

Actigraphy to Evaluate Sleep in the Intensive Care Unit: A Systematic Review

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ONLINE DATA SUPPLEMENT

Search Strategy

Database	Search Terms	Results
PubMed	<p>("acute care"[tw] OR "acute disease"[MeSH] OR "anesthesia department, hospital"[MeSH] OR "anesthesia recovery period"[MeSH] OR "anesthesia"[MeSH:noexp] OR "anesthetic recovery"[tw] OR "assisted circulation"[tw] OR "burns"[MeSH] OR cardiac surgical procedure*[tw] OR "cardiopulmonary bypass"[tw] OR cardiovascular surgical procedure*[tw] OR "controlled respiration"[tw] OR "controlled ventilation"[tw] OR "craniectomies"[tw] OR "craniectomy"[tw] OR "critical care"[MeSH] OR "critical care"[tw] OR "critical illness"[MeSH] OR "critical illness"[tw] OR "critically ill"[tw] OR "ecmo"[tw] OR "extracorporeal circulation"[tw] OR "extracorporeal membrane oxygenation"[tw] OR "general surgery"[MeSH] OR heart-assist device*[tw] OR "intensive care units"[MeSH] OR "intensive care"[tw] OR neurosurgical procedure*[tw] OR organ transplant*[tw] OR "postoperative care"[MeSH] OR "postoperative period"[MeSH] OR "pulmonary surgical procedure"[tw] OR "recovery room"[MeSH] OR "respiration, artificial"[MeSH] OR "respiratory weaning"[tw] OR "specialties, surgical"[MeSH:noexp] OR "surgery"[subheading] OR "surgical decompression"[tw] OR "surgical procedures, operative"[MeSH] OR "surgical"[tw] OR thoracic surgical procedure*[tw] OR vascular surgical procedure*[tw] OR "ventilator weaning"[tw] OR acute condition*[tw] OR acute disease*[tw] OR acute disorder*[tw] OR anaesthes*[tw] OR anaesthesia* [tw] OR anesthes*[tw] OR anaesthesia* [tw] OR artificial respiration*[tw] OR artificial ventilation*[tw] OR burn*[tw] OR coronary care unit*[tw] OR esophagectom*[tw] OR hepatectom*[tw] OR icu*[tw] OR mechanical ventilation*[tw] OR pancreatectom*[tw] OR pancreaticoduodenectom*[tw] OR pancreaticojejunostom*[tw] OR postoperative*[tw] OR postsurger*[tw] OR recovery room*[tw] OR respiratory therap*[tw] OR sternotom*[tw] OR surger*[tw] OR thoracotom*[tw] OR ventilat*[tw]) AND ("actigraphy"[MeSH] OR "accelerometry"[MeSH] OR acceleromet*[tw] OR actimet*[tw] OR actig*[tw] OR actomet*[tw])</p>	912
Embase	<p>('acute care':ti,ab,de or 'acute condition':ti,ab,de or 'acute conditions':ti,ab,de or 'acute disease':ti,ab,de or 'acute diseased':ti,ab,de or 'acute diseases':ti,ab,de or 'acute disorder':ti,ab,de or 'acute disorders':ti,ab,de or anaesthes*:ti,ab,de or anesthes*:ti,ab,de or 'anesthesia'/de or 'anesthetic recovery'/exp or 'artificial respiration':ti,ab,de or 'artificial respirations':ti,ab,de or 'artificial ventilation'/exp or 'artificial ventilation':ti,ab,de or 'artificial ventilations':ti,ab,de or 'assisted circulation':ti,ab,de or burn*:ti,ab,de or 'burn'/exp or 'cardiac surgical procedure':ti,ab,de or 'cardiac surgical procedures':ti,ab,de or 'cardiopulmonary bypass':ti,ab,de or 'cardiovascular surgical procedure':ti,ab,de or 'cardiovascular surgical procedures':ti,ab,de or 'controlled respiration':ti,ab,de or 'controlled ventilation':ti,ab,de or 'coronary care unit':ti,ab,de or 'coronary care units':ti,ab,de or 'craniectomies':ti,ab,de or 'craniectomy':ti,ab,de or 'critical care':ti,ab,de or 'critical illness'/exp or 'critical illness':ti,ab,de or 'critically ill':ti,ab,de or 'ecmo':ti,ab,de or esophagectom*:ti,ab,de or 'extracorporeal circulation':ti,ab,de or 'extracorporeal membrane oxygenation':ti,ab,de or 'general surgery'/exp or 'heart-assist device':ti,ab,de or 'heart-assist devices':ti,ab,de or hepatectom*:ti,ab,de or icu*:ti,ab,de or 'intensive care unit'/exp or 'intensive care':ti,ab,de or 'mechanical ventilation':ti,ab,de or 'mechanical ventilations':ti,ab,de or 'neurosurgical procedure':ti,ab,de or 'neurosurgical procedures':ti,ab,de or 'organ transplant':ti,ab,de or 'organ transplantation':ti,ab,de or 'organ transplantations':ti,ab,de or 'organ transplants':ti,ab,de or pancreatectom*:ti,ab,de or pancreaticoduodenectom*:ti,ab,de or pancreaticojejunostom*:ti,ab,de or 'postoperative care'/exp or 'postoperative period'/exp or postoperative*:ti,ab,de or postsurger*:ti,ab,de or 'pulmonary surgical procedure':ti,ab,de or 'recovery room'/exp or 'recovery room':ti,ab,de or 'recovery rooms':ti,ab,de or 'respiratory therapeutic':ti,ab,de or 'respiratory therapeutics':ti,ab,de or 'respiratory therapies':ti,ab,de or 'respiratory therapy':ti,ab,de or 'respiratory weaning':ti,ab,de or sternotom*:ti,ab,de or surger*:ti,ab,de or 'surgery'/de or 'surgical decompression':ti,ab,de or 'surgical':ti,ab,de or 'thoracic surgical procedure':ti,ab,de or 'thoracic surgical procedures':ti,ab,de or thoracotom*:ti,ab,de or 'vascular surgical procedure':ti,ab,de or 'vascular surgical procedures':ti,ab,de or ventilat*:ti,ab,de or 'ventilator weaning':ti,ab,de) and ('actimetry'/exp or 'accelerometry'/exp or acceleromet*:ti,ab,de or actimet*:ti,ab,de or actig*:ti,ab,de or actomet*:ti,ab,de)</p>	1,483
CINAHL	<p>(MH("acute care" OR "acute disease" OR "anesthesia" OR "anesthesia recovery" OR "Respiration, Artificial+" OR "burns+" OR "burn units" OR "critical care+" OR "critical illness" OR "intensive care units+" OR "surgery, operative+" OR "specialties, surgical" OR "postoperative period" OR "postoperative care+") OR (TX("acute care" OR "acute condition" OR "acute conditions" OR "acute disease" OR "acute diseases" OR "acute diseased" OR "acute disorder" OR "acute disorders" OR anesthes* OR anaesthes* OR "anesthetic recovery" OR "artificial</p>	2,192

