modulation of the autonomic nervous system assessed through heart rate variability by a mindfulness based stress reduction program.	prospektive Kohortenstudie	22 gesunde freiwillige Probanden	8 Wochen Training in einem Meditationsprogramm	Das Meditationstraining verbessert die Heart-Rate-Variabilität	Untersuchung an gesunden Probanden	für eine Empfehlung zum klinischen Monitoring von Stress nicht geeignet/ausreichend, Evidenz zu gering	2b
Chlan LL. Relationship between two anxiety instruments in patients receiving mechanical ventilatory support. Journal of advanced nursing 2004; 48(5): 493-9.	Diagnostikstudie	200 mechanisch-beatmete Patienten einer medical ICU, rekrutiert von 9 ICUs in 5 Universitätskliniken	Zuerst Erhebung des State Anxiety Portion des STAI, im Anschluss VAS-A auf einer 10 cm langen vertikalen Linie	"Level of statistical significance was established in advance at P < 0·05. Bivariate correlation analysis using the Pearson product–moment (r) was used to determine the relationship, and hence the concurrent validity, between the VAS-A and SAI. A statistically significant relationship was	Selektives Patientengut, Einfluss Angstlösender Medikation muss diskutiert werden	Vgl.: STAI vs VAS-A: VAS einfach und valide, aber besserer Test muss her	1b
Schenck CH, Mahowald MW: Injurious sleep behavior disorders (parasomnias) affecting patients on intensive care units. Intensive Care Med 1991; 17: 219-24	prospektive Kohortenstudie	200 erwachsene Patienten mit Parasomnie, von denen 20 auf einer ICU aufgenommen wurden	comprehensive clinical examinations, ausführliche PSG, audiovisuelles Monitoring, EMG	"Three groups of parasomnia-ICU relationships were identified: i) Parasomnias originating in ICUs, stroke-induced (n = 3); ii) Admission to ICUs resulting from parasomnia-induced injuries: C2 odontoid process fracture and C3 spinous process fracture with severe concussion (n = 2); iii) Parasomnias in patients admitted to ICUs for	ICU-Aufenthalte durch Verletzungen beim Schlafwandeln, Zielgruppe verfehlt, aber PSG auf ICU durchgeführt	Schlafmonitoring	2b
Shiihara Y, Nogami T, Chigira M, Tanno Y, Sakai Y, Takahashi S, Kodama M, Kunimoto F: Sleep-wake rhythm during stay in an intensive care unit: a week's long-term recording of skin potentials. Psychiatry Clin Neurosci 2001; 55: 279-80	Fallbericht	2 Patienten auf einer Intensivstation (männlich, 70 Jahre; männlich, 48 Jahre)	kontinuierliche Langzeit Hautpotentialableitung zur Erfassung des Wachheitsniveaus (arousal level) und als Index des Schlaf-Wachrhythmus	Deskription der Messergebnisse. Die Messung der Hautpotentiale konnte Stimuli wie Schmerz durch pflegerische Maßnahmen sowie Sedierungseffekte im ersten Patientenfall abbilden. Ferner schien dem Beginn eines Delirs bei einem zweiten Patienten ein höheres Wachheits-/Agitationslevel vorauszugehen.	Rein deskriptiv, Einzelfälle, interessante Beschreibung einer Technik. Weitere Studien notwendig.	hautpotentiale	4
Reinke L, van der Hoeven JH, van Putten MJ, Dieperink W, Tulleken JE: Intensive care unit depth of sleep: proof of concept of a simple electroencephalography index in the	Fall-Kontroll-Studie	5 Patienten auf einer Intensivstation vs. 15 ambulante Patienten	IDOS Index als Polysomnographieverfahren	Der IDOS Index ist ein technisch einfach durchführbares, valides Monitoringverfahren zur Schlaftiefenmessung im Vergleich zu traditionellen Polysomnographieverfahren	Feasibility-Studie. Kleines Patientenkollektiv	1-Kanal-EEG	2b

Watson PL, Pandharipande P, Gehlbach BK, Thompson JL, Shintani AK, Dittus BS, Bernard GR, Malow BA, Ely EW: Atypical sleep in ventilated patients: empirical electroencephalography findings and the path toward revised ICU sleep scoring criteria. Crit Care Med 2013; 41: 1958-67	prospektive Kohortenstudie	37 kritisch kranke, mechanisch beatmete, internistische ICU Patienten, multizentrisch	Schlafstadien und -Architektur Analyse durch Polysomographie auf zwei internistischen ICUs	"Of 37 medical ICU patients enrolled, 36 experienced atypical sleep, which accounted for 85% of all recorded data, with 5.1% normal sleep and 9.4% wake. Coupling observed patient arousal levels with polysomnographic characteristics revealed that standard polysomnographic staging criteria did not reliably determine the presence or absence of sleep. Rapid eye movement occurred in only five patients (14%). The revised scoring system incorporating frequently seen atypical characteristics yielded very high interrater reliability (weighted κ = 0.80;	kleines Patientenkollektiv (sicher auch aufgrund schwieriger Durchführbarkeit), sehr gute Studie!	PSG	2b
Beecroft JM, Ward M, Younes M, Crombach S, Smith O, Hanly PJ: Sleep monitoring in the intensive care unit: comparison of nurse assessment, actigraphy and polysomnography.	prospektive Kohortenstudie	12 kritisch kranke, mechanisch beatmete Patienten auf einer gemischt internistisch-chirurgischen ICU	Simultane Polysomnographie, Actigraphie und Verhaltenseinschätzung des Schlafes durch Nurse	"Actigraphy and behavioural assessment by the bedside nurse are inaccurate and unreliable methods to monitor sleep in critically ill patients."	winziges Kollektiv, interessante Ergebnisse	Actigrafie, subj. Einschätzung	2b
Martorella G, Boitor M, Michaud C, Gelinas C. Feasibility and acceptability of hand massage therapy for pain management of postoperative cardiac surgery patients in the intensive care unit. Heart & lung : the journal of critical	RCT	40 ICU Patienten	Applikation einer Handmassage oder einfaches Handhalten zu drei abfolgenden Zeitpunkten	Machbarkeit und Akzeptanz der Maßnahme durch Videoüberwachung,	kleines Patientenkollektiv, 70 % der Patienten aus beiden Gruppen erhielten keine Maßnahme zum dritten Zeitpunkt	zu geringe Evidenz	3b
Friesner SA, Curry DM, Moddeman GR. Comparison of two pain-management strategies during chest tube removal: relaxation exercise with opioids and opioids alone. Heart & lung : the journal of critical care 2006; 35(4): 269-76.	Fall-Kontroll-Studie	40 Patienten nach Koronararterien Bypass Operation, davon 21 Patienten konventionell und 19 mit Training im "slow-breathing relaxation exercise" Manöver	Entfernung der Thoraxdrainage unter Schmerz Monitoring vor, direkt nach und 15 Minuten nach Drainagenzug. 19 Patienten führten das "slow-breathing relaxation exercise" Manöver und erhielten Analgetika, 21 Patienten erhielten nur Analgetika	"This study supports the use of a slow deep-breathing relaxation exercise as an adjunct to the use of opioids for pain management during CTR among patients who have undergone coronary bypass surgery." In der 15 Minuten Schmerzmessung nach Drainagenzug wiesen die Fallpatienten geringere Schmerzscores auf als die Kontrollen	sehr kleines Patientenkollektiv, guter Ansatz, größere Studien notwendig	"slow deep-breathing relaxation exercise" reduziert Schmerzen	3b

Chlan LL, Weinert CR, Heiderscheit A, Tracy MF, Skaar DJ, Guttormson JL, Savik K: Effects of patient-directed music intervention on anxiety and sedative exposure in critically ill patients receiving mechanical ventilatory support: a randomized clinical trial. Jama 2013; 309: 2335-44	RCT	373 Patienten von 12 ICUs aus 5 Krankenhäusern	126 Patienten hörten täglich Musik, 122 Patienten erhielten Lärmabsorbierende Kopfhörer, 125 Patienten wurden ICU Standard betreut	"Patients in the PDM group listened to music for a mean (SD) of 79.8 (126) (median [range], 12 [0-796]) minutes/day. Patients in the NCH group wore the noise-abating headphones for a mean (SD) of 34.0 (89.6) (median [range], 0 [0-916]) minutes/day. The mixed-models analysis showed that at any time point, patients in the PDM group had an anxiety score that was 19.5 points lower (95% CI, -32.2 to -6.8) than patients in the usual care group (P = .003). By the fifth study day, anxiety was reduced by 36.5% in PDM patients. The treatment × time interaction showed that PDM significantly reduced both measures of sedative exposure. Compared with usual care, the PDM group had reduced sedation intensity by -0.18 (95% CI, -0.36 to -0.004) points/day (P = .05) and had reduced frequency by -0.21 (95% CI, -0.37 to -0.05) points/day (P = .01). The PDM group had reduced sedation frequency by -0.18 (95% CI, -0.36 to -0.004) points/day vs the NCH group (P = .04). By the fifth study day, the PDM patients received 2 fewer sedative doses (reduction of 38%) and had a reduction of	großes Kollektiv, Methodik gut aufgearbeitet, sehr schöne Studie, einfache Maßnahme (präferierte Musik) führt zur Angstreduktion	Angebot von Musik an ICU Patienten kann einfach durchzuführende Angstreduktion erwirken	1b
But AK, Erdil F, Yucel A, Gedik E, Durmus M, Ersoy MO. The effects of single-dose tramadol on post-operative pain and morphine requirements after coronary artery bypass surgery. Acta anaesthesiologica Scandinavica 2007; 51(5): 601-6.	RCT	60 Patienten postoperativ nach Koronararterien Bypass	30 Patienten erhielten 1 mg/kg Tramadol, 30 Patienten erhielten 2 ml Kochsalzlösung eine Stunde vor Extubation. Beide Gruppen wurden mit einer Morphin PCA für die folgenden 24 Stunden ausgestattet. Schmerzmonitoring via VAS nach 30 Minuten, 1 h, 2 h, 4 h, 12 h und 24 h.	"In group P, the visual analogue scale (VAS) scores were found to be higher 30 min (P < 0.01), 1 h (P < 0.01), 2 h (P < 0.01) and 4 h (P < 0.05) after extubation. The patient comfort scores were higher in group T 30 min (P < 0.01), 1 h (P < 0.05), 2 h (P < 0.01) and 4 h (P < 0.01) after extubation. The total morphine consumption was higher in group P at all evaluation times (P < 0.01), and the numbers of PCA demands and boluses were also higher in group P (P < 0.01)."	verändertes Analgesiekonzept, präemptive Analgesie aktuell	Opioid-basierte Therapie	3b

Carrer S, Bocchi A, Candini M, Donega L, Tartari S. Short term analgesia based sedation in the Intensive Care Unit: morphine vs remifentanil + morphine. Minerva anestesiologica 2007; 73(6): 327-32.	RCT	N = 100, große Abdominalchirurgie	Alle Patienten erhielten eine Aufsättigungs und Erhaltungsdosis mit Morphin: (0.1 mg/kg gefolgt von 0.24 µg/kg/min) Randomisierung erfolgte auf der ICU mit einem zweiten Opioid: Morphin oder Remifentanil. Die zweite Infusion diente der Schmerzscoregesteuerten Therapie Ziel: Numerische Rating Scala (NRS) < 3 and Ramsay Scale ≥2. Rescue Sedierung: Diazepam	Insgesamt weniger Rescuesedierung unter Remifentanil und eine signifikant bessere Erreichung des Schmerzziels wurde erreicht.	Keine Bewertung des Langzeit-Outcomes. Mischung von Opioiden. Entspricht nicht unbedingt der üblichen Praxis, aber Steuerbarkeit von Opioiden charakterisiert. Cave: interindividuelle Schwankungsbreite bei "Grundinfusion" nicht berücksichtigt.	Opioid-basierte Therapie	1b
Machata AM, Illievich UM, Gustorff B, Gonano C, Fassler K, Spiss CK. Remifentanil for tracheal tube tolerance: a case control study. Anaesthesia 2007; 62(8): 796-801.	prospektive Kohortenstudie	N = 40 alle Patienten mit offener, elektiver abdominalen Chirurgie.	TOF-gesteuerte Beendigung der Sedierungsindikation (TOF-Ration > 0.75) Remofentanil-Start mit 0.1 µg/kgKG/min und Titration um 0.025 µg/kgKG/min Schritten alle 30 Minuten. CSRR, VAS und RSS als Monitoring	CSRR, VAS und RSS als Monitoring, Extubation nach Monitoring. 0.025 bis 0.05 wird als optimale Infusionslaufrate für Patienten mit endoktrachealem Tubus angesehen.	Keine RCT.	Opioid-basierte Therapie	2b
Memis D, Inal MT, Kavalci G, Sezer A, Sut N. Intravenous paracetamol reduced the use of opioids, extubation time, and opioid-related adverse effects after major surgery in intensive care unit. Journal of critical care 2010; 25(3): 458-62.	RCT	N = 40 (Randomisierung 1:1)	IV Paracetamol 6 stündlich + Pethidin vs. IV Pethidin-mono über 24h; open-label	Behavioral Pain Scale und VAS scores waren signifikant niedriger unter Paracetamol-Pethidin über 24h (P < .05). Pethidin und Paracetamol zeigte weniger Pethidinbedarf (76.75 ± 18.2 mg vs. 198 ± 66.4 mg) und eine kürzere Extubationszeit (64.3 ± 40.6 min vs. 204.5 ± 112.7 min) (P < .01). PONV	Kleine Studie Enges Kollektiv Unverblindet	Paracetamoltherapie als Adjunktiv	1b
Strom T, Martinussen T, Toft P: A protocol of no sedation for critically ill patients receiving mechanical ventilation: a randomised trial. Lancet 2010; 375: 475-80	RCT	140 kritisch kranke Patienten unter mechanischer Ventilation	1:1 Randomisierung "no sedation" (N=70, 15 ausgeschlossen, Auswertung N = 55)--> Stufentherapie Morphin, Haloperidol und Sedierung als ultima Ratio "sedation" (N=70, 12 ausgeschlossen, Auswertung N=58) --> 48h Propofol, danach Midazolam mit DSI. beide Gruppen mit Morphin behandelt	Primäres Outcome: Anzahl der Tage ohne mechanische Venitlation 28 Tage 13,8 ns v. 9.6 s p=0.091; LOS ICU: 13.1 ns vs. 22,8 s; kein signifikanter Mortalitätsunterschied, aber Trend (p=0.06 zugunsten ns-Gruppe für in Hospital Mortalität. Sekundäre Outcomes: CT/MRT-Frequenz, akzidentelle Selbstextubation, ventilatorassoziierte Pneumonie. Kein Unterschied hinsichtlich Tracheostomieraten, VAP-Raten, CTMRT oder akzidenteller Selbstextubation.	Es handelt sich nicht um einen tatsächlichen No-Sedation Approach, sondern eher um einen First-line vs. Last-line Sedation approach. Delirmonitoring mittels DSM IV 1x/Tag 1:1 Patienten/Schwesternverhältnis	Last-Line Sedation Approach ist günstiger als First Line Sedation Ansatz.	1b

Arabi Y, Haddad S, Hawes R, et al. Changing sedation practices in the intensive care unit--protocol implementation, multifaceted multidisciplinary approach and teamwork. Middle East journal of anesthesiology 2007; 19(2): 429-47.	Fall-Kontroll-Studie	207 ICU-Patienten, mit mechanischer Ventilation, ab dem 18. Lebensjahr, erwarteter ICU-LOS über 24h	Protokollbasierte gegen Nicht-Protokollbasierte Analgesie und Sedierung; Vor und Nach Schulungsmaßnahmen zur protokollbasierten Therapie "To examine the effect of the multifaceted multidisciplinary approach, we compared the first 3 months to the second 3 months in the following 4 groups: G1 no protocol group in the first 3 months, G2 protocol group in first 3 months, G3 no protocol group in the second 3 months, G4 protocol group in the second 3 months."	"After ICU day 3, SAS in the groups G2, G3 and G4 became higher than in G1 reflecting “lighter” levels of sedation. There were significant reductions in the use of analgesics and sedatives in the protocol group after 3 months. This was associated with a reduction in VAP rate and trends towards shorter mechanical ventilation duration and hospital length of stay (LOS)."	CONSORT fehlt, Gruppeneinteilung unklar, Auswahlkriterien für Zuweisung zu einer Gruppe nicht beschrieben	multifaktorielle Sedierungsprotokolle sind überlegen	2b
Arias-Rivera S, Sanchez-Sanchez Mdel M, Santos-Diaz R, et al. Effect of a nursing-implemented sedation protocol on weaning outcome. Critical care medicine 2008; 36(7): 2054-60.	Fall-Kontroll-Studie	356 ICU Patienten mit mechanischer Ventilation, 176 in der Observationsphase, 189 in der Interventionsphase	Observation: Erhebung der Verschreibung der Sedativa und Analgetika Intervention: Applikation von Analgetika und Sedativa nach einer algorythmus-basierten Empfehlung unter Verwendung einer Sedierungsskala	"There were no significant differences in the duration of intubation between the two periods (median, 7 [interquartile range, 5-13] days vs. 7 [interquartile range, 5-9] days). In a Kaplan-Meier analysis, the probability of successful extubation was higher during the intervention period than during the observational period (log-rank = 0.02). During the intervention period, patients were more awake without a significant increment in the nurse workload"	Patienten mit Sedierungsprotokoll und Sedierungstiefemessung sind häufiger wach und konnten schneller erfolgreich extubiert werden	besseres Outcome mit neuen Sedierungsstrategien	1b
Quenot JP, Ladoire S, Devoucoux F, et al. Effect of a nurse-implemented sedation protocol on the incidence of ventilator-associated pneumonia. Critical care medicine 2007; 35(9): 2031-6.	Fall-Kontroll-Studie	423 ICU Patienten mit mechanischer Ventilation für mindestens 48h, mit Sedativa-Applikation von entweder Midazolam oder Propofol	Observation: Erhebung der Verschreibung der Sedativa und Analgetika Intervention: Applikation von Analgetika und Sedativa nach einer algorythmus-basierten Empfehlung unter Verwendung einer Sedierungsskala	the protocol group compared with the control group (6% and 15%, respectively, p = .005)." "The median duration of mechanical ventilation was significantly shorter in the protocol group (4.2 days; interquartile range, 2.1-9.5) compared with the control group (8 days; interquartile range, 2.2-22.0; p = .001), representing a 52% relative reduction. Extubation failure was more frequently observed in the control group compared with the protocol group (13% and 6%, respectively, p = .01). There was no significant difference in in-hospital mortality (38% vs. 45% in the protocol vs. control group, respectively, p = .22)."	Reduktion der Gesamtdosis von MIdazolam oder Propofol in der Interventionsgruppe, geringer Übersedierung mit Sedierungsprotokoll	Weniger ventilator-assoziierte Pneumonie mit Sedierungsprotokollen	1b

Robinson BR, Mueller EW, Henson K, Branson RD, Barsoum S, Tsuei BJ. An analgesia-delirium-sedation protocol for critically ill trauma patients reduces ventilator days and hospital length of stay. The Journal of trauma 2008; 65(3): 517-26.	Fall-Kontroll-Studie	143 ICU-Patienten	Observation: Erhebung der Verschreibung der Sedativa und Analgetika Intervention: Implementierung eines Behandlungsprotocols für Analgesie, Sedierung und Delir inklusive der objektiven Messverfahren	"The median duration of mechanical ventilation in the protocol group was 1.2 days (0.5-3.0) which was significantly reduced compared with 3.2 days (1.0-12.9) in the control group (p = 0.027). Analysis of ventilator-free days at day 28 found that the protocol group had 26.4 ventilator-free days (13.9-27.4) compared with 22.8 days (10.5-26.9) in the control group (p = 0.007). The median ICU length of stay was 5.9 days (2.3-18.2) in the control group and 4.1 days (2.5-8.3) in the protocol group (p = 0.21). Hospital length of stay was 12 days (7-17) in the protocol group in contrast to 18 days (10-27) in the control group (p = 0.036). Opiate equivalents and propofol use per patient was significantly reduced in the protocol group from 2,465 mg (+/-1,242 mg) to 1,641 mg	besseres Outcome mit neuen Sedierungsstrategien	besseres Outcome mit neuen Sedierungsstrategien	1b
Bucknall TK, Manias E, Presneill JJ. A randomized trial of protocol-directed sedation management for mechanical ventilation in an Australian intensive care unit. Critical care medicine 2008; 36(5): 1444-50.	RCT	312 künstlich beatmete Erwachsene	Sedierung gemäß Guidelines (n=153) gegen lokale Sedierungspraxis (n=159)	"The median (95% confidence interval) duration of ventilation was 79 hrs (56-93 hrs) for patients in the protocol group compared with 58 hrs (44-78 hrs) for patients who received control care (p = .20). Lengths of stay (median [range]) in the intensive care unit (94 [2-1106] hrs vs. 88 (14-962) hrs, p = .58) and hospital (13 [1-113] days vs. 13 (1-365) days, p = .97) were similar, as were the proportions of subjects receiving a tracheostomy (17% vs. 15%, p = .64) or undergoing unplanned self-extubation (1.3% vs. 0.6%, p = .61). Death in the intensive care unit occurred in 32 (21%) patients in the protocol group and 32 (20%) control subjects (p = .89), with a similar overall proportion of deaths in hospital (25% vs. 22%, p = .51). A Cox proportional hazards model, after adjustment for age, gender, Acute Physiology and Chronic Health Evaluation II score, diagnostic category, and doses of commonly used drugs, estimated that protocol sedation management was	RCT ohne methodisch erkennbare Mängel, Allerdings lokale Effekte Praxisabhängig	besseres Outcome mit neuen Sedierungsstrategien	1b
DuBose JJ, Inaba K, Shiflett A, et al. Measurable outcomes of quality improvement in the trauma intensive care unit: the impact of a daily quality rounding checklist. The Journal of trauma 2008; 64(1): 22-7; discussion 7-9.	Fall-Kontroll Studie	810 Patiententage auf einer ICU	Tägliche globale Bewertung eines "care bundles" anhand einer Qualitätscheckliste (QRC) zur Vermeidung einer Ventilator assoziierten Pneumonie	"Implementation of the QRC tool facilitated improvement of all measures not already at >95% compliance. Compliance with VAP prevention measures of head of bed elevation >30 degrees (35.2% vs. 84.5%), sedation holiday (78.0% vs. 86.0%), and prophylaxis for both peptic ulcer disease (76.2% vs. 92.3%) and deep venous thrombosis (91.4% vs. 92.8%) were all increased. A decrease in central line duration >72 hours (62.4% vs. 52.8%) and ventilator duration >72 hours (74.0% vs. 61.7%) was also noted. Additionally, a decrease in mean monthly rates per 1,000 device days of VAP (16.3 vs. 8.9), central line infection (11.3 vs. 5.8) and self-extubation (7.8 vs. 2.2) was	Qualitäts Checks sind sehr einfach in der Durchführung und verbessern das Patientenoutcome.	besseres Outcome mit neuen Sedierungsstrategien	1b