respiration" OR "artificial respirations" OR "artificial ventilation" OR "artificial ventilations" OR "assisted circulation" OR burn* OR "cardiac surgical procedure" OR "cardiac surgical procedures" OR "cardiopulmonary bypass" OR "cardiovascular surgical procedure" OR "cardiovascular surgical procedures" OR "controlled respiration" OR "controlled ventilation" OR "coronary care unit" OR "coronary care units" OR craniectomy OR craniectomies OR "critical care" OR "critical illness" OR "critically ill" OR ecmo OR esophagectom* OR "extracorporeal circulation" OR "extracorporeal membrane oxygenation" OR "heart-assist device" OR "heart-assist devices" OR hepatectom* OR ICU* OR "intensive care" OR "mechanical ventilation" OR "mechanical ventilations" OR "neurosurgical procedure" OR "neurosurgical procedures" OR "organ transplant" OR "organ transplantation" OR "organ transplantations" OR "organ transplants" OR pancreatectom* OR pancreaticoduodenectom* OR pancreaticojejunostom* OR postoperative* OR postsurger* OR "pulmonary surgical procedure" OR "pulmonary surgical procedures" OR "recovery room" OR "recovery rooms" OR "respiratory therapy" OR "respiratory therapies" OR "respiratory therapeutic" OR "respiratory therapeutics" OR "respiratory weaning" OR sternotom* OR surgical OR surger* OR "surgical decompression" OR "thoracic surgical procedure" OR "thoracic surgical procedures" OR thoracotom* OR "vascular surgical procedure" OR "vascular surgical procedures" OR ventilat* OR "ventilator weaning")) AND ((MH "accelerometry+") OR (TX(acceleromet* OR actimet* OR actig* OR actomet*)))