Marshall J, Finn CA, Theodore AC. Impact of a clinical pharmacist-enforced intensive care unit sedation protocol on duration of mechanical ventilation and hospital stay. Critical care medicine 2008; 36(2): 427-33.	Fall-Kontroll Studie	156 künstlich beatmete Patienten auf zwei internistischen ICUs, davon 78 Kontrollen und 78 Interventionspatienten	Einführung eines Sedierungsstandards auf zwei internisitischen Intensivstationen	"The mean duration of mechanical ventilation was reduced from 338 +/- 348 hrs (14 days) in the pre-intervention group to 178 +/- 178 hrs (7.4 days) in the postintervention group (p < .001). Durations of both intensive care unit stay (380 +/- 325 hrs vs. 238 +/- 206 hrs, p = .001) and hospital stay (537 +/- 350 hrs vs. 369 +/- 274 hrs, p = .001) were also significantly reduced in	besseres Outcome mit neuen Sedierungsstrategien	besseres Outcome mit neuen Sedierungsstrategien	2b
Ho KM, Ng JY. The use of propofol for medium and long-term sedation in critically ill adult patients: a meta-analysis. Intensive care medicine 2008; 34(11): 1969-79.	systematisches Review	16 randomisierte kontrollierte Studien mit insgesamt 1386 ICU Patienten, davon konnten 9 gepoolt ausgewertet werden	Propofol Sedierung gegen alternative Medikamente	"Nine of the pooled studies (56%) limited the doses of propofol infusion to <6 mg/kg h(-1). Mortality was not significantly different between patients sedated with propofol, or an alternative sedative agent (odds ratio [OR] 1.05, 95% confidence interval [CI] 0.80-1.38, P = 0.74; I(2) = 0%). Using propofol for medium and long-term sedation was associated with a significant reduction in length of ICU stay (overall weighted-mean-difference [WMD] in days -0.99, 95%CI -1.51 to -0.47, P = 0.0002; I(2) = 82.26%) when compared to an alternative sedative agent; however, this benefit became insignificant (overall WMD in days -0.98, 95%CI -2.86 to 0.89, P = 0.30; I(2) = 78.8%) when the	sehr hohe Qualität	Benzos machen längere Beatmung, längeren ICU-Aufenthalt und Delir	1a
Fraser GL, Devlin JW, Worby CP, et al. Benzodiazepine versus nonbenzodiazepine-based sedation for mechanically ventilated, critically ill adults: a systematic review and meta-analysis of randomized trials. Critical care medicine 2013; 41(9 Suppl 1): S30-8.	systematisches Review	6 randomisierte kontrollierte Studien mit insgesamt 1235 ICU Patienten	Vergleich Sedierung Midazolam gegen Dexmedetomidin (n=3), Lorazepam gegen Dexemedetomidin (n=1), Lorazepam gegen Propofol (n=1)	"Compared to a benzodiazepine sedative strategy, a nonbenzodiazepine sedative strategy was associated with a shorter ICU length of stay (n = 6 studies; difference = 1.62 d; 95% CI, 0.68-2.55; I = 0%; p = 0.0007) and duration of mechanical ventilation (n = 4 studies; difference = 1.9 d; 95% CI, 1.70-2.09; I2 = 0%; p < 0.00001) but a similar prevalence of delirium (n = 2; risk ratio = 0.83; 95% CI, 0.61-1.11; I2 = 84%; p = 0.19) and short-term mortality rate (n = 4; risk ratio = 0.98; 95% CI, 0.76-1.27; I2 = 30%; p = 0.88)." ICU Verweildauer und die Zeit künstlicher Beatmung sind verkürzt bei der Sedierung via Dexmedetomidin oder Propofol im Vergleich zu Benzodiazepin basierter Sedierung.	sehr hohe Qualität	Propofol zur tiefen Sedierung	1a

Soro M, Gallego L, Silva V, et al. Cardioprotective effect of sevoflurane and propofol during anaesthesia and the postoperative period in coronary bypass graft surgery: a double-blind randomised study. European journal of anaesthesiology 2012; 29(12): 561-9.	RCT	75 ICU Patienten nach Koronararterien Bypass Operation	Postoperative Sedierung durch Propofol (n=37) oder Sevofluran (n=36) für mindestens 4 Stunden postoperativ. Myokardiale Biomarker Bestimmung präoperativ, sowie 6,24,48 und 72 Stunden postoperativ. doppelblind	"Elevation of myocardial biomarkers was the primary endpoint. The secondary endpoints were haemodynamic events and lengths of stay in the intensive care unit and hospital." "Necrosis biomarkers increased significantly in the postoperative period in both groups with no significant differences at any time. Inotropic support was needed in 72.7 and 54.3% of patients in the propofol and sevoflurane groups, respectively (P = 0.086). There were no significant differences in haemodynamic variables, incidence of arrhythmias, myocardial ischaemia or and lengths of stay in the ICU and hospital between the two	gute Qualität, mittlere Größe, Sevofluran und Propofol gleichwertig im Bezug auf die TnI Konzentration	Sevo und Propofol gut	1b
Hellstrom J, Owall A, Bergstrom J, Sackey PV. Cardiac outcome after sevoflurane versus propofol sedation following coronary bypass surgery: a pilot study. Acta anaesthesiologica Scandinavica 2011; 55(4): 460-7.	RCT	100 ICU Patienten nach Koronararterien Bypass Operation	Postoperative Sedierung via Propofol (n=50) gegen Sevofluran (n=49) für mindestens 2 Stunden und bis zum erreichen der Extubationskriterien. Prä- und 12 Stunden postoperative Messung des cTnT.	"There was no statistically significant difference between groups in the primary endpoint cTnT values at 12 h post-operatively, cardiac events or the need for hemodynamic support. In the post hoc analysis, the cTnT increase from pre-operative values to 12 h post-operatively was less pronounced in the sevoflurane group (P=0.008)."	sehr gute Qualität, großes Kollektiv, CONSORT vorhanden	Sevo und Propofol gut	1b
Rohm KD, Wolf MW, Schollhorn T, Schellhaass A, Boldt J, Piper SN. Short-term sevoflurane sedation using the Anaesthetic Conserving Device after cardiothoracic surgery. Intensive care medicine 2008; 34(9): 1683-9.	RCT	70 ICU Patienten nach elektiver Koronararterien Bypass Operation	Postoperative Sedierung mittels Propofol 1,5 - 3 mg/kgKG/h (n=35) oder Sevofluran 0,5 - 1 Vol % (n=35) bis zu 72 Stunden postoperativ.	"Mean recovery times were significantly shorter with sevoflurane than with propofol (extubation time: 22 vs. 151 min; following commands: 7 vs. 42 min). The mean (SD) sevoflurane consumption was 3.2 +/- 1.4 mL/h to obtain mean endtidal concentrations of 0.76 vol%. No serious complications occurred during sedation with either sedative drug. The length of ICU stay was comparable in both groups, but hospital length of stay was significantly shorter in the sevoflurane group. Drug costs (in Euro) for sedation per patient were similar in both groups (sevoflurane: 15.1 +/- 9.5 <euro>; propofol: 12.5 +/- 5.8 <euro>), while sevoflurane sedation costs	Sevofluran ist eine gleich sichere Alternative zu Propofol. In dieser Studie war die Zeit bis zur Extubation bei Sevofluran kürzer als bei Propofol.	Sevo und Propofol gut	1b
Bosel J, Purrucker JC, Nowak F, Renzland J, Schiller P, Perez EB, Poli S, Brunn B, Hacke W, Steiner T: Volatile isoflurane sedation in cerebrovascular intensive care patients using AnaConDa((R)): effects on cerebral oxygenation, circulation, and pressure. Intensive Care Med 2012; 38: 1955-64	prospektive Kohortenstudie	19 neurologische ICU Patienten (davon 12 ICB, 4 SAB, 3 ischämischer Apoplex)	Wechsel der Sedierung von Propofol auf durchschnittlich 3, 5 Tage Isofluran, dabei Monitoring von mittlerem arteriellem Blutdruck (MAP), intracraniellem Druck (ICP), cerebraler perfusionsdruck (CPP), mittlere cerebrale Arterien Flussgeschwindigkeit (MFV), Fraktion der cerebralen Sauerstoff Ausschöpfung (FTOE) sowie systemisch-kardiopulmonale Parameter und verabreichte Medikamente	"After the first hour, mean ICP showed an increase of 2.1 mmHg that was not clinically relevant. Likewise, MFV did not change. MAP and CPP, however, decreased by 6.5 and 6.3 mmHg, respectively. FTOE was reduced slightly from 0.24 to 0.21 (p = 0.03). Over an observation period of 12 h, ICP remained stable, while MAP and thus CPP showed distinct decreases (CPP: -10 mmHg at 6 h, p < 0.001; -7.5 mmHg at 12 h, p = 0.005, when compared to preswitch levels) despite a 1.5-fold increase in vasopressor administration."	kleines Kollektiv, Methodik gut, Inhalative Sedierung bei neurologischen Patienten ist sicher durchführbar ohne Erhöhung des Hirndrucks, multimodales Monitoring wird ausdrücklich empfohlen bei der off-label Therapie mit inhalativen Anästhetika	CPP unter inhal	1b

Villa F, Iacca C, Molinari AF, Giussani C, Aletti G, Pesenti A, Citerio G: Inhalation versus endovenous sedation in subarachnoid hemorrhage patients: effects on regional cerebral blood flow. Crit Care Med 2012; 40: 2797-804	prospektive Kohortenstudie	13 ICU Patienten mit schwerer SAB	Zerebrales und hämodynamisches Monitoring wurde in drei Schritten durchgeführt. 1. Schritt: Sedierung mit Propofol 3-4 mg/kg/h 2. Schritt: Anschließend nach 1 Stunde Propofol Stop, weitere Sedierung Isofluran 0,8% 3. Schritt: anschließend nach einer weiteren Stunde mit Propofol in gleicher Dosis wie in Step 1	"Regional cerebral blood flow increased significantly during step 2 (39.3±29 mL/100 hg/min) compared to step 1 (20.8±10.7) and step 3 (24.7±8). There was no difference in regional cerebral blood flow comparing step 1 vs. step 3. No significant difference in intracranial pressure, mean cerebral artery transcranial Doppler velocity, PaCO2, cerebral perfusion pressure between the different steps."	kleines Kollektiv, Methodik gut, Inhalative Sedierung bei SAB Patienten erhöht die cerebrale Durchblutung und ist sicher durchführbar	CPP unter inhal	1b
Arroliga AC, Thompson BT, Ancukiewicz M, et al. Use of sedatives, opioids, and neuromuscular blocking agents in patients with acute lung injury and acute respiratory distress syndrome. Critical care medicine 2008; 36(4): 1083-8.	retrospektive Kohortenstudie	549 Patienten mit ALI/ARDS	Einsatz von Sedativa, Opioiden und NMBAs bei ALI/ARDS, Endpunkte: Dauer der mechanischen Ventilation, Weaning und Mortality	"The use of sedatives and opioids, but not the use of NMBAs, was associated with longer time on mechanical ventilation and an increased time to achieve a 2-hr spontaneous breathing trial (p < .0001). Sedatives were also associated with increased time to achieve unassisted breathing."	retrospektive Analyse, hatten kränkere Patienten mehr Bedarf an Sedierung/Analgetika oder waren Sedierung/Analgesie per se Grund für ein prolongiertes Weaning? Kann anhand der Daten nicht beantwortet	Bei ALI/ARDS geht erhöhter Bedarf/Gabe von Analgetika/Sedativa mit prolongiertem Weaning einher	2b
Fong JJ, Kanji S, Dasta JF, Garpestad E, Devlin JW. Propofol associated with a shorter duration of mechanical ventilation than scheduled intermittent lorazepam: a database analysis using Project IMPACT. The Annals of pharmacotherapy 2007; 41(12): 1986-91.	retrospektive Kohortenstudie	Von 4608 Datenbank Patienten, trafen 287 die Ein- und Ausschlusskriterien; Datenbank des Tufts-New England Medical Centers, Daten von 2001 - 2005, monozentrisch	"To compare the duration of mechanical ventilation between medical and surgical ICU patients receiving propofol versus scheduled intermittent lorazepam in routine clinical practice."	"Factors associated with a prolonged duration of mechanical ventilation for the medical ICU cohort included sedation use for 5 or more days (OR 13.8; 95% CI 8.3 to 19.4), narcotic use (OR 7.6; 95% CI 2.3 to 13), and scheduled intermittent lorazepam use (OR 7.0; 95% CI 0.4 to 13.7). For the surgical ICU cohort, these factors included sedation use for 5 or more days (OR 15; 95% CI 11.4 to 19.4), APACHE II (Acute Physiology and Chronic Health Evaluation II) score equal to or greater than 18 (OR 4.1; 95% CI 0.4 to 7.8), and scheduled intermittent lorazepam use (OR 4.0; 95% CI 0.2 to 7.7). Duration of mechanical ventilation was the only variable that differed significantly between propofol and scheduled intermittent lorazepam in both the medical ICU, with a median (range) of 6 (3-12) versus 11 (5-	Häufigerer Einsatz von Propofol, wenn absehbar ist, dass eine Langzeitsedierung über 7d nicht indiziert ist, daher eventuell auch kürzere Beatmungszeiten unter Propofol, kein gematchtes Design	Unter Propofol kürzere Beatmungszeiten als unter Lorazepam	2b
Jones C, Backman C, Capuzzo M, Flaatten H, Rylander C, Griffiths RD. Precipitants of post-traumatic stress disorder following intensive care: a hypothesis generating study of diversity in care. Intensive care medicine 2007; 33(6): 978-85.	prospektive Kohortenstudie	238 genesende, erwachsene ICU-Patienten, nach einer mechanischen Ventilation, multizentrisch: 5 Zentren in Europa	"Assessment of patients' memories of ICU was undertaken at 1-2 weeks post ICU discharge. Patients' psychological recovery was assessed by examining the level of PTSD-related symptoms and rate of PTSD by 3 months post ICU."	"The rate of defined PTSD was 9.2%, ranging from 3.2% to 14.8% in the different study ICUs. Independent of case mix and illness severity, the factors found to be related to the development of PTSD were recall of delusional memories, prolonged sedation, and physical restraint with no sedation."	Fixierende Maßnahmen im Delir ohne symptombezogene medikamentöse Therapie sind selbstverständlich Faktoren, die den Patienten nachhaltig beeinflussen	Übersedierung und Angst machen PTSD	1b
Maldonado JR, Wysong A, van der Starre PJ, Block T, Miller C, Reitz BA. Dexmedetomidine and the reduction of postoperative delirium after cardiac surgery. Psychosomatics 2009; 50(3): 206-17.	RCT	118 kardiochirurgische Patienten zur Klappenintervention	Dexmedetomidin n=36, Propofol n=31, Midazolam n=32 zur postoperativen Sedierung	"The incidence ofdelirium for patients receiving dexmedetomidine was 3%, for those receiving propofol was 50%,and for patients receiving midazolam, 50%. Patients who developed postoperative delirium expe-rienced significantly longer intensive-care stays and longer total	relativ kleines Kollektiv, kein Loss-to-follow up, CONSORT vorhanden, gute Studie	Benzos machen längere Beatmung, längeren ICU-Aufenthalt und Delir	1b

Samuelson KA, Lundberg D, Fridlund B. Stressful experiences in relation to depth of sedation in mechanically ventilated patients. Nursing in critical care 2007; 12(2): 93-104.	prospektive Kohortenstudie	313 beatmete, sedierte ICU Patienten, davon 250 Interviewte	mehr als 6 Stunden beatmete und sedierte Patienten wurden nach Entlassung auf Normalstation bezüglich Erinnerungen an unangenehme Ereingisse während ihres ICU Aufenthaltes interviewed	"This study suggests that light sedation, by means ofhigher proportion of MAAS score 3, increases the riskof remembering the ETT and stressful experiences ofthe ICU as more bothersome, and the longer the ICUstay, the higher the risk of perceiving nightmares andother bothering experiences as quite a bit or extremelystressful. Due to limitations in study design andmeasurement quality, further research, preferably asrandomized clinical trials,	inkonsistente Evidenzlage	Benzos schlecht	1b
Huey-Ling L, Chun-Che S, Jen-Jen T, Shau-Ting L, Hsing IC. Comparison of the effect of protocol-directed sedation with propofol vs. midazolam by nurses in intensive care: efficacy, haemodynamic stability and patient satisfaction. Journal of clinical nursing 2008; 17(11): 1510-7.	RCT	60 Patienten mit elektiver CABG-Op und anschließender mechanischer Beatmung auf einer cardiochirurgischen Intensivstation, ausgeschlossen wurden Patienten mit Nieren- und Leberinsuffizienz, EF<30%, Schlaganfall, Demenz, hämodynamischer	Patienten wurden in die Propofol oder Midazolam-Gruppe randomisiert, beide Sedativa Ramsay-gesteuert mit Ziel-Ramsay: 3-4	"The nursing staff were able to maintain patients at Ramsay sedation scale (RSS) 3–4 during the sedative period. The efficacy of sedation was 74·2% and 66·9% of time in propofol and midazolam group respectively. Both sedatives reduced the arterial blood pressure and heart rate, but did not alter haemodynamic stability. The mean score of satisfactory sedation was not significantly different between the two groups (propofol: 11·4 SEM 0·2 vs. midazolam: 11·5 SEM 0·7)."	sehr ausgewähltes Patientenkollektiv, moderate Sedierungstiefe als Ziel, kein fast-track nach Kardiochirurgie in dieser Studie	Midazolam und Propofol gleich sicher und effektiv	1b
Pandharipande PP, Pun BT, Herr DL, et al. Effect of sedation with dexmedetomidine vs lorazepam on acute brain dysfunction in mechanically ventilated patients: the MENDS randomized controlled trial. JAMA : the journal of the American Medical Association 2007; 298(22): 2644-53.	RCT	106 erwachsene ICU-Patienten, die für mindestens 24h mechanischer Ventilation bedürfen, MENDS-Trial	kontinuiertlich doppelblind Dexmedetomidin versus Lorazepam; für maximal 120h; Rescue: Propofolbolus; daily SAT und SBT nicht Teil des Protokolls	"Sedation with dexmedetomidine resulted in more days alive without delirium or coma (median days, 7.0 vs 3.0; P = .01) and a lower prevalence of coma (63% vs 92%; P < .001) than sedation with lorazepam. Patients sedated with dexmedetomidine spent more time within 1 RASS point of their sedation goal compared with patients sedated with lorazepam (median percentage of days, 80% vs 67%; P = .04). The	RASS-Ziel zu tief, fragliche Übersedierung mit Lorazepam;	Lorazepam im Vergleich zu Dexmedetomidin nicht unterschiedlich hinsichtlich Mortalität	1b
Ruokonen E, Parviainen I, Jakob SM, et al. Dexmedetomidine versus propofol/midazolam for long-term sedation during mechanical ventilation. Intensive care medicine 2009; 35(2): 282-90.	RCT	Dexmedetomidin vs. Standard Care (Propofol oder Midazolam) (N = 41 vs. 44) monozentrisches Pilotprojekt	Dexmedetomidin vs. Standard Care (Propofol vs. Midazolam), doppelblind	Kein Non-inferiority Nachweis von Dexmedetomidin vs. Standard Sedation. Kein Vorteil bei RASS 0-(-3) für Dex vs. Standardprotokoll	Kleine Pilotstudie, kein Sedierungsmanagement gemäß Standard.	Outcome unabhängig von appliziertem Sedativum	1b

			vs. Diazepam (N= 26 vs. 24) FK protokollbasiert Ethanol vs. historische Kontrollgruppe (N = 68 vs. 92) FK Clonidin vs. non-AUD PAtietnen (N = 13 vs. 11) RCT Flunitrazepam+Clonidin vs. Clomethiazol + haloperidol vs. Flunitrazepam + haloperidol vs. Ethanol (N= 52 vs. 49 vs. 50 vs. 50) RCT Ethanol vs. Midazolam vs. Clonidin (N= 52 ohne Subdivision) RCT Ethanol vs. symptomatische Therapie (Clomethiazol + haloperidol) (N = 10 vs. 9) RCT GHB vs. Clomethiazol (N = 14 vs. 12) FK Protokollbasiertes, multimodales Vorgehen vs. historische Kontrollgruppe (N = 24 vs. 14)				
Ungur LA, Neuner B, John S, Wernecke K, Spies C. Prevention and therapy of alcohol withdrawal on intensive care units: systematic review of controlled trials. Alcoholism, clinical and experimental research 2013; 37(4): 675-86.	Systematisches Review	6 kontrollierte Studien: Prävention 8 kontrollierte Studien: Therapie	FK Benzo/Phenobarbital vs. historische Kontrolle ohne Protokoll (N = 41 vs. 54) FK Lorazepam vs.	Keine systematische Aufwarbeitung anhand von Endpunten aber sehr exakte deskriptive Statistik mit vorsichtigen Schlüssen und ausführlicher Diskussion	Systematisches Review erfüllt Kriterien internationaler Standards. Keine Metaanalyse.	Benzodiaziepine sind Standard für AWS, Eine symptomgetriggerte Bolusdaministration ist einer kontinuierlichen Gabe überlegen.	1a
Mehta S, Burry L, Cook D, Fergusson D, Steinberg M, Granton J, Herridge M, Ferguson N, Devlin J, Tanios M, Dodek P, Fowler R, Burns K, Jacka M, Olafson K, Skrobik Y, Hebert P, Sabri E, Meade M: Daily sedation interruption in mechanically ventilated critically ill patients cared for with a sedation protocol: a randomized controlled trial.	RCT	Protokollbasierte Sedierung N = 209 (Kontrolle) Protokollbasierte Sedierung und tägliche Sedierungsunterbrechung N = 214 (Intervention), multizentrisch	DSI + protokollbasierte Sedierung vs. protokollbasierte Sedierung	Keine Unterschiede in Ergebnisparametern (Länge der Krankenhausverweildauer, ICU-Verweildauer); DSI-Protokoll war mit höhren Dosen von Midazolam und Fentanyl assoziiert und mehr Boli von Benzodiazepinen und Opioiden.	RCT Subgruppenanalyse; Studiendesign und durchführung gemäß SIGN Kriterien ohne Mängel, große Studie, multizentrisch. Am ehesten ist fehlender DSI Effekt im Vergleich zu Vorstudien auf veränderte Behandlung der Kontrollgruppe	kein DSI mehr bei protokollbasierter Sedierung	1b
Burry L, Rose L, McCullagh IJ, Fergusson DA, Ferguson ND, Mehta S. Daily sedation interruption versus no daily sedation interruption for critically ill adult patients requiring invasive mechanical ventilation. The Cochrane database of systematic reviews 2014;7:CD009176.	Systematisches Review	9 Studien N = 1282	Cochrane Review zur Analyse von DSI vs. non-DSI Protokollen	" [DSI] did not find strong evidence of an effect on ICU length of stay (-10%, 95% CI -20% to 3%,n = 9 trials, moderate quality evidence) or hospital length of stay (-6%, 95% CI -18% to 8%, n = 8 trials, moderate quality evidence).Heterogeneity for these three outcomes was moderate and statistically significant. The risk ratio for ICU mortality was 0.96 (95% CI0.77 to 1.21, n = 7 trials, moderate quality evidence), for rate of accidental endotracheal tube removal 1.07 (95% CI 0.55 to 2.12, n= 6 trials, moderate quality evidence), for catheter removal 1.48 (95% CI 0.76 to 2.90, n = 4 trials), and for incidence of	Qualitativ hochwerties Cochrane Review.	DSI-Protokoll ist non-DSI Protokoll nicht mehr sicher überlegen.	1a

Jakob SM, Ruokonen E, Grounds RM, et al. Dexmedetomidine vs midazolam or propofol for sedation during prolonged mechanical ventilation: two randomized controlled trials. JAMA : the journal of the American Medical Association 2012; 307(11): 1151-60.	RCT	Midazolam N = 251 Dexmedetomidin (MIDEX) N = 227; Propofol N= 214 vs. Dexmedetomidine (PRODEX) N = 223 Intervention ist in diesem Fall Dexmedetomidin. Zwei RCTs im non-inferiority-Design (PRODEX/MIDEX), multizentrisch 44 Zentren für MIDEX und 31 Zentren für PRODEX	Midazolam vs. Dexmedetomidin; Propofol vs. Dexmedetomidin	Dauer der mechanischen Ventilation Dexmedetomidine (123 Stunden [IQR, 67-337]) vs Midazolam (164 Stunden[IQR, 92-380]; P = .03) signifikant kürzer bei Midazolam als Vergleichssubstanz aber nicht bei Propofol Dex (97 Stunden [IQR, 45-257]) vs Propofol (118 Stunden [IQR, 48-327]; P = .24Deutlich verbesserte Erweckbarkeit und Kommunikation des Patienten unter allen subjektiven Kriterien. Kein Unterschied in Liegedauer Krankenhaus/ITS, höhrere Inzidenz von Hypotension und Bradykardie unter Dexmedetomidine. Kein Mortalitätseffekt	Non-inferiority Design als europäische Zulassunggstudie; Heterogenität hoch; kein Delirscreening; zeigt lediglich nicht-Inferiorität von Dex vs. Mdz oder Pro bei erhöhter Nebenwirkungsrate aber besserer Kommunikationsfähigkeit; Übersedierung gemäß Leitlinie gegeben.	Dex	1b
Triltsch AE, Welte M, von Homeyer P, et al. Bispectral index-guided sedation with dexmedetomidine in intensive care: a prospective, randomized, double blind, placebo-controlled phase II study. Critical care medicine 2002;	RCT	30 postoperative beatmete Patienten	Dexmedetomidin vs. Placebo; BIS gestützte Titration von Morphin und Propofol, doppelblind	"Dexmedetomidine reduced propofol require-ments and improved hemodynamic stability during bispectralindex-guided intensive care unit sedation."	Dexmedetomidin ist sicher in der Anwendung zur Sedierung beatmeter Patienten. Kleine Studie.	Dex	2b
Pandharipande PP, Sanders RD, Girard TD, et al. Effect of dexmedetomidine versus lorazepam on outcome in patients with sepsis: an a priori-designed analysis of the MENDS randomized controlled trial. Critical	RCT	doppelblinde RCT (MENDS-Trial, siehe Nummer 87), Subgruppenanalyse, a priori designed	Lorazepam vs. dexmedetomidin als Sedativum in der Intensivmedizin	Subgruppenanlyse ergibt, dass Patienten mit Dexmedetomidin mehr Tage ohne Hirnfunktionsstörung und eine signifikant geringere Mortalität aufwiesen. 28 Tage Mortalitätsrisiko: 70% [hazard ratio 0.3 (0.1, 0.9)] in Dexmedetomidine Patienten mit	RCT Subgruppenanalyse; Studiendesign und durchführung gemäß SIGN Kriterien ohne Mängel, aber nur Subgruppenanalyse von 62 Patienten 31 vs 32	Dexmedetomidine scheint einen Vorteil bei septischen Patietnen zu haben, kleines Kollektiv, weitere Studien	1b
Wang HR, Woo YS, Bahk WM. Atypical antipsychotics in the treatment of delirium. Psychiatry and clinical neurosciences 2013; 67(5): 323-31.	Systematisches Review	6 RCTs, insgesamt 289 Patienten	Therapie des Delir mittels Antipsychotika	"It was found that atypical antipsychotics areeffective and safe in treating delirium, even thoughthere seemed to be no difference between each agent.In particular, comparison studies with haloperidolshowed that the efficacy of atypical antipsychoticswas similar to that of low-dose haloperidol. It wasconcluded that atypical antipsychotics appear to beeffective and tolerable in the management ofdelirium, even though the	Evidenzlage noch gering, weitere Studien notwendig.	Therapie sinnvoll, welche Agentien überlegen sind, Bedarf weiteren Studien	1a
Girard TD, Pandharipande PP, Carson SS, et al. Feasibility, efficacy, and safety of antipsychotics for intensive care unit delirium: the MIND randomized, placebo-controlled trial. Critical care medicine 2010; 38(2): 428-37.	RCT	101 beatmete ICU Patienten, multicenter	"Patients were randomly assigned to receive haloperidol or ziprasidone or placebo every 6 hrs for up to 14 days. Twice each day, frequency of study drug administration was adjusted according to delirium status, level of sedation, and side effects."	"A randomized, placebo-controlled trial of antipsychotics for delirium in mechanically ventilated intensive care unit patients is feasible. Treatment with antipsychotics in this limited pilot trial did not improve the number of days alive without delirium or coma, nor did it increase adverse outcomes. Thus, a large trial is needed to determine whether use of antipsychotics for intensive care unit delirium is appropriate."	sehr gute Studie	MIND: Haldol vs. Ziprasidone vs. Placebo: Pilotstudie n=100: kein Vorteil	1b
Morandi A, Brummel NE, Ely EW. Sedation, delirium and mechanical ventilation: the 'ABCDE' approach. Current opinion in critical care 2011;	narratives Review	sedierte, beatmete ICU Patienten	diverse RCTs zu SAT, sowie Sedierung mit Dex		Vermischung von zwei Themengebieten	Review zu 2 verschiedenen Themen	5
Dieye E, Minville V, Asehnoune K, et al. Pharmacodynamics of cisatracurium in the intensive care unit: an observational study. Annals of intensive care 2014; 4(1): 3.	prospektive Kohortenstudie	17 ICU Patienten zur dilatativen Tracheotomie vs. 17 elektiv chirurgische Patienten	Cisatracurium Applikation bis TOF 0/4	"After the initial dose of cisatracurium, none of ICU patients (0/17) versus 15/17 of the elective surgery patientswere completely paralyzed (P< 0.0001). There was a delay in the onset of neuromuscular blockade among the ICU patients. The cumulative doses of cisatracurium were significantly higher in the ICU group with 38 ± 14 mg (that is,10 ± 4.7 ED95) versus 11 ± 2 mg (that is, 3 ± 0.3 ED95) in the elective surgery	kleine Studiengruppe, Methodik gut	NMB nur unter Monitoring, wegen veränderter Wirkdosen und Wirkdauern bei ITS-Patienten	2b

Warren J, Fromm RE, Jr., Orr RA, Rotello LC, Horst HM. Guidelines for the inter- and intrahospital transport of critically ill patients. Critical care medicine 2004; 32(1): 256-62.	Leitlinie	Intra- und interhospital transportierte Patienten	Leitline zum sicheren intra- und interhospital Transport von Patienten, konsensusbasierte Leitlinie, da Evidenz laut Autoren unzureichend für evidenzbasiertes Vorgehen.	Empfehlung zur Implementierung eines organisierten, effizienten Transportprozesses mit passender Ausrüstung und ausgebildetem Personal	"Expert opinion and a search of Index Medicusfrom January 1986 through October 2001 provided the basis forthese guidelines. A task force of experts in the field of patienttransport provided personal experience and expert opinion." Limitierung Datenursprung. nicht evidenzbasiert	Expertenmeinung einer Task-Force	5
Dunn MJ, Gwinnutt CL, Gray AJ. Critical care in the emergency department: patient transfer. Emergency medicine journal : EMJ	Expertendiskussion	Intra- und interhospital transportierte Patienten	keine	fiktiver Fall eines gestürzten Patienten anhand dessen der sichere Intra- und Interhospitaltransport diskutiert wird	Expertenmeinung	LL	5
Heegaard W, Fringer RC, Frascone RJ, Pippert G, Miner J. Bispectral index monitoring in helicopter emergency medical services patients. Prehospital emergency care : official journal of the National Association of EMS Physicians and the National	prospektive Kohortenstudie	Probanden: 18, Patienten: 47	BIS-Monitoring in gesunden Probanden während eines Helikoptertransports und bei kritisch Kranken während eines Helokopter Transports.	"Our prospective, observational study indicates that among critically ill patients transported by our criticalcare clinicians in a helicopter environment, almost allpatients were appropriately sedated during transport.Furthermore, the BIS monitor was able to collect qualitydata in the helicopter setting."	Prospektive Kohorte, kleines Patientenkollektiv, Feasibilitystudie in gesunden Probanden	BIS verblindet im Helikopter ist durchführbar	2b
Ab hier Aktualisierungsprozess 2020: die Referenzen sind kapitelweise sortiert für den allgemeinen Teil							
Nagaraj SB, McClain LM, Zhou DW, Biswal S, Rosenthal ES, Purdon PL, Westover MB. Automatic Classification of Sedation Levels in ICU Patients Using Heart Rate Variability. Crit Care Med. 2016 Sep;44(9):e782-9.	Multicenter, pilot study.	40 beatmete ICU Patienten	ECG recordings from 40 mechanically ventilated adult patients receiving sedatives in an ICU setting were utilized to develop and test automated monitoring of sedation levels.	An overall accuracy of 69% was achieved for discriminating between the 4 levels of sedation. The proposed system was able to reliably discriminate (accuracy = 79%) between sedated (RASS <0) and non-sedated states (RASS >0).	Pilot, kleine Fallzahl	nur zusätzliche Aussage von Vitalparametern, allein nicht aussreichend	2b
Ritmala-Castren M, Virtanen I, Vahlberg T, Leivo S, Kaukonen KM, Leino-Kilpi H. Evaluation of patients' sleep by nurses in an ICU. J Clin Nurs. 2016 Jun;25(11-12):1606-13.	observational study	21 erwachsene Patienten	Standard overnight polysomnography was recorded on 21 patients. Simultaneously, nurses marked into an electronic patient care documentation system all the changes noted in the patients' sleep status. Patients' arterial blood pressure and heart-rate data were automatically saved into the electronic patient care documentation.	The evaluations of patients' sleep/wake state by nurses corresponded to polysomnography 68% of the time. A correlation was found between nurses' evaluations and polysomnography recordings only on total sleep time. There was no correlation in the other sleep aspects (sleep latency, amount of awakenings or movements during sleep). Most patients' blood pressures and heart rate varied according to sleep/wake state. There was less variation if the patient had received noradrenalin for blood pressure control.	kleine Observation	Fremdeinschätzung der Schlafqualität möglich	2b
Finger RG, Mallmann C, Nedel WL. BIS monitoring in sedated, mechanically ventilated patients: right tool in the wrong patients? A meta-analysis.	Metaanalysis	4 RCT	BIS in ICU sedated patients	BIS may still have utility in these specific patients, where it is not possible to perform clinical scales. Further studies in this population should be performed to determine some benefit of BIS monitoring.	kein Verkürzung der Beatmungsdauer oder ICU-LOS durch BIS Verwendung, aber kleine Studien	Forschungsbedarf	1a

Arbour RB, Dissin J. Predictive value of the bispectral index for burst suppression on diagnostic electroencephalogram during drug-induced coma. J Neurosci Nurs. 2015 Apr;47(2):113-22.	prospective, observational cohort study	4 patients receiving drug-induced coma/EEG monitoring	Validating BIS data versus diagnostic EEG during drug-induced coma	Regression coefficient of 0.6673 shows robust predictive value between EEG burst count and BIS SR. Spearman rank coefficient of -0.8727 indicates strong inverse correlation between EEG burst count and BIS SR. Pearson's correlation coefficient between EEG versus BIS burst count was .8256 indicating strong positive correlation. Spearman's rank coefficient of 0.8810 and Pearson's correlation coefficient of .6819 showed strong correlation between BIS value versus EEG burst count. Number of patients (4) limits available statistics and ability to generalize results. Graphs and statistics show strong	Fall-Kontroll-Serie	BIS und EEG korrellieren	3b
Herman ST, Abend NS, Bleck TP, Chapman KE, Drislane FW, Emerson RG, Gerard EE, Hahn CD, Husain AM, Kaplan PW, LaRoche SM, Nuwer MR, Quigg M, Riviello JJ, Schmitt SE, Simmons LA, Tsuchida TN, Hirsch LJ; Critical Care Continuous EEG Task Force of the American Clinical Neurophysiology Society. Consensus statement on continuous EEG in critically ill adults and children, part I: indications. J Clin Neurophysiol. 2015 Apr;32(2):87-95.	practice guideline		The Critical Care Continuous EEG Task Force of the American Clinical Neurophysiology Society developed expert consensus recommendations on the use of CCEEG in critically ill adults and children.	The consensus panel recommends CCEEG for diagnosis of nonconvulsive seizures, nonconvulsive status epilepticus, and other paroxysmal events, and for assessment of the efficacy of therapy for seizures and status epilepticus. The consensus panel suggests CCEEG for identification of ischemia in patients at high risk for cerebral ischemia; for assessment of level of consciousness in patients receiving intravenous sedation or pharmacologically induced coma; and for prognostication in patients after cardiac arrest. For each indication, the consensus panel describes the patient populations for which CCEEG is indicated, evidence supporting use of CCEEG, utility of	LL	internationale LL zur Verwendung von EEG auf der ICU	1a
Luetz A, Balzer F, Radtke FM, Jones C, Citerio G, Walder B, Weiss B, Wernecke KD, Spies C. Delirium, sedation and analgesia in the intensive care unit: a multinational, two-part survey among intensivists. PLoS One. 2014 Nov 14;9(11):e110935.	prospective, observational multicenter study	Questionnaires from 101 hospitals / 868 patients	1)investigates the implementation rate of delirium monitoring among intensivists 2) Assesment of the current practice of analgesia and sedation monitoring as well as treatment strategies for delirium 3)Comparison between perceived and actual practice regarding delirium, sedation	1) 56% of the intensive care units reported to monitor for delirium in clinical routine 2) 44% of the ICUs reported the use of a validated delirium score. In this respect, the survey suggests an increasing use of delirium assessment tools compared to previous surveys. Nevertheless, part two of the survey revealed that in actual practice 73% of included patients were not monitored with a validated score. Furthermore, we observed a trend towards moderate or deep sedation which is contradicting to guideline-recommendations. Every fifth patient was suffering from pain. The implementation rate of adequate pain-assessment tools for mechanically ventilated and sedated patients was low (30%). In conclusion, further efforts are necessary to implement guideline recommendations into clinical practice. The study	sehr große Prävalenzerhebung, 101 Krankenhäuser, fast 1000 Patienten	Delirmonitoring ist sicher, durchführbar und bewährt; auch vom klinischen Routine-Personal erhobene Scores sind valide	2a

Lapinlampi TP, Viertiö-Oja HE, Helin M, Uutela KH, Särkelä MO, Vakkuri A, Young GB, Walsh TS. Algorithm for Quantifying Frontal EMG Responsiveness for Sedation Monitoring. Can J Neurol Sci. 2014 Sep;41(5):611-9	Observational study	17 ICU patients	First, the characteristics of FEMG response patterns related to vocal stimulation of 17 ICU patients were studied. Second, we collected continuous FEMG data from 30 ICU patients. Based on these data, we developed the Responsiveness Index (RI) algorithm that quantifies FEMG responses. Third, we compared the RI values with clinical sedation level assessments and adjusted algorithm parameters for best performance.	In patients who produced a clinically observed response to the vocal stimulus, the poststimulus FEMG power was 0.33 µV higher than the prestimulus power. In nonresponding patients, there was no difference. The sensitivity and specificity of the developed RI for detecting deep sedation in the subgroup with low probability of encephalopathy were 0.90 and 0.79, respectively.	kleines Kollektiv	Frontale EMG zur Messung tiefer Sedierung geeignet	2b
Benedict N, Felbinger M, Ridenour T, Anthes A, Altawalbeh S, Kane-Gill S. Correlation of patient-reported outcomes of sedation and sedation assessment scores in critically ill patients. J Crit Care. 2014 Dec;29(6):1132.e5-9.	observational study	29 mechanically ventilated adult ICU patients requiring continuous infusion sedation for 24 hours or more	Patient-reported outcomes were evaluated through sedation questionnaire 24 hours post-continuous infusion sedation. The primary outcome was the correlation of PROs with Sedation-Agitation Scale (SAS) scores.	Mean (SD) SAS scores per 12-hour nursing shift for propofol (n=179), midazolam (n=42), and dexmedetomidine (n=8) were 3.78 (77), 3.31 (1.1), and 2.98 (0.76), respectively. The mean score for survey questions addressing perceptions of comfort was 5.3 (1, complete comfort; 10, not comfortable at all). Of the patients, 34%, 7%, and 52% would want more, less, or the same amount of sedation, respectively, if this situation were to arise again. Patient perception of comfort correlated with the	Vergleich PROs mit Sedierungstiefe nach Score	Einhalten des Ziel-RASS erhöht PROs !!	2b
Luetz A, Balzer F, Radtke FM, Jones C, Citerio G, Walder B, Weiss B, Wernecke KD, Spies C. Delirium, sedation and analgesia in the intensive care unit: a multinational, two-part survey among intensivists. PLoS One. 2014 Nov 14;9(11):e110935. doi: 10.1371/journal.pone.0110935. eCollection 2014. PubMed PMID: 25398099; PubMed Central PMCID: PMC4232258.	observational study	Questionnaires from 101 hospitals and 868 patients were included in data analysis	implementation rate of delirium monitoring among intensivists	Fifty-six percent of the intensive care units reported to monitor for delirium in clinical routine. Fourty-four percent reported the use of a validated delirium score. In this respect, the survey suggests an increasing use of delirium assessment tools compared to previous surveys. Nevertheless, part two of the survey revealed that in actual practice 73% of included patients were not monitored with a validated score. Furthermore, we observed a trend towards moderate or deep sedation which is contradicting to guideline-recommendations. Every fifth patient was suffering from pain. The implementation rate of adequate pain-assessment tools for mechanically ventilated and sedated patients was	sehr große Prävalenzerhebung, 101 Krankenhäuser, fast 1000 Patienten	Delirmonitoring ist sicher, durchführbar und bewährt; auch vom klinischen Routine-Personal erhobene Scores sind valide	2a
Verceles AC, Hager ER. Use of Accelerometry to Monitor Physical Activity in Critically Ill Subjects: A Systematic Review. Respir Care. 2015 Sep;60(9):1330-6. doi: 10.4187/respcare.03677. Epub 2015 Apr 7. Review. PubMed PMID: 25852167;PubMed Central PMCID:	systematic review	9 studies	PubMed search	The selected literature demonstrates that accelerometry correlates well with direct observation in reporting frequency and duration of various types of physical activity (rolling, sitting up, transferring, walking), but cannot differentiate various intensities of activity or whether movements are voluntary or involuntary with respect to effort.	heterogene Studien und Endpunkte	Messung der physischen Aktivität mittels Accelerometry möglich	1a