Cochrane

- #1 "acute care":ti,ab,kw
- #2 "acute condition*":ti,ab,kw
- #3 "acute disease*":ti,ab,kw
- #4 MeSH descriptor: [Acute Disease] explode all trees
- #5 "acute disorder*":ti,ab,kw
- #6 anaesthes*:ti,ab,kw
- #7 anesthes*:ti,ab,kw
- #8 MeSH descriptor: [Anesthesia Recovery Period] explode all trees
- #9 MeSH descriptor: [Anesthesia] this term only
- #10 "artificial respiration*":ti,ab,kw
- #11 MeSH descriptor: [Respiration, Artificial] explode all trees
- #12 "artificial ventilation*":ti,ab,kw
- #13 "assisted circulation":ti,ab,kw
- #14 burn*:ti,ab,kw
- #15 MeSH descriptor: [Burns] explode all trees
- #16 "cardiac surgical procedure*":ti,ab,kw
- #17 "cardiopulmonary bypass":ti,ab,kw
- #18 "cardiovascular surgical procedure*":ti,ab,kw
- #19 "controlled respiration":ti,ab,kw
- #20 "controlled ventilation":ti,ab,kw
- #21 "coronary care unit*":ti,ab,kw
- #22 craniectomy:ti,ab,kw
- #23 MeSH descriptor: [Critical Care] explode all trees
- #24 "critical care":ti,ab,kw
- #25 MeSH descriptor: [Critical Illness] explode all trees
- #26 "critical illness":ti,ab,kw
- #27 "critically ill":ti,ab,kw
- #28 ecmo:ti,ab,kw
- #29 esophagectom*:ti,ab,kw
- #30 "extracorporeal circulation":ti,ab,kw
- #31 "extracorporeal membrane oxygenation":ti,ab,kw
- #32 MeSH descriptor: [General Surgery]
- #33 "heart-assist device*":ti,ab,kw
- #34 hepatectom*:ti,ab,kw
- #35 icu*:ti,ab,kw
- #36 MeSH descriptor: [Intensive Care Units] explode all trees
- #37 "intensive care":ti,ab,kw
- #38 "mechanical ventilation*":ti,ab,kw
- #39 "neurosurgical procedure*":ti,ab,kw
- #40 "organ transplant*":ti,ab,kw
- #41 pancreatectom*:ti,ab,kw
- #42 pancreaticoduodenectom*:ti,ab,kw
- #43 pancreaticojejunostom*:ti,ab,kw
- #44 MeSH descriptor: [Postoperative Care] explode all trees

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- #45 MeSH descriptor: [Postoperative Period] explode all trees
 - #46 postoperative*:ti,ab,kw
 - #47 postsurger*:ti,ab,kw
 - #48 "pulmonary surgical procedure":ti,ab,kw
 - #49 MeSH descriptor: [Recovery Room] explode all trees
 - #50 "recovery room*":ti,ab,kw
 - #51 "respiratory therap*":ti,ab,kw
 - #52 "respiratory weaning":ti,ab,kw
 - #53 sternotom*:ti,ab,kw
 - #54 surger*:ti,ab,kw
 - #55 MeSH descriptor: [Anesthesia Department, Hospital] explode all trees
 - #56 MeSH descriptor: [Specialties, Surgical] this term only
 - #57 MeSH descriptor: [Surgical Procedures, Operative] explode all trees
 - #58 "surgical decompression":ti,ab,kw
 - #59 surgical:ti,ab,kw
 - #60 "thoracic surgical procedure*":ti,ab,kw
 - #61 thoracotom*:ti,ab,kw
 - #62 "vascular surgical procedure*":ti,ab,kw
 - #63 ventilat*:ti,ab,kw
 - #64 "ventilator weaning":ti,ab,kw
 - #65 MeSH descriptor: [Actigraphy] explode all trees
 - #66 MeSH descriptor: [Accelerometry] explode all trees
 - #67 acceleromet*:ti,ab,kw
 - #68 actimet*:ti,ab,kw
 - #69 actig*:ti,ab,kw
 - #70 actomet*:ti,ab,kw
 - #71 "anesthetic recovery":ti,ab,kw
 - #72 craniectomies:ti,ab,kw
 - #73 anesthesia*:ti,ab,kw
 - #74 anaesthesia*:ti,ab,kw
 - #75 #1 or #2 or #3 or #4 or #5 or #6 or #7 or #8 or #9 or #10 or #11 or #12 or #13 or #14 or #15 or #16 or #17 or #18 or #19 or #20 or #21 or #22 or #23 or #24 or #25 or #26 or #27 or #28 or #29 or #30 or #31 or #32 or #33 or #34 or #35 or #36 or #37 or #38 or #39 or #40 or #41 or #42 or #43 or #44 or #45 or #46 or #47 or #48 or #49 or #50 or #51 or #52 or #53 or #54 or #55 or #56 or #57 or #58 or #59 or #60 or #61 or #62 or #63 or #64 or #65 or #66 or #67 or #68 or #69 or #70 or #71 or #72 or #73 or #74
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Proquest