Aslanidis T, Grosomanidis V, Karakoulas K, Chatzisotiriou A. Electrodermal Activity Monitoring During Painful Stimulation in Sedated Adult Intensive Care Unit Patients: a Pilot Study. Acta Medica (Hradec Kralove). 2018;61(2):47-52. doi: 10.14712/18059694.2018.50. PubMed PMID: 30216182.	observational study	25 sedated patients requiering mechanically ventilation	recordings of Skin conductance variability, selected hemodynamic and respiratory parameters, Bispectral index (BIS) and ambient noise level,before and after pain stimulus were performed, groups devided by Ramsey Sedation Score	In both groups the rate of EDA changes was greater than other monitoring parameters: more in Group A than in Group B. Yet, the difference between groups was not statistically significant.	kleines Kollektiv, Pilot	Eingeschränkte Aussagekraft der EDA, Hauptstudie abwarten	1b
Wildemeersch D, Gios J, Jorens PG, Hans GH. Objective Nociceptive Assessment in Ventilated ICU Patients: A Feasibility Study Using Pupillometry and the Nociceptive Flexion Reflex. J Vis Exp. 2018 Jul 4;(137). doi: 10.3791/57972. PubMed PMID: 30035771; PubMed Central PMCID: PMC6124604.	Feasibility Study/ single-center cohort study	critically ill, non-communicative patients	Measurement of the Pupil Dilation Reflex, Measurement of the Nociceptive Flexion Reflex	The use of PDR and NFR measurements are currently limited to specialized pain clinics and researchinstitutions because of impressions that these are technically demanding or time-consuming procedures, or even because of a lack of knowledgeregarding their existence.By focusing on the two abovementioned nociceptive reflex assessments, this study evaluated their feasibility as a physiological painmeasurement method in daily practice. Pursuing novel technologies for evaluating the analgesia level in unconscious patients may furtherimprove individual pharmacological treatment and patient related outcome measures. Therefore, future	Pupillomotorik und Nociceptionsreflex sind feasible auf der ICU, Forschungsbedarf zur Aussage	Forschungsbedarf adressieren! Apparative Schmerzmessung	2b
Chanques G, Tarri T, Ride A, Prades A, De Jong A, Carr J, Molinari N, Jaber S. Analgesia nociception index for the assessment of pain in critically ill patients: a diagnostic accuracy study. Br J Anaesth. 2017 Oct 1;119(4):812-820. doi: 10.1093/bja/aex210. PubMed PMID: 29121287.	observational study	110 patients with RASS > -4, mechanically ventilated or receiving vasopessors	Mean-ANI (ANIm) and Instant-ANI (ANIi) were continuously recorded then compared with the Behavioral Pain Scale (BPS) before, during and after routine care procedures in critically-ill non-comatose patients.	969 assessments were performed in 110 patients. ANIi was the most discriminative pain tool. It was significantly correlated with BPS (r=-0.30; 95%CI -0.37 to -0.25; P<0.001). For an ANIi threshold of 42.5, the sensitivity, specificity, positive and negative predictive values were respectively 61.4%, 77.4%, 37.0%, and 90.4%. Compared with the BPS, ANIi had no significantly different ability to change during turning and tracheal-suctioning but changed significantly more during dressing change. ANIi increased independently with age, obesity and severity of illness, and controlled mechanical-ventilation, vasopressors use and analgesia. ANIi decreased	Analgesia nociception index - ANI korrelliert mit BPS (vielleicht) --> Forschungsbedarf	Forschungsbedarf adressieren! Apparative Schmerzmessung	2b
Hasanin A, Mohamed SAR, El-Adawy A. Evaluation of perfusion index as a tool for pain assessment in critically ill patients. J Clin Monit Comput. 2017 Oct;31(5):961-965.	Prospective observastional study	87 sedated non-intubated patients in a surgical ICU	Assesment of pain in critically ill via perfusion index (PI) ; The PI, arterial blood pressure, heart rate, RASS, and BPS-NI values before and after the application of a standard painful stimulus (changing the patient position) were reported.	Changing the patient position resulted in a significant increase in SBP (128 ± 20 vs 120.4 ± 20.6, P = 0.009), DBP (71.3 ± 11.2 vs 68.7 ± 11.3, P = 0.021), heart rate (99.5 ± 19 vs 92.7 ± 18.2, P = 0.013), and BPS-NI (7[6–8] vs 3[3–3], P < 0.001) values and a significant decrease in the PI (1[0.5–1.9] vs 2.2[0.97–3.6], P < 0.001) value compared to the baseline readings. There was no correlation between the values of the PI and the ABP, BPS-NI, and RASS at the two measurements. A good correlation was found between the delta PI and delta BPS-NI (r = −0.616, P < 0.001). A weak correlation was observed between the PI and heart rate after the patient positioning (r = −0.249, P < 0.02). In surgical critically ill non-intubated patients, the application of a painful stimulus was associated with decreased PI.	Perfusionsindex als Maß für Schmerzen, validiert gegen BPS-NI, da guter Zusammenhang, keine Korrelation mit HF (passt dazu, dass Vitalparameter allein nicht zur Beurteilung herangezogen werden dürfen, ob Schmerzen vorliegen)	Forschungsbedarf adressieren! Apparative Schmerzmessung	2b

Shetty RM, Bellini A, Wijayatilake DS, Hamilton MA, Jain R, Karanth S, Namachivayam A. BIS monitoring versus clinical assessment for sedation in mechanically ventilated adults in the intensive care unit and its impact on clinical outcomes and resource utilization. Cochrane Database Syst	Systematisches Review	4 RCTs with 256 participants comparing BIS versus clinical assessment (CA)	CENTRAL, MEDLINE, Embase, CINAHL, ProQuest, OpenGrey and SciSearch up to May 2017	We found insufficient evidence about the effects of BIS monitoring for sedation in critically ill mechanically ventilated adults on clinical outcomes or resource utilization. The findings are uncertain due to the low- and very low-quality evidence derived from a limited number of studies.	SR, dass weiterhin Forschungsbedarf anzeigt, auf Grund schlechter Evidenzqualität	BIS Einsatz möglich	1a
Nagaraj SB, Biswal S, Boyle EJ, Zhou DW, McClain LM, Bajwa EK, Quraishi SA, Akeju O, Barbieri R, Purdon PL, Westover MB. Patient-Specific Classification of ICU Sedation Levels From Heart Rate Variability. Crit Care Med. 2017 Jul;45(7):e683-e690. doi:	Multicenter, pilot study	70 sedated, mechanically ventilated adult ICU patients	routine ECG recordings and RASS assesment used to develop an automatic sedation level classification system	The patient-independent version of the proposed system discriminated between the 4 sedation levels with an overall accuracy of 59%. Upon personalizing the system supplementing the training data with patient-specific calibration data, consisting of an individual's labeled HRV epochs from the preceding 24 hours, accuracy improved to 67%. The personalized system discriminated between light- and deep-sedation states with an	Pilotstudie, HRV zur Beurteilung der Seiderungstiefe, kann zwischen leichter und tiefer Sedierung diskriminieren	Einsatz bei leichter Sedierung unklar, da dann klinische Messmethoden im Vordergrund stehen	2a
Schramm P, Luczak J, Engelhard K, El Shazly J, Juenemann M, Tschernatsch M. Continuous electroencephalography in a mixed non-neurological intensive care population, an observational study. J Crit Care. 2017 Jun;39:62-65. doi: 10.1016/j.jcrc.2017.01.015. Epub 2017 Feb 9. PubMed PMID: 28219810.	Fifty-three cEEGs of 50 patients with a median interpretable length of 24 hours	53 cEEGs of 50 patients	Feasibility of cECG in ICU setting	ifty-three cEEGs of 50 patients with a median interpretable length of 24 hours [IQR 20 to 42 hours] were recorded. One patient had status epilepticus, while 5 patients had non-convulsive seizures. Automated seizure detection recognized the status epilepticus and 3 of 10 non-convulsive seizures, however, detected 42 false positive seizures. Predominant background EEG activity was alpha (9%), theta (17%), delta (26%), burst-suppression (17%), and suppressed background activity (30%). EEG activity correlated neither with dosage of analgo-sedative	continous EEG auf Neuro-ICU --> eingeschränktes Kollektiv; Aussage EEG auf ICU feasible	EEG auf ICU feasible	2b
Wang ZH, Chen H, Yang YL, Shi ZH, Guo QH, Li YW, Sun LP, Qiao W, Zhou GH, Yu RG, Yin K, He X, Xu M, Brochard LJ, Zhou JX. Bispectral Index Can Reliably Detect Deep Sedation in Mechanically Ventilated Patients: A Prospective Multicenter Validation Study. Anesth Analg. 2017 Jul;125(1):176-183.	Prospective Multicenter Validation Study	90 beatmete Patienten; Training Set aus 45 Patienten und Validierungset aus 45 Patienten	BIS zur Detektion von Tiefer Sedierung / Übersedierung; RASS als Kontrolle	Deep sedation was only prescribed in 6 (6.7%) patients, but 76 patients (84.4%) had at least 1 episode of deep sedation. Thresholds for detecting deep sedation of 50 for baseline and 80 for stimulated BIS were identified, with respective areas under the receiver-operating characteristic curve of 0.771 (95% confidence interval, 0.714-0.828) and 0.805 (0.752-0.857). The sensitivity and specificity of baseline BIS were 94.0% and 66.5% and of stimulated BIS were 91.0% and 66.5%. When baseline and stimulated BIS were combined, the sensitivity, specificity, and clinical utility index were 85.0% (76.1%-91.1%), 85.9%	Trainingsset und Validierungsset,	BIS detektiert Übersedierung bei tiefer Sedierung!!!	1b

Walsh TS, Kydonaki K, Antonelli J, Stephen J, Lee RJ, Everingham K, Hanley J, Phillips EC, Uutela K, Peltola P, Cole S, Quasim T, Ruddy J, McDougall M,Davidson A, Rutherford J, Richards J, Weir CJ; Development and Evaluation of Strategies to Improve Sedation Practice in Intensive Care (DESIST) study investigators. Staff education, regular sedation and analgesia quality feedback, and a sedation monitoring technology for improving sedation and analgesia quality for critically ill, mechanically ventilated patients: a cluster randomised trial. Lancet Respir Med. 2016 Oct;4(10):807-817.	RCT	8 ICUs/ 881 patients during the baseline period and 591 patients during the intervention period	an online education programme; regular feedback of sedation-analgesia quality data; and use of the Responsiveness Index	We found a significant improvement in optimal sedation-analgesia with RI monitoring (odds ratio [OR] 1·44 [95% CI 1·07-1·95]; p=0·017), which was mainly due to increased periods free from excessive sedation (OR 1·59 [1·09-2·31]) and poor ventilator synchronisation (OR 1·55 [1·05-2·30]). However, more patients experienced sedation-related adverse events (OR 1·91 [1·02-3·58]). We found no improvement in overall optimal sedation-analgesia with education (OR 1·13 [95% CI 0·86-1·48]), but fewer patients experienced sedation-related adverse events (OR 0·56 [0·32-0·99]). The sedation-analgesia quality data feedback did not improve quality (OR 0·74 [95% CI 0·54-1·00]) or sedation-related adverse events (OR 1·15 [0·61-2·15]). The process evaluation suggested many clinicians found the RI monitoring useful, but it was often not used for decision making as intended. Education was	multicenter, hohe Fallzahl, protokollbasierte Sedierung und Analgesie verbessern, Fortbildung wird vom Personal positiv bewertet	multicenter, hohe Fallzahl, protokollbasierte Sedierung und Analgesie verbessern, Fortbildung wird vom Personal positiv bewertet	1b
Cerebral Oxygenation and Neurological Outcomes Following Critical Illness (CONFOCAL) Research Group; Canadian Critical Care Trials Group, Wood MD, Maslove DM, Muscedere JG, Day AG, Gordon Boyd J. Low brain tissue oxygenation contributes to the development of delirium in critically ill patients: A prospective	single-centre prospective observational study	88 adult ICU patients requiering mechanical ventilation for > 24h and /or vasopressor support; n= 69 CAM-ICU negative for majority of sty, n= 19 CAM-ICU positive for majority of stay	BtO2 was measured using near-infrared spectroscopy, for 24 h after enrollment. Daily Screening with CAM-ICU.	BtO2 and the proportion of time spent delirious did not result in a significant correlation (p = 0.168). However, critically ill patients who spent the majority of their ICU stay delirious had significantly lower mean BtO2 compared to non-delirious patients, (p = 0.017). BtO2 correlated positively with central venous pO2 (p = 0.00003) and hemoglobin concentration (p = 0.001). Logistic regression indicated that lower BtO2, higher narcotic doses and a history of alcohol	kleine Fallzahl, guter Comparator CAM-ICU	erniedrigte BtO2 RF für Delir, kein Monitoringparameter	2b
Green C, Hendry K, Wilson ES, Walsh T, Allerhand M, MacLullich AMJ, Tieges Z. A Novel Computerized Test for Detecting and Monitoring Visual Attentional Deficits and Delirium in the ICU. Crit	pilot study followed by prospective case-control study	pilot study in 20 patients; Case control stufy in 30 selected patients with and without delirium (median age=63 years, range 23–84)	Patients were assessed with the EDTB-ICU on up to 5 separate days. Presence of delirium was determined using CAM-ICU	EDTB-ICU scores (range=0-11) were lower for patients with delirium than those without at the first (median=0 vs. 9.5), second (median=3.5 vs. 9), and third (median=0 vs. 10.5) assessments (all p<0.001). An EDTB-ICU score ≤5 was 100% sensitive and 92% specific to delirium across assessments. Longitudinally, participants' EDTB-	Pilot, kleine Fallzahl	apparative Delirdiagnostik: Forschungsbedarf	2b
Luetz A, Weiss B, Boettcher S, Burmeister J, Wernecke KD, Spies C. Routine delirium monitoring is independently associated with a reduction of hospital mortality in critically ill surgical patients: A prospective, observational cohort study. J Crit Care. 2016	prospective, noninterventional, observational cohort study	185 surgical ICU patients of which 87 were mechanically ventilated	none	We found an independent association between delirium-monitoring adherence and in-hospital mortality for ventilated patients (odds ratio, 0.973; P= .041). Estimating the effect size, delirium monitoring indicated a reduction of 22% of in-hospital mortality if conducted 50% or more of ICU days per patient. The average ICU length of stay of 46 days was estimated to be reduced by	starker Endpunkt: Mortalität, prospective Observation	Durchführen des LL-gerechten Delirmonitngs hat direkten Einfluß auf die Mortalität!!	2b
Huttmann SE, Wilms K, Hamm C, Magnet FS, Windisch W, Storre JH. Assessment of Sleep in Patients Receiving Invasive Mechanical Ventilation in a Specialized Weaning Unit. Lung. 2017 Jun;195(3):361-369.	observational study	19 Tracheotomized patients undergoing prolonged weaning from mechanical ventilation	Polysomnography and gas exchange monitoring during nocturnal ventilation. Subjective evaluation of sleep quality and health-related quality of life	No significant difference in sleep quality was found between subjects with successful (N = 7) or unsuccessful (N = 12) weaning. Bicarbonate levels were negatively correlated both with sleep efficacy and sleep quality, that latter of which was subjectively assessed by the subjects using a visual analogue scal	sehr kleine Fallzahl, komische Fragestellung, weaningversagen - schlafqualität	PSG zur Beurteilung der Schlafqualität im Weaningversagen	2b

acas S, McInrue E, Gropper MA, Maze M, Zak R, Lim E, Leung JM. The Feasibility and Utility of Continuous Sleep Monitoring in Critically Ill Patients Using a Portable Electroencephalography Monitor. Anesth Analg. 2016 Jul;123(1):206-12.	observational study	23 ICU patients	monitoring sleep in the ICU setting using a portable EEG device	Overall, the SedLine brain monitor was able to differentiate sleep stages, as well as capture arousals and transitions between sleep stages when compared to the PSG performed in the sleep laboratory. The percentage agreement was 67% for the wake stage, 77% for the non-rapid eye movement (REM) stage (N1=29%, N2=88%, N3=6%) and 89% for the REM stage. The overall agreement was measured using weighted kappa, which was 0.61, 95% CI=0.58–0.64.In the ICU study – the mean recording time for the 23 enrolled patients was 19.10 hours. There were several signs indicative of poor quality sleep, where sleep was distributed throughout the day, with reduced time spent in REM (1.38 ± 2.74 % of total sleep time), and stage N3 (2.17 ± 5.53 % of total sleep time) coupled with a high arousal index (34.63 ± 19.04 arousals/hour). The	kleines Kollektiv, Feasability	SEDLine zur Beurteilung der Schlafqualität genauso gut wie PSG, sofern von geschultem Personal ausgewertet	2b
Holm A, Dreyer P. Use of Communication Tools for Mechanically Ventilated Patients in the Intensive Care Unit. Comput Inform Nurs. 2018 Aug;36(8):398-405	observational study	7 non-sedated, mechanicylly ventilates patients	Use of communication tools ,e.g. tablet with communication software and a laminated "communication book"	Patients may experience difficulties in using the tools, especially if they are extremely fatigued or have cognitive impairments and/or reduced muscle strength. Communication tools were not always necessary; however, some found them very helpful and the only way of conveying a message. Findings also show that the best way to facilitate communication is through a systematic	kleines Kollektiv, aber: 7 Patienten an Beatmung ohne Sedierung, Austesten der Kommunikationstools	Umdenken erfordert, Kommunikationshilfen erforderlich, wenn Patienten wach und beatmet	2b
Handberg C, Voss AK. Implementing augmentative and alternative communication in critical care settings: Perspectives of healthcare Professionals. J Clin Nurs.2018 Jan;27(1-2):102-114.	multicenter study survey	48 health care professionals in 5 ICUs	participant observations and 10 focus group interviews.	The findings represent an understanding of the healthcare professionals' perspectives on implementing AAC in critical care settings and revealed three themes. Caring Ontology was the foundation of the healthcare professionals' profession. Cultural Belief represented the actual premise in the interactions during the healthcare professionals' work, saving lives in a biomedical setting whilst appearing competent and efficient, leading to Triggered Conduct and giving low	repräsentative Umfrage, Verständnis ist da, Bedenken bestehen	Notwendigkeit, dass Ärzte und Pflegende alternative Kommunikationsmöglichkeiten erlernen	2a
Berning JN, Poor AD, Buckley SM, Patel KR, Lederer DJ, Goldstein NE, Brodie D, Baldwin MR. A Novel Picture Guide to Improve Spiritual Care and Reduce Anxiety in Mechanically Ventilated Adults in the Intensive Care Unit. Ann Am Thorac Soc. 2016 Aug;13(8):1333-42. Doi: 10.1513/AnnalsATS.201512-831OC PubMed PMID:27097049; PubMed Central PMCID: PMC5021077.	quasi-experimental study	50 mechanically ventilated adults ICUs without delirium/ dementia	patients received spiritual care by a hospital chaplain using an illustrated communication card; Assesment via semistructured interview and VAS	Using the card, 50 (100%) identified a spiritual affiliation, 47 (94%) identified one or more emotions, 45 (90%) rated their spiritual pain, and 36 (72%) selected a chaplain intervention. Anxiety after the first visit decreased 31% (mean score change, −20; 95% confidence interval, −33 to −7). Among 28 ICU survivors, 26 (93%) remembered the intervention and underwent semistructured interviews, of whom 81% felt more capable of dealing with their hospitalization and 0% felt worse. The 18 ICU survivors who underwent additional VAS testing during semistructured follow-up interviews reported a 49-point reduction in stress (95% confidence interval,	alternative Methoden zur Reduktion von Angst auf der ICU	Angst reduzieren in Beatmeten	1b
Tembo AC, Higgins I, Parker V. The experience of communication difficulties in critically ill patients in and beyond intensive care: Findings from a larger phenomenological study. Intensive Crit Care Nurs. 2015 Jun;31(3):171-8. doi: 10.1016/j.iccn.2014.10.004. Epub 2014	Phenomenological Study	12 mechanically ventilated patients In ICU setting, subjected to DSI	In-depth face to face interviews with participants were conducted at two weeks after discharge from ICU and at six to eleven months later.	Participants' reports of communication difficulties in ICU are similar to those reported by patients in other studies where DSI was not used. However, not many studies have reported ongoing communication difficulties after ICU hospitalisation.	Befragung /Untersuchung von beatmeten Patienten mit DSI	Konsequenzen der Kommunikationsschwierigkeiten	2b

Hosokawa K, Nishimura M, Egi M, Vincent JL. Timing of tracheotomy in ICU patients: a systematic review of randomized controlled trials. Crit Care. 2015 Dec 4;19:424. doi: 10.1186/s13054-015-1138-8. Review. PubMed PMID: 26635016; PubMed Central PMCID: PMC4669624.	systematic review	12 RCTs, including a total of 2,689 patients	PubMed and CENTRAL for randomized controlled trials, Meta-analysis	The tracheotomy rate was significantly higher with early than with late tracheotomy (87 % versus 53 %, OR 16.1 (5.7-45.7); p <0.01). Early tracheotomy was associated with more ventilator-free days (WMD 2.12 (0.94, 3.30), p <0.01), a shorter ICU stay (WMD -5.14 (-9.99, -0.28), p = 0.04), a shorter duration of sedation (WMD -5.07 (-10.03, -0.10), p <0.05) and reduced long-	frühe Tracheotomie geht mit Sedierungsreduktion einher, dadurch besseres Outcome	Zeitpunkt der Tracheotomie, cave: frühe Tracheotomie führt zu schneller Sedierungsreduktion, irrglaube, Sedierungsreduktion auch ohne Tracheotomie möglich	1a
Herritt B, Chaudhuri D, Thavorn K, Kubelik D, Kyeremanteng K. Early vs. late tracheostomy in intensive care settings: Impact on ICU and hospital costs. J Crit Care. 2018 Apr;44:285-288. doi: 10.1016/j.jcrc.2017.11.037. Epub 2017 Dec 22. PubMed PMID: 29223743	cost-analysis		We extracted individual length of hospital stay and length of ICU stay data from the studies included in the systematic review from Hosokawa et al. + any recent rRCTs published after this review.	The average weighted cost of ICU stay in patients with an early tracheostomy was $4316 less when compared to patients with late tracheostomy (95% CI: 403-8229). Subgroup analysis revealed that very early tracheostomies (<4days) cost on average $3672 USD less than late tracheostomies (95% CI: -1309, 10,294) and that early tracheostomies (<10days but >4) cost on average $6385 USD less than late	frühe Tracheotomie geht mit geringen Kosten einher, wahrscheinlich auch durch Sedierungsreduktion und nicht die Tracheotomie selbst	frühe Tracheotomie geht mit geringen Kosten einher, wahrscheinlich auch durch Sedierungsreduktion und nicht die Tracheotomie selbst	1b
Johnson K, Curry V, Steubing A, Diana S, McCray A, McFarren A, Domb A. A non-pharmacologic approach to decrease restraint use. Intensive Crit Care Nurs. 2016 Jun;34:12-9. doi: 10.1016/j.iccn.2015.08.004. Epub 2015 Dec 1. PubMed PMID: 26652790.	Pre/post-intervention design		Patients were assessed by nursing on admission and every shift with the Confusion Assessment Method for TICU. Restraint use was measured in a 24-hour period. Nurses' perception of restraints was measured using Perceptions of Restraint Use Questionnaire (PRUQ).	statistically significant difference was demonstrated in restraint use before and after the educational intervention. Mean and standard deviation for restraints per 1000 patient days pre-intervention was 314.1 (35.4), post-intervention 237.8 (56.4) (p=0.008). Mean PRUQ overall, 3.57 (range 1-5) indicated that nurses had positive attitudes towards restraints in certain circumstances. The primary reasons for using restraints were: "protecting patients from falling out of bed", 37 (72.5%), and "protecting patients from falling out of chair", 34 (66.7%).	nicht-pharmakologische Maßnahmen zur Vermeidung von Fixierung	nicht-pharmakologische Maßnahmen zur Vermeidung von Fixierung	1b
Bounds M, Kram S, Speroni KG, Brice K, Luschinski MA, Harte S, Daniel MG. Effect of ABCDE Bundle Implementation on Prevalence of Delirium in Intensive Care Unit Patients. Am J Crit Care. 2016	retrospective observational Study	159 records reviewed (80 before and 79 after bundle implementation),	Retrospective data were collected from before and after implementation of the ABCDE bundle.	fter implementation of the ABCDE bundle, the prevalence of delirium decreased significantly (from 38% to 23%, P = .01) and the mean number of days of delirium decreased significantly (from 3.8 to 1.72 days, P < .001). The number of patients with delirium-free stays	before/after Design, Fallzahl ok, guter Effekt	ABCDE senkt Delir	1b
Patel J, Baldwin J, Bunting P, Laha S. The effect of a multicomponent multidisciplinary bundle of interventions on sleep and delirium in medical and surgical intensive care patients. Anaesthesia. 2014 Jun;69(6):540-9. doi: 10.1111/anae.12638. PubMed PMID: 24813132.	Pre/post-intervention design	167 ICU patients pre implementation, 171 patients post implementation	the implementation of a bundle of non-pharmacological interventions, consisting of environmental noise and light reduction	Compliance with the interventions was > 90%. The bundle of interventions led to an increased mean (SD) sleep efficiency index (60.8 (3.5) before vs 75.9 (2.2) after, p = 0.031); reduced mean sound (68.8 (4.2) dB before vs 61.8 (9.1) dB after, p = 0.002) and light levels (594 (88.2) lux before vs 301 (53.5) lux after, p = 0.003); and reduced number of awakenings caused by care activities overnight (11.0 (1.1) before vs 9.0 (1.2) after, p = 0.003). In addition, the introduction of the care bundle led to a reduced incidence of delirium (55/167 (33%) before vs 24/171 (14%) after, p < 0.001), and less time spent in delirium (3.4 (1.4) days before vs 1.2 (0.9) days after, p = 0.021). Increases in sleep efficiency index were	große before/after, nicht-pharma bundle implementation --> Maßnahmen reduzieren Lärm/verbssern Licht, verbessern Schlaf --> führen zu Delirreduktion	verbesserter Schlaf durch nicht-pharma auf der ICU ist möglich und senkt möglicherweise delir	1b

Litton E, Carnegie V, Elliott R, Webb SA. The Efficacy of Earplugs as a Sleep Hygiene Strategy for Reducing Delirium in the ICU: A Systematic Review and Meta-Analysis. Crit Care Med. 2016 May;44(5):992-9. doi: 10.1097/CCM.0000000000001557. Review. PubMed PMID: 26741578.	ystematic review / meta-analysis	Nine studies published between 2009 and 2015, including 1,455 participants	MEDLINE, EMBASE, and the Cochrane Central Register of controlled trials were searched using the terms "intensive care," "critical care," "earplugs," "sleep," "sleep disorders," and "delirium."	Placement of earplugs in patients admitted to the ICU, either in isolation or as part of a bundle of sleep hygiene improvement, is associated with a significant reduction in risk of delirium. The potential effect of cointerventions and the optimal strategy for improving sleep hygiene and associated effect on patient-centered outcomes remains uncertain.	SR zu Schlafbrillen und Ohrstöpseln	schlafbrille/Ohrstöpsel reduzieren Delir	1a
Trogrlić Z, van der Jagt M, Bakker J, Balas MC, Ely EW, van der Voort PH, Ista E. A systematic review of implementation strategies for assessment, prevention, and management of ICU delirium and their effect on clinical outcomes. Crit Care. 2015 Apr 9;19:157. doi: 10.1186/s13054-015-0886-9. Review. PubMed PMID: 25888230; PubMed Central PMCID: PMC4428250.	systematic review	21 studies (16 before-after studies; one RCT, four prospective or retrospective cohort studies)all including process measures, while 9 reported both process measures and clinical outcomes.	PubMed, Embase, PsychINFO, Cochrane and CINAHL (January 2000 - April 2014). Studies were suitable for inclusion if implementation strategies' efficacy, in terms of a clinical outcome, or process outcome was described.	Successful implementation interventions were frequently reported to change process measures, such as improvements in adherence to delirium screening with up to 92%, but relating process measures to outcome changes was generally not possible. In meta-analyses, reduced mortality and ICU length of stay reduction were statistically more likely with implementation programs that employed more (six or more) rather than less implementation strategies and when a framework was used that either integrated current evidence on pain, agitation and delirium management (PAD) or when a strategy of early awakening, breathing, delirium screening and early exercise (ABCDE bundle) was employed. Using implementation strategies aimed at organizational	systematisches Review zum LL-gerechten Delirmanagement, viele Studien, unterschiedliche Outcomes	PAD Management und ABCDE reduzieren Mortalität!	1a
Collet MO1,2, Caballero J3, Sonneville R4,5, Bozza FA6, Nydahl P7,8, Schandl A9, Wøien H10, Citerio G11, van den Boogaard M12, Hästbacka J13, Haenggi M14, Colpaert K15, Rose L16,17, Barbateskovic M18,19, Lange T18,20,21, Jensen A18,20, Krog MB22, Egerod I23,18, Nibro HL18,22, Wetterslev J18,19, Perner A23,18; AID-ICU cohort study co-authors. Prevalence and risk factors related to haloperidol use for delirium in adult intensive care patients: the multinational AID-ICU inception cohort study.	cohort study	1260 patients from 99 ICUs in 13 countries. Delirium occurred in 314/1260 patients [25% (95% confidence interval 23-27)]	haloperidol use for delirium in ICU patients	We included 1260 patients from 99 ICUs in 13 countries. Delirium occurred in 314/1260 patients [25% (95% confidence interval 23-27)] of whom 145 received haloperidol [46% (41-52)]. Other interventions for delirium were benzodiazepines in 36% (31-42), dexmedetomidine in 21% (17-26), quetiapine in 19% (14-23) and olanzapine in 9% (6-12) of the patients with delirium. In the first 24 h in the ICU, all subtypes of delirium [hyperactive, adjusted odds ratio (aOR) 29.7 (12.9-74.5); mixed 10.0 (5.0-20.2); hypoactive 3.0 (1.2-6.7)] and circulatory support 2.7 (1.7-4.3) were associated with haloperidol use. At 72 h after ICU admission, circulatory support remained associated with subsequent use of haloperidol, aOR 2.6 (1.1-6.9). Haloperidol use within 0-24 h and within 0-72 h of ICU admission was not	314 Patienten mit Delir aus 13 Ländern, ca. die Hälfte mit Haloperidol behandelt. Die übrigen sehr unterschiedlich mit Benzos, A2A und anderen Neuroleptika	Haloperidol kein Einfluss auf Mortalität	1b

Subramaniam B, Shankar P, Shaefi S, Mueller A, O'Gara B, Banner-Goodspeed V, Gallagher J, Gasangwa D, Patxot M, Packiasabapathy S, Mathur P, Eikermann M, Talmor D, Marcantonio ER. Effect of Intravenous Acetaminophen vs Placebo Combined With Propofol or Dexmedetomidine on Postoperative Delirium Among Older Patients Following Cardiac Surgery: The DEXACET Randomized Clinical Trial. JAMA. 2019 Feb 19;321(7):686-696. doi: 10.1001/jama.2019.0234. PubMed PMID: 30778597; PubMed Central PMCID: PMC6439609.	andomized, placebo-controlled, factorial clinical trial	120 patients aged 60 years or older undergoing on-pump coronary artery bypass graft (CABG) surgery or combined CABG/valve surgeries	Evaluate of the effect of postoperative intravenous (IV) acetaminophen vs placebo combined with IV propofol vs dexmedetomidine on postoperative delirium	Among 121 patients randomized (median age, 69 years; 19 women [15.8%]), 120 completed the trial. Patients treated with IV acetaminophen had a significant reduction in delirium (10% vs 28% placebo; difference, −18% [95% CI, −32% to −5%]; P = .01; HR, 2.8 [95% CI, 1.1-7.8]). Patients receiving dexmedetomidine vs propofol had no significant difference in delirium (17% vs 21%; difference, −4% [95% CI, −18% to 10%]; P = .54; HR, 0.8 [95% CI, 0.4-1.9]). There were significant differences favoring acetaminophen vs placebo for 3 prespecified secondary outcomes: delirium duration (median, 1 vs 2 days; difference, −1 [95% CI, −2 to 0]), ICU length of stay (median, 29.5 vs 46.7 hours; difference, −16.7 [95% CI, −20.3 to −0.8]), and breakthrough analgesia (median, 10 082.5 vs 12 609.0 µg morphine equivalents; difference, −2530 [95% CI, −5064 to −22]). For dexmedetomidine vs propofol, only breakthrough analgesia was significantly different (median, 10 110.0 vs 12 612.5 µg; difference, −2567 [95% CI, −5094 to −26]; P = .03). Fourteen patients in	nur Kardiochirurgische	Solange Sedierungsziel wach eingehalten wurde, weder Propofol noch A2A im Vorteil	1b
Aitken LM, Bucknall T, Kent B, Mitchell M, Burmeister E, Keogh SJ. Protocol-directed sedation versus non-protocol-directed sedation in mechanically ventilated intensive care adults and children. Cochrane Database Syst Rev. 2018 Nov 12;11:CD009771. doi: 10.1002/14651858.CD009771.pub3. PubMed PMID: 30480753.	systematic review	4 studies with a total of 3323 participants (864 adults and 2459 paediatrics). Three studies were single-centre, patient-level RCTs and one study was a multicentre cluster-RCT.	tandard search strategy of the Cochrane Anaesthesia, Critical and Emergency Care Group (ACE). We searched the Cochrane Central Register of Controlled trials (CENTRAL) (December 2017), MEDLINE (OvidSP) (2013 to December 2017), Embase (OvidSP) (2013 to December 2017), CINAHL (BIREME host) (2013 to December 2017), LILACS (2013 to December 2017), trial registries and reference lists of articles.	included general, mixed medical-surgical, medical only and a range of paediatric units. All four included studies compared the use of protocol-directed sedation, specifically protocols delivered by nurses, with usual care. We rated the risk of selection bias due to random sequence generation low for two studies and unclear for two studies. The risk of bias was highly variable across the domains and studies, with the risk of selection and performance bias generally rated high and the risk of detection and attrition bias generally rated low.When comparing protocol-directed sedation with usual care, there was no clear evidence of difference in duration of mechanical ventilation in hours for the entire duration of the first ICU stay for each patient (MD -28.15 hours, 95% CI -69.15 to 12.84; I2 = 85%; 4 studies; adjusted sample 2210 participants; low-quality evidence). There was no clear evidence of difference in ICU mortality (RR 0.77, 95% CI 0.39 to 1.50; I2 = 67%; 2 studies; 513 participants; low-quality evidence), or hospital mortality (RR 0.90, 95% CI 0.72 to 1.13; I2 = 10%; 3 studies; adjusted sample 2088 participants; low-quality evidence). There was no clear evidence of difference in ICU length of stay (MD -1.70 days, 95% CI-3.71 to 0.31; I2 = 82%; 4 studies; adjusted sample of 2123 participants; low-quality of evidence), however there was evidence of a significant reduction in hospital length of stay (MD -3.09 days, 95% CI -5.08 to -1.10; I2 = 2%; 3 studies; adjusted sample of 1922 participants;	Cochrane-Standard	protokollbasierte Sedierung verkürzt LOS, andere Endpunkte Tendenzen, Forschungsbedarf, Outcome vor allem abhängig vom Sedierungsziel wach	1a

Guo K, Zhang H, Peng S. [Comparison of two schemes of daily arousal and comfort analgesia and sedation in patients on mechanical ventilation in intensive care unit]. Zhonghua Wei Zhong Bing Ji Jiu Yi Xue. 2018 Oct;30(10):950-952. doi: 10.3760/cma.j.issn.2095-4352.2018.010.009. Chinese. PubMed PMID: 30439315.	RCT	80 patients with mechanical ventilation admitted to ICU	The control group was given a daily analgesic and sedation regimen with critical-care pain observation tool (CPOT) 0-3 and Richmond agitation-sedation scale (RASS) maintained at -3 to -4. The observation group was given comfort analgesic sedative scheme with immediate analgesia and sedation score, CPOT 0-1 and RASS -1-0	There were no significant differences in baseline data such as gender [male (cases): 25 vs. 28], age (years old: 55.2±8.3 vs. 56.1±7.9), acute physiology and chronic health evaluation II (APACHE II: 19.4±3.0 vs. 19.8±3.2) and etiology [sepsis (cases): 13 vs. 16, chronic obstructive pulmonary disease (cases): 12 vs. 10, acute lung injury (cases): 8 vs. 9, hemorrhagic shock (cases): 5 vs. 4, cardiogenic shock (cases): 2 vs. 1] between the observation group and the control group (all P > 0.05). Compared with control group, the duration of mechanical ventilation and the length of ICU stay were significantly decreased in observation group (days: 5.6±1.9 vs. 7.8±2.7, 6.6±2.1 vs. 9.8±2.5, both P < 0.01), the VAP rate and delirium rate were significantly decreased (17.5% vs. 40.0%, 25.0% vs. 47.5%, both P < 0.05), the average dose and total dose of sedative drugs were significantly reduced [propofol average dose (mg): 200.3±94.2 vs. 455.7±143.1, propofol total dose (mg): 1 266.4±419.7 vs. 2 682.6±734.1;	RCT wach versus moderat sediert, in Interventionsgruppe tatsächlich weniger Sedierung	Keine Sedierung besser als moderate Sedierung in Bezug auf ICU LOS, duration mv, delir	1b
Ng KT, Shubash CJ, Chong JS. The effect of dexmedetomidine on delirium and agitation in patients in intensive care: systematic review and meta-analysis with trial sequential analysis. Anaesthesia. 2019 Mar;74(3):380-392. doi: 10.1111/anae.14472. Epub 2018 Oct 27. PubMed PMID: 30367689	systematic review , meta -analysis	25 RCTs including 3240 patients	randomised clinical trials in MEDLINE, EMBASE, PubMed and CENTRAL from their inception until June 2018	In the patients who received dexmedetomidine (eight trials, 1425 patients), delirium was reduced, odds ratio (95%CI) 0.36 (0.26-0.51), p < 0.001 and high quality of evidence. The use of dexmedetomidine was associated with a reduced incidence of agitation, OR (95%CI) 0.34 (0.20-0.59), p < 0.001, moderate quality of evidence. Patients who were randomly assigned to dexmedetomidine had a significantly higher incidence of bradycardia, OR (95%CI) 2.18 (1.46-3.24), p < 0.001, moderate quality of evidence; and hypotension, OR (95%CI) 1.89 (1.48-2.41), p < 0.001, high quality of evidence. We found no evidence of an effect on mortality, OR (95%CI) 0.86 (0.66-1.10), p = 0.23, moderate quality of evidence. The trial sequential analyses for the incidence of delirium, bradycardia and hypotension was conclusive but not for the incidence of agitation and mortality. In summary,	SR und MA zu Dex, 25 RCTs eingeschlossen, hohe quality of evidence	Dex reduziert Delir	1a
Shehabi Y, Howe BD, Bellomo R, Arabi YM, Bailey M, Bass FE, Bin Kadiman S, McArthur CJ, Murray L, Reade MC, Seppelt IM, Takala J, Wise MP, Webb SA; ANZICS Clinical Trials Group and the SPICE III Investigators. Early Sedation with Dexmedetomidine in Critically Ill Patients. N Engl J Med. 2019 Jun 27;380(26):2506-2517. doi: 10.1056/NEJMoa1904710. Epub 2019 May 19. PMID: 31112380. Format:	RCT	4000 critically-ill, mechanically Ventilated patients 74 ICUs in Eight countries	Patients in the dexmedetomidine group received dexmedetomidine as the primary/sole sedative agent vs patients int the usual care group receaving propofor, midazolam or both.	We enrolled 4000 patients at a median interval of 4.6 hours between eligibility and randomization. In a modified intention-to-treat analysis involving 3904 patients, the primary outcome event occurred in 566 of 1948 (29.1%) in the dexmedetomidine group and in 569 of 1956 (29.1%) in the usual-care group (adjusted risk difference, 0.0 percentage points; 95% confidence interval, −2.9 to 2.8). An ancillary finding was that to achieve the prescribed level of sedation, patients in the dexmedetomidine group received supplemental propofol (64% of patients), midazolam (3%), or both (7%) during the first 2 days after randomization; in the usual-care group, these drugs were administered as primary	Riesige Multicenter RCT, Medikamentenmix in beiden Gruppen, Sedierungsziele nur nuancen unterschiedlich	keine und leichte Sedierung mit vergleichbarem Outcome	1b

Girard TD, Exline MC, Carson SS, Hough CL, Rock P, Gong MN, Douglas IS, Malhotra A, Owens RL, Feinstein DJ, Khan B, Pisani MA, Hyzy RC, Schmidt GA, Schweickert WD, Hite RD, Bowton DL, Masica AL, Thompson JL, Chandrasekhar R, Pun BT, Strength C, Boehm LM, Jackson JC, Pandharipande PP, Brummel NE, Hughes CG, Patel MB, Stollings JL, Bernard GR, Dittus RS, Ely EW; MIND-USA Investigators. Haloperidol and Ziprasidone for Treatment of Delirium in Critical Illness. N Engl J Med. 2018 Dec 27;379(26):2506-	randomized, double-blind, placebo-controlled tria	1183 patients recruited, Delirium developed in 566 patients (48%), of whom 89% had hypoactive delirium and 11% had hyperactive delirium	Patients with acute respiratory failure or shock and hypoactive or hyperactive delirium to receive intravenous boluses of haloperidol (maximum dose, 20 mg daily), ziprasidone (maximum dose, 40 mg daily), or placebo.	Written informed consent was obtained from 1183 patients or their authorized representatives. Delirium developed in 566 patients (48%), of whom 89% had hypoactive delirium and 11% had hyperactive delirium. Of the 566 patients, 184 were randomly assigned to receive placebo, 192 to receive haloperidol, and 190 to receive ziprasidone. The median duration of exposure to a trial drug or placebo was 4 days (interquartile range, 3 to 7). The median number of days alive without delirium or coma was 8.5 (95% confidence interval [CI], 5.6 to 9.9) in the placebo group, 7.9 (95% CI, 4.4 to 9.6) in the haloperidol group, and 8.7 (95% CI, 5.9 to 10.0) in the ziprasidone group (P=0.26 for overall effect across trial groups). The use of haloperidol or ziprasidone, as compared with placebo, had no significant effect on the primary end point (odds ratios, 0.88 [95% CI, 0.64 to 1.21] and 1.04 [95%	RCT hochdosiert Haloperidol versus Ziprasidone, zuviel Haloperidol!	Kein Benefit durch Haloperdol hochdosiert	1b
Kim HY, Lee JE, Kim HY, Kim J. Volatile sedation in the intensive care unit: A systematic review and meta-analysis. Medicine (Baltimore). 2017 Dec;96(49):e8976. doi: 10.1097/MD.0000000000008976. Review. PubMed PMID: 29245269; PubMed Central PMCID: PMC5728884.	systematic review	Thirteen Rcs with a total of 1027 patients were included.	PubMed, Embase, Cochrane Central Register, and Web of Science databases were searched for all RCT comparing volatile sedation using an anesthetic-conserving device (ACD) with IV sedation	Compared with IV sedation, volatile sedation administered through an ACD in the ICU shortened the awakening and extubation times. Considering the difference in serum troponin levels between both arms, volatile anesthetics might have a myocardial protective effect after cardiac surgery even at a subanesthetic dose. Because the included studies used small sample sizes with high heterogeneity, further large, high-quality prospective clinical trials are needed to	SR mit 13 RCTs, 1027 Patienten	kürzere Aufwachzeiten durch volatile Anästhetika, sonst kein Benefit	1a
Chanques G, Conseil M, Roger C, Constantin JM, Prades A, Carr J, Muller L, Jung B, Belafia F, Cissé M, Delay JM, de Jong A, Lefrant JY, Futier E, Mercier G, Molinari N, Jaber S; SOS-Ventilation study investigators. Immediate interruption of sedation compared with usual sedation care in critically ill postoperative patients (SOS-Ventilation): a	RCT	137 adult patients patients requiering mechanical ventilation after abdominal surgerry; patients were randomly assigned to the control (n=68) or intervention groups (n=69	intervention group received immediate Interruption of sedation upon admittance to ICU, control group Received usual sedation care provided according to recommended practices	. In the intention-to-treat analysis, time to successful extubation was significantly lower in the intervention group than in the control group (median 8 h [IQR 4-36] vs 50 h [29-93], group difference -33·6 h [95% CI -44·9 to -22·4]; p<0·0001). The adjusted hazard ratio was 5·2 (95% CI 3·1-8·8, p<0·0001).	postsurgical patients	generelle Sedierung nach OP ist keine Indikation, bietet nur Nachteile	1b
Liu D, Lyu J, Zhao H, An Y. The influence of analgesic-based sedation protocols on delirium and outcomes in critically ill patients: A randomized controlled trial. PLoS One. 2017 Sep 14;12(9):e0184310. doi: 10.1371/journal.pone.0184310. eCollection 2017. PubMed PMID: 28910303; PubMed Central PMCID: PMC5598969.	RCT	105 mechanically ventilated patients requiring sedation.	N= 35 patients werde included in each group: 1) the remifentanil group received remifentanil and midazolam, 2) the fentanyl group received fentanyl and midazolam, and 3) the control group received only midazolam. The analgesic effect, sedation depth, and presence of delirium were evaluated	Compared to the control group, patients who received remifentanil and fentanyl required less midazolam each day (P = 0.038 and <0.001, respectively). Remifentanil has a significant effect on reducing the occurrence of delirium (P = 0.007). The logistic regression analysis of delirium demonstrated that remifentanil (OR 0.230, 95%CI 0.074-0.711, P = 0.011) is independent protective factors for delirium, and high APACHE II score (OR 1.103, 95%CI 1.007-1.208, P = 0.036) is the independent risk factor for delirium.	keine Angabe wie häufig Ziel-RASS -1 bis -3 eingehalten wurden	Opioide reduzieren Sedierungsbedarf	1b