(all("acute care" OR "acute condition" OR "acute conditions" OR "acute disease" OR "acute diseases" OR "acute diseased" OR "acute disorder" OR "acute disorders" OR anesthes* OR anaesthes* OR "anesthetic recovery" OR "artificial respiration" OR "artificial respirations" OR "artificial ventilation" OR "artificial ventilations" OR "assisted circulation" OR burn* OR "cardiac surgical procedure" OR "cardiac surgical procedures" OR "cardiopulmonary bypass" OR "cardiovascular surgical procedure" OR "cardiovascular surgical procedures" OR "controlled respiration" OR "controlled ventilation" OR "coronary care unit" OR "coronary care units" OR craniectomy OR craniectomies OR "critical care" OR "critical illness" OR "critically ill" OR ecmo OR esophagectom* OR "extracorporeal circulation" OR "extracorporeal membrane oxygenation" OR "heart-assist device" OR "heart-assist devices" OR hepatectom* OR ICU* OR "intensive care" OR "mechanical ventilation" OR "mechanical ventilations" OR "neurosurgical procedure" OR "neurosurgical procedures" OR "organ transplant" OR "organ transplantation" OR "organ transplantations" OR "organ transplants" OR pancreatectom* OR pancreaticoduodenectom* OR pancreaticojejunostom* OR postoperative* OR postsurger* OR "pulmonary surgical procedure" OR "pulmonary surgical procedures" OR "recovery room" OR "recovery rooms" OR "respiratory therapy" OR "respiratory therapies" OR "respiratory therapeutic" OR "respiratory therapeutics" OR "respiratory weaning" OR sternotom* OR surgical OR surger* OR "surgical decompression" OR "thoracic surgical procedure" OR "thoracic surgical procedures" OR thoracotom* OR "vascular surgical procedure" OR "vascular surgical procedures" OR ventilat* OR "ventilator weaning") OR SU("Critical care" OR "intensive care" OR "ventilation" OR "surgery" OR "anesthesia" OR "burns" OR "postoperative period")) AND all(accelerometer OR accelerometry OR actimet* OR actigraph* OR actomet*)

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Table E1. Risk of Bias Assessment for Observational Studies (Newcastle Ottawa Scale)

Observational studies	Representativeness of exposed cohort [†]	Selection of non-exposed cohort [†]	Ascertainment of exposure(s) [†]	Demonstration that sleep disorders/problems were not present at start [‡]	Comparability of cohorts [‡]	Assessment of outcome [§]	Was follow-up long enough for outcome to occur? [¶]	Adequacy of follow-up ^{¶¶}
Beecroft et al (E1)	●					○	●	○
Van Der Kooij et al (E2)	●			○		○	●	○
Mistraletti et al (E3)	●					●	○	○
Kroon et al (E4)	●					●	●	○
Shilo et al (E5)	●	○	○	●	●	●	○	○
Shilo et al (E6)	●			●		●	○	○
Redeker et al (E7)	●					●	○	○
Raymond et al (E8)	●					●	○	○
Takaesu et al (E9)	○	○	○	●	●	●	●	○
Hamze et al (E10)	●			●		●	●	○

● = high risk of bias, ● = unclear risk of bias, ○ = low risk of bias
[‡] high risk if not consecutively screened, chosen based on specific criteria.
[†] only applicable for studies with a pre-defined exposure.
[‡] only for cohort studies.
[§] low risk if compared to polysomnography (PSG) or other scale.
[¶] high risk if individual study period <24 h, low risk if >24h.
^{¶¶} low risk if <10% lost to follow up.

Table E2. Risk of Bias Assessment for Randomized Controlled Trials (Cochrane Method)

RCT studies	Random sequence generation (selection bias)	Allocation concealment (selection bias)	Blinding of participants and personnel (performance bias)	Incomplete outcome data addressed (attrition bias)	Selective reporting	Other potential threats	Comments on other threats
Chen et al (E11)	○	○	●	○	○	◐	
Bourne et al (E12)	○	◐	○	●	○	○	
Ono et al (E13)	○	○	●	◐	○	●	All participants are males

● = high risk of bias, ◐ = unclear risk of bias, ○ = low risk of bias

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