Zhu Y, Wang Y, Du B, Xi X. Could remifentanil reduce duration of mechanical ventilation in comparison with other opioids for mechanically ventilated patients? A systematic review and meta-analysis. Crit Care. 2017 Aug 3;21(1):206. doi: 10.1186/s13054-017-1789-8. Review. PubMed PMID: 28774327; PubMed Central PMCID: PMC5543734.	systematic review	Twenty-three RCTs with 1905 patients	A search to identify RCTs was conducted in the PubMed, Embase, Cochrane Library and SinoMed databases that had been published up to 31 December 2016. The results were analysed using WMDs and 95% Cis	Remifentanil was associated with reductions in the duration of mechanical ventilation (mean difference -1.46; 95% CI -2.44 to -0.49), time to extubation after sedation cessation (mean difference -1.02; 95% CI -1.59 to -0.46), and ICU-LOS (mean difference -0.10; 95% CI -0.16 to -0.03). No significant differences were identified in hospital-LOS (mean difference -0.05; 95% CI -0.25 to 0.15), costs (mean difference -709.71; 95% CI -1590.98 to 171.55; I2 88%), mortality (mean difference -0.64; 95% CI -1.33 to 0.06; I2 87%) or agitation (mean difference -0.71; 95% CI -1.80 to 0.37; I2 93%). Conclusions: Remifentanil seems to be associated with reductions in the duration of mechanical ventilation, time to extubation after cessation of sedation, and ICU-LOS. No	SR+MA, Remifentanil nicht an harten Outcomes signifikant	Remifentanil unter Beachtung der Wirkweise auf ICU einsetzbar	1a
Page VJ, Casarin A, Ely EW, Zhao XB, McDowell C, Murphy L, McAuley DF. Evaluation of early administration of simvastatin in the prevention and treatment of delirium in critically ill patients undergoing mechanical ventilation (MoDUS): a randomised, double-blind, placebo-controlled trial. Lancet Respir Med. 2017 Sep;5(9):727-737. doi: 10.1016/S2213-	randomised, double-blind, placebo-controlled trial	142 critically ill patients (≥18 years) needing mechanical ventilation within 72 h of admission.	intervention group (n=71) received simvastatin, control group (n=71) received placebo;delirium was assesed via CAM-ICU	142 patients were randomly assigned to receive simvastatin (n=71) or placebo (n=71), and were included in the final analysis. The mean number of days alive without delirium and without coma at day 14 did not differ significantly between the two groups (5·7 days [SD 5·1] with simvastatin and 6·1 days [5·2] with placebo; mean difference 0·4 days, 95% CI -1·3 to 2·1; p=0·66). The most common adverse event was an elevated creatine kinase concentration to more than ten times the upper limit of normal (eight [11%] in the simvastatin group vs three [4%] in the placebo	Negativstudie, kein Vorteil von Simvastatin	Simvastatin schützt nicht vor Delir	1b
Chlan LL, Skaar DJ, Tracy MF, Hayes SM, Hetland BD, Savik K, Weinert CR. Safety and Acceptability of Patient-Administered Sedatives During Mechanical Ventilation. Am J Crit Care. 2017 Jul;26(4):288-296. doi: 10.4037/ajcc2017408. PubMed PMID: 28668914; PubMed Central PMCID: PMC5576507.	RCT	17 intubated patients in three ICUs	patients were randomly assigned to dexmedetomidine via patient controlled anesthesia and 20 to usual care.;Acceptability was based on patients' self-reported satisfaction , ability to administer the sedative and VAS.	The sample was 59% male and 89% white. Mean values were age, 50.6 years; score on the Acute Physiology and Chronic Health Evaluation, 60.1; and protocol duration, 3.4 days. Five dexmedetomidine patients had blood pressure and/or heart rate lower than safety parameters, necessitating short-term treatment. Nurses' adherence to reporting of safety parameters was 100%; adherence to the dexmedetomidine titration algorithm was 73%. Overall baseline anxiety score was 38.4 and did not change significantly (βday = 2.1; SE, 2.5; P = .40). Most	Feasability	neue Option: Patient-controlled sedation	1b
Wang JG, Belley-Coté E, Burry L, Duffett M, Karachi T, Perri D, Alhazzani W, D'Aragon F, Wunsch H, Rochwerg B. Clonidine for sedation in the critically ill: a systematic review and meta-analysis. Crit Care. 2017 Feb 25;21(1):75. doi: 10.1186/s13054-017-1610-8. Review. PubMed PMID: 28330506; PubMed Central PMCID: PMC5363026.	Systematic review and meta-analysis of randomized trials.	eight RCTs (n = 642 patients).	search of MEDLINE, EMBASE, CINAHL and the Cochrane trial registry for RCTs that compared clonidine to any non-clonidine regimen in critically ill patients requiring mechanical ventilation. The GRADE method was used to assess certainty of evidence.	We included eight RCTs (n = 642 patients). In seven of the trials clonidine was used for adjunctive rather than stand-alone sedation. There was no difference in the duration of mechanical ventilation (mean difference (MD) 0.05 days, 95% confidence interval (CI) = -0.65 to 0.75, I 2 = 86%, moderate certainty), ICU mortality (relative risk (RR) 0.98, 95% CI = 0.51 to 1.90, I 2 = 0%, low certainty), or ICU length of stay (MD 0.04 days, 95% CI = -0.46 to 0.53, I 2 = 16%, moderate certainty), with clonidine. There was a significant reduction in the total dose of narcotics (standard mean difference (SMD) -0.26, 95% CI = -0.50 to -0.02, I 2 = 0%, moderate certainty) with clonidine use. Clonidine was	kleine RCTs, Sedierungsziele unterschiedlich, unklar	Clonidine reduziert Sedativabedarf	1a

Zhang Z, Chen K, Ni H, Zhang X, Fan H. Sedation of mechanically ventilated adults in intensive care unit: a network meta-analysis. Sci Rep. 2017 Mar 21;7:44979. doi: 10.1038/srep44979. Review. PubMed PMID: 28322337; PubMed Central PMCID: PMC5359583.	systematic review and network meta-analysis.	52 RCTs	Electronic databases including Pubmed, SCOPUS, ISI web of science, and EMBASE were searched from inception to April 2016. randomized controlled trials were included in our study.	Conclusions: Until further RCTs are performed, data remains insufficient to support the routine use of clonidine as a sedative in the mechanically ventilated population. Clonidine may act as a narcotic-sparing agent, albeit with an increased risk of clinically significant hypotension.	SR+MA mit 52 RCTs	Clonidine reduziert Sedativabedarf	1a
Jerath A, Panckhurst J, Parotto M, Lightfoot N, Wasowicz M, Ferguson ND, Steel A, Beattie WS. Safety and Efficacy of Volatile Anesthetic Agents Compared With Standard Intravenous Midazolam/Propofol Sedation in Ventilated Critical Care Patients: A Meta-analysis and Systematic Review of Prospective Trials. Anesth Analg. 2017 Apr;124(4):1190-1199. doi: 10.1213/ANE.0000000000001634. Review. PubMed PMID: 27828800.	systematic review	8 trials with 523 patients	A search was conducted using MEDLINE (1946-2015), EMBASE (1947-2015), Web of Science index (1900-2015), and Cochrane Central Register of Controlled Trials.	ight trials with 523 patients comparing all volatile agents with intravenous midazolam or propofol showed a reduction in extubation times using volatile agents (difference in means, -52.7 minutes; 95% confidence interval [CI], -75.1 to -30.3; P < .00001). Reductions in extubation time were greater when comparing volatiles with midazolam (difference in means, -292.2 minutes; 95% CI, -384.4 to -200.1; P < .00001) than propofol (difference in means, -29.1 minutes; 95% CI, -46.7 to -11.4; P = .001). There was no significant difference in time to obey verbal commands, proportion of time spent in target sedation, adverse events, death, or length of hospital stay. Conclusions: Volatile-based sedation demonstrates a reduction in time to extubation, with no increase in short-term adverse outcomes. Marked study heterogeneity was present, and the results show marked positive publication bias.	hohe Heterogenität der Studien, publication bias der Studien	volatile Anästhetika verkürzen Aufwachzeit	1a
Mehta S, Meade M, Burry L, Mallick R, Katsios C, Fergusson D, Dodek P, Burns K, Herridge M, Devlin JW, Tanios M, Fowler R, Jacka M, Skrobik Y, Olafson K, Cook D; SLEAP Investigators and the Canadian Critical Care Trials Group. Variation in diurnal sedation in mechanically ventilated patients who are managed with a sedation protocol alone or a sedation protocol and daily interruption. Crit Care. 2016 Aug 1;20(1):233. doi:	Secondary analysis of RCT	423 ICU patiets expected to require mechanical ventilation for longer than 48 hours and receiving continuous infusions of opioids and/or benzodiazepines	Using fentanyl equivalents and midazolam equivalents, we compared dosages administered during night (19:00 to 07:00) and day (07:00 to 19:00) shifts.	Nighttime benzodiazepine and opioid doses were significantly higher than daytime doses (mean difference midazolam equivalents 23.3 mg, 95 % CI 12.9, 33.8, p < 0.0001; mean difference fentanyl equivalents 356 mcg, 95 % CI 130, 582, p = 0.0021). Mean Sedation Agitation Scale score was similar between night and day, and was at target (3.2 vs 3.3, 95 % CI -0.05, 0.02, p = 0.35). Self-reported nurse workload was similar during the night and day. Patients were more often restrained during day shifts (76.3 % vs 73.7 %, p < 0.0001), and there were more unintentional device removals during the day compared with night (15.9 % vs 9.1 %, p < 0.0001). Increases in nighttime drug doses were independently associated with failure to meet SBT screening	RCT zu Sedierungsprotokoll versus DSI, Problem: möglichweise Übersedierung	nachts höherer Sedativa Bedarf, um gleiches Sedierungsziel einzuhalten, nachts mehr Agitation	1b
Conti G, Ranieri VM, Costa R, Garratt C, Wighton A, Spinazzola G, Urbino R, Mascia L, Ferrone G, Pohjanjousi P, Ferreyra G, Antonelli M. Effects of dexmedetomidine and propofol on patient-ventilator interaction in difficult-to-wean, mechanically ventilated patients: a prospective, open-label, randomised, multicentre study. Crit Care. 2016 Jul 2;20(1):206. doi: 10.1186/s13054-016-1386-2. PubMed PMID: 27368279; PubMed Central	RCT	23 difficult-to-wean patients for whom the first weaning trial had failed	patients were randomised to receive sedation with either dexmedetomidine or propofol at a similar level of sedation (RASS +1 to -2). The asynchrony index (AI) was calculated using tracings of airflow, airway pressure and electrical activity of the diaphragm sampled at 0, 0.5, 1, 2, 6, 12, 18 and 24 h.	The mean AI was lower with dexmedetomidine than with propofol from 2 h onwards, although the two groups significantly differed only at 12 h (2.68 % vs 9.10 %, p < 0.05). No further difference was observed at 18 and 24 h.	Weaningversager entweder mit Dex oder Propofol zum Erreichen des Ziel-RASS +1 bis -2, kleine Fallzahl	kein Vorteil für ein Medikament, solange Sedierungsziel wach	1b

Landoni G, Pasin L, Cabrini L, Scandroglio AM, Baiardo Redaelli M, Votta CD, Bellandi M, Borghi G, Zangrillo A. Volatile Agents in Medical and Surgical Intensive Care Units: A Meta-Analysis of Randomized Clinical Trials. J Cardiothorac Vasc Anesth. 2016 Aug;30(4):1005-14. doi: 10.1053/j.jvca.2016.02.021. Epub 2016 Feb 23. PubMed PMID: 27238433.	Systematic review and meta-analysis of randomized trials.	12 studies with 934 patients	The BioMedCentral, PubMed, Embase, and Cochrane Central Register databases of clinical trials were searched systematically for RCT on volatile agents used in the ICU settin	he use of halogenated agents reduced the time to extubation (standardized mean difference = –0.78 [–1.01 to –0.55] hours; p for effect<0.00001; p for heterogeneity = 0.18; I 2 = 32% in 7 studies with 503 patients). Results for time to extubation were confirmed in all subanalyses (eg, medical and surgical patients) and sensitivity analyses. No differences in length of hospital stay, ICU stay, and mortality were recorded. In this meta-analysis of randomized trials, volatile anesthetics reduced time to extubation in medical and surgical ICU patients. The results of this study should be confirmed by large and high-	MA von 12 RCTs (knapp 1000 Patienten)	volatile Anästhetika auf ICU sicher	1a
Neufeld KJ, Yue J, Robinson TN, Inouye SK, Needham DM. Antipsychotic Medication for Prevention and Treatment of Delirium in Hospitalized Adults: A Systematic Review and Meta-Analysis. J Am Geriatr Soc. 2016 Apr;64(4):705-14.	Systematic review and meta-analysis	19 RCT oder cohort studies	PubMed, EMBASE, CINAHL, and ClinicalTrials.gov databases were searched from January 1, 1988, to November 26, 2013; Intervention: Antipsychotic administration for delirium prevention or treatment in randomized controlled trials or cohort studies.	Screening of 10,877 eligible records identified 19 studies. In seven studies comparing antipsychotics with placebo or no treatment for delirium prevention after surgery, there was no significant effect on delirium incidence (OR = 0.56, 95% confidence interval (CI) = 0.23-1.34, I(2) = 93%). Using data reported from all 19 studies, antipsychotic use was not associated with change in delirium duration, severity, or hospital or ICU LOS, with high heterogeneity among studies. No association with mortality was detected (OR = 0.90, 95% CI = 0.62-1.29, I(2) = 0%). Current evidence does not support the use of	SR und MA zu Haldol, RCTs und Cohorten, häufig überdosiert mit sedierenden NW	In US wird Haloperidol nicht mehr empfohlen, in D behaupten die Antipsychotika in der Indikation produktiv-psychotischer Symptome vorsichtig dosiert weiter ihren Platz	1a
Reade MC, Eastwood GM, Bellomo R, Bailey M, Bersten A, Cheung B, Davies A, Delaney A, Ghosh A, van Haren F, Harley N, Knight D, McGuiness S, Mulder J, O'Donoghue S, Simpson N, Young P; DahLIA Investigators; Australian and New Zealand Intensive Care Society Clinical Trials Group. Effect of Dexmedetomidine Added to Standard Care on Ventilator-Free Time in Patients With Agitated Delirium: A Randomized Clinical Trial. JAMA. 2016 Apr 12;315(14):1460-8. doi:	ouble-blind, placebo-controlled, parallel-group randomized clinical trial	74 adult patients in whom extubation was considered inappropriate because of the severity of agitation and delirium; 15 ICUs	39 patients in the dexmedetomidine group and 32 patients in the placebo group for analysis.	Dexmedetomidine increased ventilator-free hours at 7 days compared with placebo (median, 144.8 hours vs 127.5 hours, respectively; median difference between groups, 17.0 hours [95% CI, 4.0 to 33.2 hours]; P = .01). Among the 21 a priori secondary outcomes, none were significantly worse with dexmedetomidine, and several showed statistically significant benefit, including reduced time to extubation (median, 21.9 hours vs 44.3 hours with placebo; median difference between groups, 19.5 hours [95% CI, 5.3 to 31.1 hours]; P < .001) and accelerated resolution of delirium (median, 23.3 hours vs 40.0 hours; median difference between groups, 16.0 hours [95% CI, 3.0 to 28.0 hours]; P = .01). Using hierarchical Cox modeling to adjust for imbalanced baseline characteristics, allocation to	multicenter, trotzdem kleine Fallzahl	Dex Gabe mit schnellerer Extubation assoziiert	1b
Carrasco G, Baeza N, Cabré L, Portillo E, Gimeno G, Manzanedo D, Calizaya M. Dexmedetomidine for the Treatment of Hyperactive Delirium Refractory to Haloperidol in Nonintubated ICU Patients: A Nonrandomized Controlled Trial. Crit Care Med. 2016 Jul;44(7):1295-306. doi: 10.1097/CCM.0000000000001622. PubMed PMID: 26925523.	Nonrandomized, controlled trial.	132 nonintubated patients in Icu with diagnosis of agitated delirium	all patients received IV bolus doses of haloperidol until agitation was controlled (RASS 0 to -2) or reaching the maximum daily dose. Group comparison: patient responders to haloperidol (control group) were compared with nonresponders (dexmedetomidine group).	A total of 132 nonintubated patients were treated with haloperidol in the initial haloperidol titration phase. Forty-six patients (34.8%; 95% CI, 26.0-43.1%) did not respond to haloperidol, and 86 patients (65.2%; 95% CI, 56.3-73.0%) were responders. During the group comparison phase, dexmedetomidine achieved a higher percentage of time in satisfactory sedation levels than did haloperidol (92.7% [95% CI, 84.5-99.8%] vs 59.3% [95% CI, 48.6-69.3%], respectively; p = 0.0001). Haloperidol was associated with 10 cases (11.6% [95% CI, 6.5-21.2%]) of oversedation and two (2.0% [0.4-8%]) of corrected QT lengthening. Direct cost of dexmedetomidine was 17 times greater than	Non-intubated patients mit Agitation wurden mit Ziel-RASS 0 bis -2 mit Haloperidol behandelt, ca. 1/3 Non-Responder (?) wurden mit Dex behandelt, KEINE RCT	Dex scheint zur Behandlung der Agitation besser geeignet als Haloperidol	2b

Constantin JM, Momon A, Mantz J, Payen JF, De Jonghe B, Perbet S, Cayot S, Chanques G, Perreira B. Efficacy and safety of sedation with dexmedetomidine in critical care patients: a meta-analysis of randomized controlled trials. Anaesth Crit Care Pain Med. 2016 Feb;35(1):7-15. doi: 10.1016/j.accpm.2015.06.012. Epub 2015 Dec 11. Review. PubMed PMID: 26700947.	systematic review	1994 patients from 16 randomized controlled trials	two reviewers independently identified randomized controlled trials comparing dexmedetomidine with other sedative agents in non-post-cardiac surgery critically ill patients in the PubMed and Cochrane databases	This meta-analysis included 1994 patients from 16 randomized controlled trials. Comparators were lorazepam, midazolam and propofol. Dexmedetomidine was associated with a reduction in ICU length of stays (WMD=-0.304; 95% CI [-0.477, -0.132]; P=0.001), mechanical ventilation duration (WMD=-0.313, 95% CI [-0.523, -0.104]; P=0.003) and delirium incidence (RR=0.812, 95% CI [0.680, 0.968]; P=0.020). Dexmedetomidine is also associated with an increase in the incidence of bradycardia (RR=1.947, 95% CI [1.387, 2.733]; P=0.001) and hypotension (RR=1.264; 95% CI [1.013, 1.576]; P=0.038). n this first meta-analysis including only randomized controlled trials related to ICU patients, dexmedetomidine was associated with a 48h reduction in ICU length of stay, mechanical ventilation duration and delirium occurrence	SR+MA aus 16 RCTs mit fast 2000 Patienten, hohe Heterogenität der Studien	Dexmedetomidine verglichen mit Benzos und Propfol in Bezug auf Beatmungsdauer und ICU-LOS im Vorteil (wahrscheinlich tiefere Sedierung in Vergleichsgruppe)	1a
Robleda G, Roche-Campo F, Sendra MÀ, Navarro M, Castillo A, Rodríguez-Arias A, Juanes-Borrego E, Gich I, Urrutia G, Nicolás-Arfelis JM, Puntillo K, Mancebo J, Baños JE. Fentanyl as pre-emptive treatment of pain associated with turning mechanically ventilated patients: a randomized controlled feasibility study. Intensive Care Med. 2016 Feb;42(2):183-91. doi: 10.1007/s00134-015-4112-7. Epub	RCT	75 mechanically ventilated patients	patients were randomized to an intervention group (fentanyl) or a control group (placebo). Patients in the intervention group received 1 µg/kg (medical patients) or 1.5 µg/kg (surgical patients) of fentanyl 10 min before turning. Pain indicators were assessed using the behavioral pain scale	The two groups had similar baseline characteristics. The area under the curve for BPS values was significantly smaller in the fentanyl group than in the control group [median and interquartile range (IQR): 132 (108-150) vs. 147 (125-180); p = 0.016, respectively]. Nineteen non-serious adverse events were recorded in 14 patients, with no significant between-group differences (23 % fentanyl group vs. 14 % control group; p = 0.381)	Feasability	Lagerungstherapie potentiell schmerzhaft, präemptive Schmerzmittelgabe	1b
Laerkner E, Stroem T, Toft P. No-sedation during mechanical ventilation: impact on patient's consciousness, nursing workload and costs. Nurs Crit Care. 2016 Jan;21(1):28-35. doi: 10.1111/nicc.12161. Epub 2015 Apr 17. PubMed PMID: 25892407.	RCT	140 mechanically ventilated patient	patients were ndomized to either no-sedation or to sedation with daily wake up	Patients from the no-sedation group had a median RASS score of -0·029 compared with -2 in the sedated group (P < 0·00001). The NCR11 scores were higher in the sedated group compared with the no-sedation group: 19·054 versus 17·05 (P = 0·00001). The nurses self-reported workload was the same in both groups (P = 0·085). Because of a shorter ICU stay and shorter hospital length of stay in the no-sedation group, we estimated that there will be no cost	DSI versus non-seda, wichtige Studie	Verzicht auf Sedierung nicht mit einem Mehraufwand für die Pflegenden verbunden	1b
Al-Qadheeb NS, Skrobik Y, Schumaker G, Pacheco MN, Roberts RJ, Ruthazer RR, Devlin JW. Preventing ICU Subsyndromal Delirium Conversion to Delirium With Low-Dose IV Haloperidol: A Double-Blind, Placebo-Controlled Pilot Study. Crit Care Med. 2016 Mar;44(3):583-91. doi: 10.1097/CCM.0000000000001411. PubMed PMID: 26540397; PubMed Central PMCID: PMC477964	Randomized, double-blind, placebo-controlled trial	Sixty-eight mechanically ventilated patients with subsyndromal delirium without complicating neurologic conditions, cardiac surgery or requiring deep sedation.	Patients were randomly assigned to receive intravenous haloperidol 1 mg or placebo every six hours until either delirium (ICDSC ≥ 4 with psychiatric confirmation), therapy ≥ 10 days or ICU discharge occurred.	Baseline characteristics were similar between the haloperidol (n=34) and placebo (n=34) groups. A similar number of patients given haloperidol [12/34 (35%)] and placebo [8/34 (23%)] patients developed delirium (p=0.29). Haloperidol use reduced the hours per study day spent agitated (SAS ≥ 5) (p=0.008), but did not influence the proportion of 12-hour ICU shifts patients' spent alive without coma (SAS ≤ 2) or delirium (p=0.36), the time to first delirium occurrence (p=0.22) nor delirium duration (p=0.26). Days of mechanical ventilation (p=0.80), ICU mortality (p=0.55) and ICU patient disposition (p=0.22) were similar in the two groups. The proportion of patients who developed QTc-interval prolongation (p=0.16), extrapyramidal symptoms (p=0.31), excessive sedation (p=0.31) or new-onset	kleine RCT, Haloperidol hochdosiert	cave: Haloperidol nicht übersedieren	1b

Kawazoe Y, Miyamoto K, Morimoto T, Yamamoto T, Fuke A, Hashimoto A, Koami H, Beppu S, Katayama Y, Itoh M, Ohta Y, Yamamura H; Dexmedetomidine for Sepsis in Intensive Care Unit Randomized Evaluation (DESIRE) Trial Investigators. Effect of Dexmedetomidine on Mortality and Ventilator-Free Days in Patients Requiring Mechanical Ventilation With Sepsis: A Randomized Clinical Trial. JAMA. 2017 Apr 4;317(13):1321-1328. doi:	multicenter randomized clinical trial	201 mechanically ventilated patients With sepsis	Patients were randomized to receive either sedation with dexmedetomidine (n = 100) or sedation without dexmedetomidine (control group; n = 101). Other agents used in both groups were fentanyl, propofol, and midazolam.	Of the 203 screened patients, 201 were randomized. The mean age was 69 years (SD, 14 years); 63% were male. Mortality at 28 days was not significantly different in the dexmedetomidine group vs the control group (19 patients [22.8%] vs 28 patients [30.8%]; hazard ratio, 0.69; 95% CI, 0.38-1.22; P = .20). Ventilator-free days over 28 days were not significantly different between groups (dexmedetomidine group: median, 20 [interquartile range, 5-24] days; control group: median, 18 [interquartile range, 0.5-23] days; P = .20). The dexmedetomidine group had a significantly higher rate of well-controlled sedation during mechanical ventilation (range, 17%-58% vs 20%-39%; P = .01); other outcomes were not significantly different between groups. Adverse	Sepsis Patienten je ca 100 mit Dex / ohne Dex	Sedierungsziel entscheidend, keine harten Vorteile mit Dex	1b
Robleda G, Roche-Campo F, Sendra MÀ, Navarro M, Castillo A, Rodríguez-Arias A, Juanes-Borrego E, Gich I, Urrutia G, Nicolás-Arfelis JM, Puntillo K, Mancebo J, Baños JE. Fentanyl as pre-emptive treatment of pain associated with turning mechanically ventilated patients: a randomized controlled feasibility study. Intensive Care Med. 2016 Feb;42(2):183-91. doi: 10.1007/s00134-	randomized, double-blind, parallel-group, placebo-controlled clinical trial	Seventy-five mechanically ventilated patients	patients were randomized to an intervention group (fentanyl) or a control group (placebo). Patients in the intervention group received 1 µg/kg (medical patients) or 1.5 µg/kg (surgical patients) of fentanyl 10 min before turning. Pain indicators were assessed using the behavioral pain scale.	The two groups had similar baseline characteristics. The area under the curve for BPS values was significantly smaller in the fentanyl group than in the control group [median and interquartile range (IQR): 132 (108–150) vs. 147 (125–180); p = 0.016, respectively]. Nineteen non-serious adverse events were recorded in 14 patients, with no significant between-group differences (23 % fentanyl group vs. 14 % control group; p = 0.381).	Feasability	Lagerungstherapie potentiell schmerzhaft, präemptive Schmerzmittelgabe	1b
171: Jing Wang G, Belley-Coté E, Burry L, Duffett M, Karachi T, Perri D, Alhazzani W, D'Aragon F, Wunsch H, Rochwerg B. Clonidine for sedation in the critically ill: a systematic review and meta-analysis (protocol). Syst Rev. 2015 Nov 6;4:154. doi: 10.1186/s13643-015-0139-7. PubMed PMID: 26542363; PubMed Central PMCID: PMC4635616.	systematic review	eight RCTs (n = 642 patients)	search of MEDLINE, EMBASE, CINAHL and the Cochrane trial registry. We identified RCTs that compared clonidine to any non-clonidine regimen in critically ill patients, requiring mechanical ventilation.	We included eight RCTs (n = 642 patients). In seven of the trials clonidine was used for adjunctive rather than stand-alone sedation. There was no difference in the duration of mechanical ventilation (mean difference (MD) 0.05 days, 95% confidence interval (CI) = -0.65 to 0.75, I 2 = 86%, moderate certainty), ICU mortality (relative risk (RR) 0.98, 95% CI = 0.51 to 1.90, I 2 = 0%, low certainty), or ICU length of stay (MD 0.04 days, 95% CI = -0.46 to 0.53, I 2 = 16%, moderate certainty), with clonidine. There was a significant reduction in the total dose of narcotics (standard mean difference (SMD) -0.26, 95% CI = -0.50 to -0.02, I 2 = 0%, moderate certainty) with clonidine use. Clonidine was associated with increased incidence of clinically significant hypotension (RR 3.11, 95% CI = 1.64 to 5.87, I 2 = 0%, moderate certainty). Conclusions: Until further RCTs are performed, data remains insufficient to support the routine	SR und MA aus 8 RCTs, Autoren addressieren weiteren Forschungsbedarf	Clonidine reduziert Sedativabedarf	1a
Laerkner E, Stroem T, Toft P. No-sedation during mechanical ventilation: impact on patient's consciousness, nursing workload and costs. Nurs Crit Care. 2016 Jan;21(1):28-35. doi: 10.1111/nicc.12161. Epub 2015 Apr 17. PubMed PMID: 25892407.	RCT	140 mechanically ventilated patients	patients were randomized to either no-sedation or to sedation with daily wake up.	Patients from the no-sedation group had a median RASS score of -0·029 compared with -2 in the sedated group (P < 0·00001). The NCR11 scores were higher in the sedated group compared with the no-sedation group: 19·054 versus 17·05 (P = 0·00001). The nurses self-reported workload was the same in both groups (P = 0·085). Because of a shorter ICU stay and shorter hospital length of stay in the no-sedation group, we estimated that there will be no cost	DSI versus non-seda, wichtige Studie	RASS 0 ist RASS -2 überlegen	1b

Burry L, Rose L, McCullagh IJ, Fergusson DA, Ferguson ND, Mehta S. Daily sedation interruption versus no daily sedation interruption for critically ill adult patients requiring invasive mechanical ventilation. Cochrane Database Syst Rev. 2014 Jul 9;(7):CD009176. doi: 10.1002/14651858.CD009176.pub2. Review. PubMed PMID: 25005604.	systematic review	9 trials with a total of 1282 patients	We searched, from database inception to February 2014, the Cochrane Central Register of Controlled Trials (CENTRAL) (The Cochrane Library 2014, Issue 1); MEDLINE (OvidSP); EMBASE (OvidSP); CINAHL (EBSCOhost); Latin American and Caribbean Health Sciences Literature (LILACS); Web of Science Science Citation Index; Database of Abstracts of Reviews of Effects (DARE); the Health Technology Assessment Database (HTA Database); trial registration websites, and reference lists of relevant articles.	ine trials were used in the analysis (n = 1282 patients). These trials were found to be predominantly at low risk of bias. We did not find strong evidence of an effect of DSI on the total duration of ventilation. Pooled data from nine trials demonstrated a 13% reduction in the geometric mean, with relatively wide confidence intervals (CI) indicating imprecision (95% CI 26% reduction to 2% increase, moderate quality evidence). Similarly, we did not find strong evidence of an effect on ICU length of stay (-10%, 95% CI -20% to 3%, n = 9 trials, moderate quality evidence) or hospital length of stay (-6%, 95% CI -18% to 8%, n = 8 trials, moderate quality evidence). Heterogeneity for these three outcomes was moderate and statistically significant. The risk ratio for ICU mortality was 0.96 (95% CI 0.77 to 1.21, n = 7 trials, moderate quality evidence), for rate of accidental endotracheal tube removal 1.07 (95% CI 0.55 to 2.12, n = 6 trials, moderate quality evidence), for catheter removal 1.48 (95% CI 0.76 to 2.90, n = 4 trials), and for incidence of new onset delirium 1.02 (95% CI 0.91 to 1.13, n = 3 trials, moderate quality evidence). Differences in the doses of any drug used or quality of life score (Short Form (SF)-36) did not reach statistical significance. Tracheostomy was performed less frequently in the DSI group (RR 0.73, 95% CI 0.57 to 0.92, n = 6 trials, moderate quality evidence). Sensitivity analysis of unlogged data resulted in similar	Cochrane-Standard	DSI-Protokoll ist non-DSI Protokoll nicht mehr sicher überlegen, besser gar keine Sedierung, wenn nicht indiziert (DSI nur, wenn keine KI)	1a
Zhou Y, Jin X, Kang Y, Liang G, Liu T, Deng N. Midazolam and propofol used alone or sequentially for long-term sedation in critically ill, mechanically ventilated patients: a prospective, randomized study. Crit Care. 2014 Jun 16;18(3):R122. doi: 10.1186/cc13922. PubMed PMID: 24935517; PubMed Central PMCID: PMC4095601.	RCT	35 patients who required mechanical ventilation for >3 days	patients werse randomly assigned to receive midazolam (group M), propofol (group P), or sequential use of both (group M-P). In group M-P, midazolam was switched to propofol until the patients passed the spontaneous breathing trial (SBT) safety screen.	The incidence of agitation following cessation of sedation in group M-P was lower than group M (19.4% versus 48.7%, P = 0.01). The mean percentage of adequate sedation and duration of sedation were similar in the three groups. The recovery time, extubation time and mechanical ventilation time of group M were 58.0 (interquartile range (IQR), 39.0) hours, 45.0 (IQR, 24.5) hours, and 192.0 (IQR, 124.0) hours, respectively; these were significantly longer than the other groups, while they were similar between the other two groups. In the treatment-received analysis, ICU duration was longer in group M than group M-P (P = 0.016). Using an intention-to-treat analysis and a treatment-received analysis, respectively, the pharmaceutical cost of group M-P was lower than group P (P <0.01) and its ICU cost was lower than group M (P <0.01; P = 0.015). The proportion of group M-P with unbearable memory of the uncomfortable events was lower than in group M (11.7% versus 25.0%,	veraltetes Design, Langzeitsedierung,	Midazolamsedierung im Nachteil	1b

Payen JF, Bosson JL, Chanques G, Mantz J, Labarere J; DOLOREA Investigators. Pain assessment is associated with decreased duration of mechanical ventilation in the intensive care unit: a post Hoc analysis of the DOLOREA study. Anesthesiology. 2009 Dec;111(6):1308-16. doi:	prospective cohort study	1144 mechanically ventilated patients	duration of ventilator support and duration of ICU stay between 513 patients who were assessed for pain and 631 patients who were not assessed for pain.	Patients assessed for pain on day 2 were more likely to receive sedation level assessment, nonopioids, and dedicated analgesia during painful procedures than patients whose pain was not assessed. They also received fewer hypnotics and lower daily doses of midazolam. Patients with pain assessment had a shorter duration of mechanical ventilation (8 vs. 11 days; P < 0.01) and a reduced duration of stay in the ICU (13 vs.	Sekundäranalyse der DOLOREA Studie	verkürzte Beatmungsdauer durch regelmäßiges Schmerzmonitoring	2b
Pöpping DM, Elia N, Van Aken HK, Marret E, Schug SA, Kranke P, Wenk M, Tramèr MR. Impact of epidural analgesia on mortality and morbidity after surgery: systematic review and meta-analysis of randomized controlled trials. Ann Surg. 2014 Jun;259(6):1056-67. doi: 10.1097/SLA.0000000000000237. PMID: 24096762.	systematic review	125 RCTs (9044 patients, 4525 received epidural analgesia	search of CENTRAL, EMBASE, PubMed, CINAHL, and BIOSIS till July 2012	A total of 125 trials (9044 patients, 4525 received epidural analgesia) were eligible. In 10 trials (2201 patients; 87 deaths), reporting on mortality as a primary or secondary endpoint, the risk of death was decreased with epidural analgesia (3.1% vs 4.9%; odds ratio, 0.60; 95% confidence interval, 0.39-0.93). Epidural analgesia significantly decreased the risk of atrial fibrillation, supraventricular tachycardia, deep vein thrombosis, respiratory depression, atelectasis, pneumonia, ileus, and postoperative nausea and vomiting, and also improved recovery of bowel function, but significantly increased the risk of arterial hypotension, pruritus, urinary retention, and motor blockade. Technical failures occurred in 6.1% of patients. Conclusions: In adults having surgery under general anesthesia, concomitant epidural analgesia reduces postoperative mortality and improves a multitude of cardiovascular, respiratory, and gastrointestinal morbidity endpoints compared with patients receiving	enormes SR+MA von fast 1000 Patienten aus 125 RCTs, 10 RCTs haben Mortalität als Endpunkt, in 6,1%technisches Versagen der Methode	Mortalitätsvorteil durch epidurale Analgesie nach OP	1a
abaudon M, Chabanne R, Sossou A, Bertrand PM, Kauffmann S, Chartier C, Guérin R, Imhoff E, Zanre L, Brénas F, Bazin JE, Constantin JM. Epidural analgesia in the intensive care unit: An observational series of 121 patients. Anaesth Crit Care Pain Med. 2015 Aug;34(4):217-23. doi: 10.1016/j.accpm.2014.12.002. Epub 2015 May 23. PMID: 26004880.	observational study	122 patients wit EA and with mean SOFA and median SAPS II scores of 3.2 and 32	Demographics, clinical and biological data were prospectively recorded. Epidural catheter tips were sent to the microbiology laboratory for culture.	One hundred and twenty-one patients were included (mean age 60 years), with mean SOFA and median SAPS II scores of 3.2 and 32, respectively. Reasons for EA initiation included trauma (14%), postoperative pain management after major surgery (42%), and pancreatitis (31%). No EA-related neurologic complication was recorded, and one case of epidural abscess is discussed. No other EA-related infectious complications were observed. Median duration of EA was 11 days. Reasons for EA discontinuation included efficient analgesia without EA (60%) and accidental catheter	kleine Observation, vergleichsweise längere Liegedauern auf ICU als postop Non-ICU,	Epiduralanalgesie auch auf ICU feasible und sicher	2b

Jensen CD, Stark JT, Jacobson LL, Powers JM, Joseph MF, Kinsella-Shaw JM, Denegar CR. Improved Outcomes Associated with the Liberal Use of Thoracic Epidural Analgesia in Patients with Rib Fractures. Pain Med. 2017 Sep 1;18(9):1787-1794. doi: 10.1093/pm/pnw199. PMID: 27550958.	retrospective observational Study	965 patients with one or more rib fractures	Analysis of the patient registry of a level II trauma center.	cross the total population, mortality was 6.7%; incidence of pneumonia was 11.1%; mechanical ventilation was required in 23.8% of patients, for an average duration of 10.0 days; average stay in the hospital was 7.7 nights; and 49.7% of patients were admitted to the ICU for an average of 7.2 nights. Epidural analgesia was administered to 18.4% of patients. After matching samples for candidacy, patients who received epidurals were 3.7 years older, fractured 2.6 more ribs, had higher injury severity scores, and were more likely to present with bilateral fractures, flail segments, pulmonary contusions, hemothoraces, and pneumothoraces. Despite greater injury severity, mortality among these patients was lower (0.5%) than those who received alternative care (1.9%). Controlling for age, injury severity, and use of	große Kohorte, keine randomisierung, PDK Anlage bei Rippenfrakturen geht wahrscheinlich mit anderen Vorteilhaften Maßnahmen einher, direkter Zusammenhang PDK Mortalität fraglich, aber in anderen Kohorten bestätigt	Trauma-ICU Patienten profitieren von Regionalverfahren	2b
Peek J, Smeeing DPJ, Hietbrink F, Houwert RM, Marsman M, de Jong MB. Comparison of analgesic interventions for traumatic rib fractures: a systematic review and meta-analysis. Eur J Trauma Emerg Surg. 2019 Aug;45(4):597-622. doi: 10.1007/s00068-018-0918-7. Epub 2018 Feb 6. PMID: 29411048; PMCID: PMC6689037.	systemic review/ meta-analysis	19 Studies	PubMed, EMBASE and CENTRAL databases were searched to identify comparative studies investigating epidural, intravenous, paravertebral and intercostal interventions for traumatic rib fractures, without restriction for study type.	A total of 19 papers met our inclusion criteria and were finally included in this systematic review. Significant differences were found in favor of epidural analgesia for the reduction of pain. No significant differences were observed between epidural analgesia, intravenous analgesia, paravertebral blocks and intercostal blocks, for the secondary outcomes. Conclusions: Results of this study show that epidural analgesia provides better pain relief than the other modalities. No differences were observed for secondary endpoints like length of ICU stay, length of mechanical ventilation or pulmonary complications. However, the quality of	SR ohne Restrektion des Studientyps	bei traumatischen Rippenfrakturen werden Schmerzen mit Regionalanästhesieverfahren besser behandelt	2a
Vester-Andersen M, Lundstrøm LH, Møller MH; Danish Anaesthesia Database. The association between epidural analgesia and mortality in emergency abdominal surgery: A population-based cohort study. Acta Anaesthesiol Scand. 2020 Jan;64(1):104-111. doi: 10.1111/aas.13461. Epub 2019 Sep 17. PMID: 31437307.	prospective cohort study	4929 adults undergoing emergency abdominal laparotomy or laparoscopy	90-day mortality, 30-day mortality and serious adverse events.	We included 4920 patients, of whom 1134 (23.0%) died within 90 days. Overall, 27.9% of the patients were treated with epidural analgesia perioperatively. This increased to 34.0% among patients undergoing major laparotomy. The crude and adjusted association between epidural analgesia and 90-day mortality was OR 0.99 (95%CI: 0.86-1.15, P = .94) and OR 0.80 (95%CI: 0.67-0.94; P = .01), respectively. For 30-day mortality the corresponding estimates were OR 0.90 (95% CI: 0.76-1.06, P = .21) and OR 0.75	große Kohorte, keine randomisierung, PDK Anlage geht wahrscheinlich mit anderen Vorteilhaften Maßnahmen einher, direkter Zusammenhang PDK Mortalität fraglich, aber in anderen Kohorten bestätigt	PDK auf ICU feasabile	1b
Harde et al. (Indian J Crit Care Med. 2016 Feb;20(2):109-13	observational study	400 adult patients (18–90 years) undergoing surgery requiring epidural anesthesia/analgesia	incidence of colonization of epidural catheters retained or 48 h in postanesthesia care unit and wards	Overall positive tip culture was 6% (24), of them 7% (14) were from PACU and 5% (10) were from ward (P = 0.5285). Positive skin swab culture was 38% (150), of them 20% (80) were from PACU and 18% (70) were from ward (P = 0.3526). The relation between positive tip culture and positive skin swab culture in same patients is extremely significant showing a strong linear relationship (95% confidence interval = 0.1053–0.2289). The most common microorganism isolated was Staphylococcus epidermidis. No patient had signs of local or epidural infection. There is no difference in the incidence of epidural catheter tip	400 Patienten mit perioperativem PDK auf ICU	PDK auf ICU feasabile	2b

Bomberg H, Kubulus C, Herberger S, Wagenpfeil S, Kessler P, Steinfeldt T, Standl T, Gottschalk A, Stork J, Meissner W, Birnbaum J, Koch T, Sessler DI, Volk T, Raddatz A. Tunnelling of thoracic epidural catheters is associated with fewer catheter-related infections: a retrospective registry analysis. Br J Anaesth. 2016 Apr;116(4):546-53. doi:	retrospective observational Study	22411 surgical patients with continuous thoracic epidural analgesia; Catheters were tunnelled (n=12 870) or not (n=9541)	hypothesis that tunnelling of thoracic epidural catheters is associated with a lower risk of catheter-related infections.	There were fewer catheter-related infections in patients with tunnelled catheters (4.5 vs 5.5%, P<0.001). Mild infections were also less common (4.0 vs 4.6%, P=0.009), as were moderate infections (0.4 vs 0.8%, P<0.001). After adjustment for potential confounding factors, tunnelling remained an independent prevention for any grade of infection (adjusted OR 0.51, 95% CI 0.42-0.61, P<0.001) and for mild infections (adjusted OR 0.54, 95% CI 0.43-0.66, P<0.001)	große retrospektive Observation	Tunnelung eines PDK schützt vor Infektion	1b
Nguyen J, Nacpil N. Effectiveness of dexmedetomidine versus propofol on extubation times, length of stay and mortality rates in adult cardiac surgery patients: a systematic review and meta-analysis. JBI Database System Rev Implement Rep. 2018 May;16(5):1220-1239. doi: 10.11124/JBISRIR-2017-003488. PubMed PMID: 29762314.	systematic review	3 cohort studies	A search was conducted in MEDLINE via PubMed, Embase, Trip Database, ProQuest Nursing and Allied Health Source Database, Web of Science, ProQuest Dissertations and Theses Global, and MedNar to locate both published and unpublished studies between January 1, 1999 and November 23, 2017.	A total of four studies were included in the review. Meta-analysis of three cohort studies revealed dexmedetomidine to be superior to propofol with an average reduction of 4.18 hours (95% CI -6.69 to -1.67, p = 0.001) on the extubation times, an average 9.89 hour (95% CI -18.6 to -1.19, p = 0.03) reduction in ICU LOS, and an average 37.9 hour (95% CI, -60.41 to -15.46, p = 0.00) reduction in overall hospital LOS. A RCT was excluded from pooling for meta-analysis, but its results were congruent with meta-analysis results. There was lack of sufficient data to perform meta-analysis on in-hospital mortality	SR beruhend auf cohorten Studien, RCT ausgeschlossen	Dex im Vergleich zu Propofol marginale Vorteile in Bezug auf Aufwachzeit und ICU-LOS	2a
Keh D, Trips E, Marx G, Wirtz SP, Abduljawwad E, Bercker S, Bogatsch H, Briegel J, Engel C, Gerlach H, Goldmann A, Kuhn SO, Hüter L, Meier-Hellmann A, Nierhaus A, Kluge S, Lehmke J, Loeffler M, Oppert M, Resener K, Schädler D, Schuerholz T, Simon P, Weiler N, Weyland A, Reinhart K, Brunkhorst FM; SepNet–Critical Care Trials Group. Effect of Hydrocortisone on Development of Shock Among Patients With Severe Sepsis: The HYPRESS Randomized Clinical Trial. JAMA. 2016 Nov 1;316(17):1775-1785. doi: 10.1001/jama.2016.14799.	RCT	380 adult patients with severe sepsis or septic shock	Patients were randomly allocated 1:1 either to receive a continuous infusion of 200 mg of hydrocortisone for 5 days followed by dose tapering until day 11 (n = 190) or to receive placebo (n = 190).	The intention-to-treat population consisted of 353 patients (64.9% male; mean [SD] age, 65.0 [14.4] years). Septic shock occurred in 36 of 170 patients (21.2%) in the hydrocortisone group and 39 of 170 patients (22.9%) in the placebo group (difference, -1.8%; 95% CI, -10.7% to 7.2%; P = .70). No significant differences were observed between the hydrocortisone and placebo groups for time until septic shock; mortality in the intensive care unit or in the hospital; or mortality at 28 days (15 of 171 patients [8.8%] vs 14 of 170 patients [8.2%], respectively; difference, 0.5%; 95% CI, -5.6% to 6.7%; P = .86), 90 days (34 of 171 patients [19.9%] vs 28 of 168 patients [16.7%]; difference, 3.2%; 95% CI, -5.1% to 11.4%; P = .44), and 180 days (45 of 168 patients [26.8%] vs 37 of 167 patients [22.2%], respectively; difference, 4.6%; 95% CI, -4.6% to 13.7%; P = .32). In the hydrocortisone vs placebo	große RCT zu Hydrocortison bei Sepsis	In Hydrocortisongruppe weniger Delir	1b

Lu X, Li J, Li T, Zhang J, Li ZB, Gao XJ, Xu L. Clinical study of midazolam sequential with dexmedetomidine for agitated patients undergoing weaning to implement light sedation in intensive care unit. Chin J Traumatol. 2016 Apr 1;19(2):94-6. PubMed PMID: 27140216; PubMed Central PMCID: PMC4897849.	RCT	80 agitated patients undergoing weaning	group A : initial loading dose of midazolam at 0.3-3mg/kg·h 24 h before extubation, followed by an infusion of dexmedetomidine at a rate of 0.2-1 μg/kg·h until extubation ,group B received midazolam at a dose of 0.3-3 mg/kg·h until extubation	Both groups reached the goal of sedation needed for ICU patients. Dexmedetomidine was associated with a significant increase in extubation quality compared with midazolam, reflected in the prevalence of delirium after extubation (20% (8/40) vs 45% (18/40)), respectively (p= 0.017). There were no clinically significant decreases in HR and MAP after infusing dexmedetomidine or midazolam. In the group A, HR was not significantly increased after extubation; however, in the group B, HR was significantly increased compared with the preextubation values (p < 0.05). HR was significantly higher in the group B compared with the group A at 30 and 60 min after extubation (both, p <0.05). Compared with preextubation values, MAP was significantly increased at extubation in the group B (p < 0.05) and MAP was significantly higher at T3, T4, T5 in the group B than group A (p < 0.05). There was a significant difference in extubation time ((3.0 ± 1.5) d vs (4.3	Midazolam versus Dex im Weaning	Auswahl des Sedativums im Weaning ohne relevanten Vorteil für Mida oder Dex	1b
Dessap AM, Roche-Campo F, Launay JM, Charles-Nelson A, Katsahian S, Brun-Buisson C, Brochard L. Delirium and Circadian Rhythm of Melatonin During Weaning From Mechanical Ventilation: An Ancillary Study of a Weaning Trial. Chest. 2015 Nov;148(5):1231-1241. doi: 10.1378/chest.15-0525. PubMed PMID: 26158245.	RCT	70 ventilated patients , 43 (61.4%) experienced delirium at the initiation of weaning	comparing two fluid management strategies during weaning	Among the 70 patients included, 43 (61.4%) experienced delirium at the initiation of weaning. Delirium at the initiation of weaning was associated with more alcohol consumption, a greater severity of illness, and medication use before weaning (including neuromuscular blockade, antibiotics, sedatives, and narcotics). Delirium at the initiation of weaning was associated with more respiratory and neurologic complications and a reduced probability of successful extubation (Cox multivariate model hazard ratio of successful extubation = 0.54; 95% CI, 0.30-0.95; P = .03). Delirium was also associated with a significant reduction in peak,	Delir im Weaning	Delir im Weaning über 60% der Patienten betroffen	1b
Kirakli C, Naz I, Ediboglu O, Tatar D, Budak A, Tellioglu E. A randomized controlled trial comparing the ventilation duration between adaptive support ventilation and pressure assist/control ventilation in medical patients in the ICU. Chest. 2015 Jun;147(6):1503-1509. doi: 10.1378/chest.14-2599. PubMed PMID: 25742308.	RCT	229 adult medical patients intubated and mechanically ventilated for > 24 h in a medical ICU	patients were were randomized to either ASV or pressure assist/control ventilation.	Two hundred twenty-nine patients were included. Median MV duration until weaning, weaning duration, and total MV duration were significantly shorter in the ASV group (67 [43-94] h vs 92 [61-165] h, P = .003; 2 [2-2] h vs 2 [2-80] h, P = .001; and 4 [2-6] days vs 4 [3-9] days, P = .016, respectively). Patients in the ASV group required fewer total number of manual settings on the ventilator to reach the desired pH and Paco2 levels (2 [1-2] vs 3 [2-5], P < .001). The number of patients extubated successfully on the first attempt was significantly higher in the ASV group	RCT zu Beatmungsmodi im Weaning	Weaning	1b

Duan EH, Adhikari NKJ, D'Aragon F, Cook DJ, Mehta S, Alhazzani W, Goligher E, Charbonney E, Arabi YM, Karachi T, Turgeon AF, Hand L, Zhou Q, Austin P, Friedrich J, Lamontagne F, Lauzier F, Patel R, Muscedere J, Hall R, Aslanian P, Piraino T, Albert M, Bagshaw SM, Jacka M, Wood G, Henderson W, Dorscheid D, Ferguson ND, Meade MO; Canadian Critical Care Trials Group. Management of Acute Respiratory Distress Syndrome and Refractory Hypoxemia. A Multicenter Observational Study. Ann Am Thorac Soc. 2017 Dec;14(12):1818-1826. doi: 10.1513/AnnalsATS.201612-1042OC. PubMed PMID: 28910146.	prospective cohort study	664 patients: 222 (33%) with moderate and 442 (67%) with severe ARDS.	To describe mechanical ventilation strategies and treatment adjuncts for adults with ARDS, including refractory hypoxemia	We enrolled 664 patients: 222 (33%) with moderate and 442 (67%) with severe ARDS. On Study Day 1, mean Vt was 7.5 (SD = 2.1) ml/kg predicted body weight (n = 625); 80% (n = 501) received Vt greater than 6 ml/kg. Mean positive end-expiratory pressure (PEEP) was 10.5 (3.7) cm H2O (n = 653); 568 patients (87%) received PEEP less than 15 cm H2O. Treatment adjuncts were common (n = 440, 66%): neuromuscular blockers (n = 276, 42%), pulmonary vasodilators (n = 118, 18%), prone positioning (n = 67, 10%), extracorporeal life support (n = 29, 4%), and high-frequency oscillatory ventilation (n = 29, 4%). Refractory hypoxemia, defined as PaO2 less than 60 mm Hg on FiO2 of 1.0, occurred in 138 (21%) patients. At onset of refractory hypoxemia, mean Vt was 7.1 (SD = 2.0) ml/kg (n = 124); 95 patients (77%) received Vt greater than 6 ml/kg. Mean PEEP was 12.1 (SD = 4.4) cm H2O (n = 133); 99 patients (74%) received PEEP less than 15 cm H2O. Among patients with refractory hypoxemia, 91% received treatment adjuncts (126/138), with	Kanadische große Kohorte	Weaning	2b
Laffey JG, Madotto F, Bellani G, Pham T, Fan E, Brochard L, Amin P, Arabi Y, Bajwa EK, Bruhn A, Cerny V, Clarkson K, Heunks L, Kurahashi K, Laake JH, Lorente JA, McNamee L, Nin N, Palo JE, Piquilloud L, Qiu H, Jiménez JIS, Esteban A, McAuley DF, van Haren F, Ranieri M, Rubenfeld G, Wrigge H, Slutsky AS, Pesenti A; LUNG SAFE Investigators; ESICM Trials Group. Geo-economic variations in epidemiology, patterns of care, and outcomes in patients with acute respiratory distress syndrome: insights from the LUNG SAFE prospective cohort study. Lancet	observational study	2813 ICU patientines receiving invasive/ non-invasive ventilation in 459 intensive-care units	Characterisation of geo-economic variations in demographics, management, and outcomes of patients with acute respiratory distress syndrome (ARDS)	Of the 2813 patients enrolled in LUNG SAFE who fulfilled ARDS criteria on day 1 or 2, 1521 (54%) were recruited from Europe-High, 746 (27%) from rWORLD-High, and 546 (19%) from Middle countries. We noted significant geographical variations in demographics, risk factors for ARDS, and comorbid diseases. The proportion of patients with severe ARDS or with ratios of the partial pressure of arterial oxygen (PaO2) to the fractional concentration of oxygen in inspired air (FiO2) less than 150 was significantly lower in rWORLD-High countries than in the two other regions. Use of prone positioning and neuromuscular blockade was significantly more common in Europe-High countries than in the other two regions. Adjusted duration of invasive mechanical ventilation and length of stay in the intensive-care unit were significantly shorter in patients in rWORLD-High countries than in Europe-High or Middle countries. High gross	weltweite Umfrage	NMB Einsatz in Europa am weitesten verbreitet, sonst eher zurückhaltend	2b

Murray MJ, DeBlock H, Erstad B, Gray A, Jacobi J, Jordan C, McGee W, McManus C, Meade M, Nix S, Patterson A, Sands MK, Pino R, Tescher A, Arbour R, Rochwerg B, Murray CF, Mehta S. Clinical Practice Guidelines for Sustained Neuromuscular Blockade in the Adult Critically Ill Patient. Crit Care Med. 2016 Nov;44(11):2079-2103. Review. PubMed PMID: 27755068.	Guideline		Task Force members reviewed this material and all available evidence and provided recommendations, suggestions, or good practice statements	recommendation: we recommend scheduled eye care that includes lubricating drops or gel and eyelid closure for patients receiving continuous infusions of neuromuscular-blocking agents. The Task Force developed 10 weak recommendations. 1) We suggest that a neuromuscular-blocking agent be administered by continuous intravenous infusion early in the course of acute respiratory distress syndrome for patients with a PaO2/FIO2 less than 150. 2) We suggest against the routine administration of an neuromuscular-blocking agents to mechanically ventilated patients with status asthmaticus. 3) We suggest a trial of a neuromuscular-blocking agents in life-threatening situations associated with profound hypoxemia, respiratory acidosis, or hemodynamic compromise. 4) We suggest that neuromuscular-blocking agents may be used to manage overt shivering in therapeutic hypothermia. 5) We suggest that peripheral nerve stimulation with train-of-four monitoring may be a useful tool for monitoring the depth of neuromuscular blockade but only if it is incorporated into a more inclusive assessment of the patient that includes clinical assessment. 6) We suggest against the use of peripheral nerve stimulation with train of four alone for monitoring the depth of neuromuscular blockade in patients receiving continuous infusion of neuromuscular-blocking agents. 7) We suggest that patients receiving a continuous infusion of neuromuscular-blocking agent receive a structured physiotherapy	10 schwache Empfehlungen zu NMB, möglicher Studienbias	10 zurückhaltende Empfehlungen zum Einsatz von NMB, wenige Indikationen, und wenn ja, dann vosichtig, begrenzt und unter Monitoring	1a
DeGrado JR, Hohlfelder B, Ritchie BM, Anger KE, Reardon DP, Weinhouse GL. Evaluation of sedatives, analgesics, and neuromuscular blocking agents in adults receiving extracorporeal membrane oxygenation. J Crit Care. 2017 Feb;37:1-6. doi: 10.1016/j.jcrc.2016.07.020. Epub 2016 Aug 10. PubMed PMID: 27610584.	prospective, observational study	32 adult intensive care unit patients on ECMO support for more than 48hours.	Evaluation of use of sedative, analgesic,NMBAs in patients undergoing ECMO support.	We analyzed 32 patients, including 15 receiving VA (venoarterial) ECMO and 17 VV (venovenous) ECMO. The median daily dose of benzodiazepines (midazolam equivalents) was 24mg, and the median daily dose of opioids (fentanyl equivalents) was 3875 µg. There was a moderate negative correlation between the day of ECMO and the median daily benzodiazepine dose (r=-0.5515) and a very weak negative correlation for the median daily opioid dose (r=-0.0053). On average, patients were sedated to Richmond Agitation Sedation Scale scores between 0 and -1. Continuous infusions of opioids, benzodiazepines, propofol, dexmedetomidine, and NMBAs were administered on 404 (85.1%), 199 (41.9%), 95 (20%), 32 (6.7%), and 60 (12.6%) ECMO days, respectively. Patients in the VA arm received a	kleine Observation	über die Zeit werden weniger Sedative und Opioide an ECMO gegeben, Nur 12% der ECMO Tage wurden NMB gegeben	2b

Bellani G, Laffey JG, Pham T, Fan E, Brochard L, Esteban A, Gattinoni L, van Haren F, Larsson A, McAuley DF, Ranieri M, Rubenfeld G, Thompson BT, Wrigge H, Slutsky AS, Pesenti A; LUNG SAFE Investigators; ESICM Trials Group. Epidemiology, Patterns of Care, and Mortality for Patients With Acute Respiratory Distress Syndrome in Intensive Care Units in 50 Countries. JAMA. 2016 Feb 23;315(8):788-800. doi: 10.1001/jama.2016.0291. Erratum in: JAMA. 2016 Jul 19;316(3):350. JAMA. 2016 Jul 19;316(3):350. PubMed PMID: 26903337.	observational study	377 patients with ARDS in the first 48 hours afte ICU admittance and whose respiratory failure was managed with invasive mechanical ventilation	ICU incidence of ARDS	Of 29,144 patients admitted to participating ICUs, 3022 (10.4%) fulfilled ARDS criteria. Of these, 2377 patients developed ARDS in the first 48 hours and whose respiratory failure was managed with invasive mechanical ventilation. The period prevalence of mild ARDS was 30.0% (95% CI, 28.2%-31.9%); of moderate ARDS, 46.6% (95% CI, 44.5%-48.6%); and of severe ARDS, 23.4% (95% CI, 21.7%-25.2%). ARDS represented 0.42 cases per ICU bed over 4 weeks and represented 10.4% (95% CI, 10.0%-10.7%) of ICU admissions and 23.4% of patients requiring mechanical ventilation. Clinical recognition of ARDS ranged from 51.3% (95% CI, 47.5%-55.0%) in mild to 78.5% (95% CI, 74.8%-81.8%) in severe ARDS. Less than two-thirds of patients with ARDS received a tidal volume 8 of mL/kg or less of predicted body weight. Plateau pressure was measured in 40.1% (95% CI, 38.2-42.1), whereas 82.6% (95% CI, 81.0%-84.1%) received a positive end-expository pressure (PEEP) of less than 12 cm H2O. Prone positioning was used in 16.3% (95% CI, 13.7%-19.2%) of patients with severe ARDS. Clinician recognition of ARDS was associated with higher PEEP, greater use of neuromuscular blockade, and prone positioning. Hospital mortality was	Observation	Beschreibung ARDS, ARDS wird schwerer eingestuft, wenn NMB gegeben werden	2b
Weiser C, Schober A, Nichol G, Frossard M, Herkner H, Kechvar J, Losert H. Continuous versus intermittent neuromuscular blockade in patients during targeted temperature management after resuscitation from cardiac arrest-A randomized, double blinded, double dummy, clinical trial. Resuscitation. 2017 Nov;120:14-19. doi: 10.1016/j.resuscitation.2017.08.238.	RCT	63 patients mechanivally ventilated patients after cardiac arrest (32 continuous-NMB-group; 31 bolus-NMB-group) were enrolled.	Patients were randomized to either a continuous administration of rocuronium (continuous-NMB-group) or to a continuous administration of saline supplemented by rocuronium bolus administration if demanded (bolus-NMB-group).	significant. Shivering episodes were detected in 94% of the patients in the bolus-NMB-group compared to 25% of the patients receiving continuous rocuronium infusion ($p < 0.01$). The continuous-NMB-group received significant lower doses of midazolam (4.3 ± 0.8 mg/kg vs. 5.1 ± 0.9 mg/kg, $p < 0.01$) and fentanyl (62 ± 14 µg/kg vs. 71 ± 7 µg/kg, $p < 0.01$), but higher cumulative doses of rocuronium (7.8 ± 1.8 mg/kg vs. 2.3 ± 1.6 mg/kg, $p < 0.01$). Earlier awakening (2 [IQR 2;3] vs. 4 [IQR 2;7.5] days, $p = 0.04$) and decreased length of stay at the ICU (6 [IQR 3;5.9] vs. 10 [IQR 5;15] days,	kleine RCT, Übersedierung in beiden Gruppen ist das größte Problem, problematisches Design, Bias Probleme	kein Vorteil von NMB nach cardiac arrest	2b
Lascarrou JB, Le Gouge A, Dimet J, Lacherade JC, Martin-Lefèvre L, Fiancette M, Vinatier I, Lebert C, Bachoumas K, Yehia A, Lagarrigue MH, Colin G, Reignier J. Neuromuscular blockade during therapeutic hypothermia after cardiac arrest: observational study of neurological and infectious outcomes. Resuscitation. 2014	observational study	311 cardiac-arrest survivors, 144 received TH, including 117 with continuous NMB and 27 without NMBs	Patients given continuous NMB for persistent shivering were compared to those managed without NMB.	Of 311 cardiac-arrest survivors, 144 received TH, including 117 with continuous NMB and 27 without NMBs. ICU mortality was lower with NMB (hazard ratio [HR], 0.54 [0.32; 0.89], p=0.016) but the difference was not significant after adjustment on the propensity score (HR, 0.70 [0.39; 1.25], p=0.22). The proportion of patients with good neurological outcomes was not significantly different (36% with and 22% without NMB, p=0.16). Early-onset pneumonia was more common with NMB (HR, 2.36 [1.24; 4.50], p=0.009) but the difference was not significant	Problem: Übersedierung in beiden Gruppen, kein Vorteil von NMB nach Propensity score matching, keine RCT	kein Vorteil von NMB bei therapeutischer Hypothermie	2b