

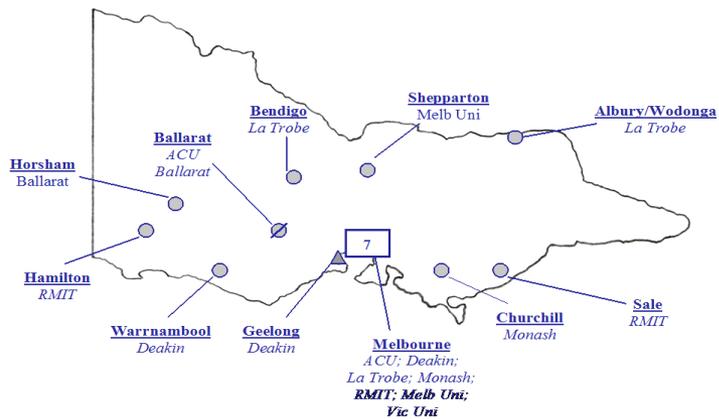


Post-anaesthetic discharge scoring criteria: a systematic review

Dr Nicole Phillips
Senior Lecturer, Director of Undergraduate Studies
School of Nursing and Midwifery
Deakin University
Melbourne, Victoria, Australia

Co authors: Dr Maryann Street, Prof. Bridie Kent, Emily
Haesler





DEAKIN
UNIVERSITY AUSTRALIA



THE JOANNA BRIGGS
INSTITUTE
The Deakin Centre for Quality
and Risk Management in Health

School of Nursing & Midwifery

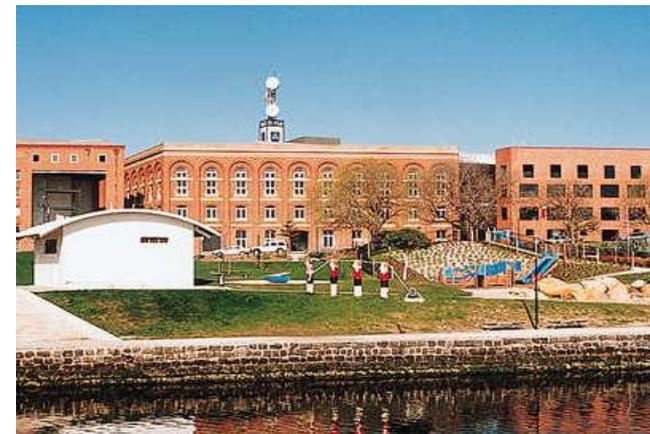
Melbourne

Geelong

Warrnambool



Undergraduate students- 2400
(+ postgraduate students)





Post-anaesthetic discharge scoring criteria: a systematic review

Acknowledgement

- Deakin University's *Strategic Research Centre for Quality and Patient Safety* funded the systematic review

Background

- Post Anaesthesia Care Unit (PACU) was introduced in 1923 and is the preferred location for the immediate recovery of the postoperative patient¹
- Number of factors impact on length of stay in PACU
- Traditionally- minimum length of stay; nursing assessment of normality & stability
- 1970; Aldrete proposed a scoring system to evaluate patient readiness for discharge from PACU
- 1995; Aldrete revised the scoring system

- While other scoring systems have been developed, currently there is no consensus regarding the variables that should be used to assess readiness for discharge from PACU
- A particular need has been identified to establish criteria to assess a patient's "home readiness" given the increasing frequency of day surgery procedures²
- Anecdotal reports of patient safety issues relating to post-anaesthetic care at different Melbourne metropolitan hospitals³
 - Reporting of adverse events is mandatory for all Australian hospitals; however, the indicators of patient safety which are collated do not allow the incidence of events relating to post-anaesthetic care to be determined

- Guidelines for the management of patients in the PACU and assessing their readiness for discharge have been implemented internationally
 - Often focused on anaesthetist
 - Suitability for discharge from PACU delegated to nurse
- Nurses central role in the management of patients in the PACU setting, anaesthetists often delegate the responsibility for evaluation of patient suitability for discharge to the PACU nurse



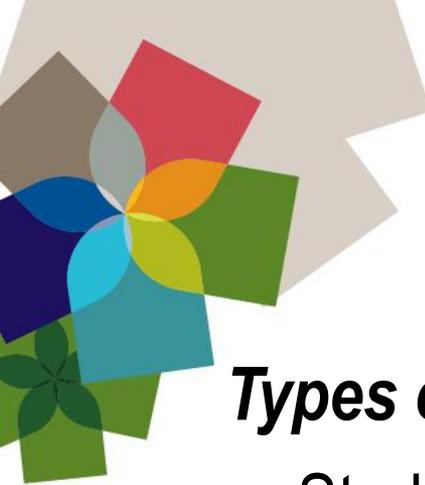
Aim

- Systematically examine the evidence to determine the essential components of an effective discharge PACU scoring system
 - The review sought to identify current best evidence for the effectiveness and feasibility of components of a scoring system to assess patients following surgery and anaesthesia



Inclusion criteria

- ***Types of Participants***
 - Studies that included adult patients (>18 yrs), male & female, who had received care in the PACU for any type of surgery, planned or unplanned
- ***Types of interventions***
 - Studies evaluating variables suitable for assessment of patient readiness for discharge from the PACU
 - eligible if evaluated pre-determined discharge criteria (individual or grouped in a discharge tool); eg, vital signs, oxygen saturation, level of consciousness, blood loss, pain, & existing tools for discharge



Types of outcomes

- Studies that included variables for patient assessment, eg:
 - vital signs and/or capillary oxygen saturation
 - nausea and/ or vomiting
 - pain
 - medication administration (eg anti-emetics, analgesics)
 - time spent in PACU
 - discharge delay from PACU
 - adverse events related to early discharge from PACU

- *Types of studies*
 - Quantitative studies

Search strategy

- Extensive literature search constructed
- Studies published in English between 1970 and 2010
- 12 databases
- Grey literature
- Reference lists of included studies

Assessment & methodological quality

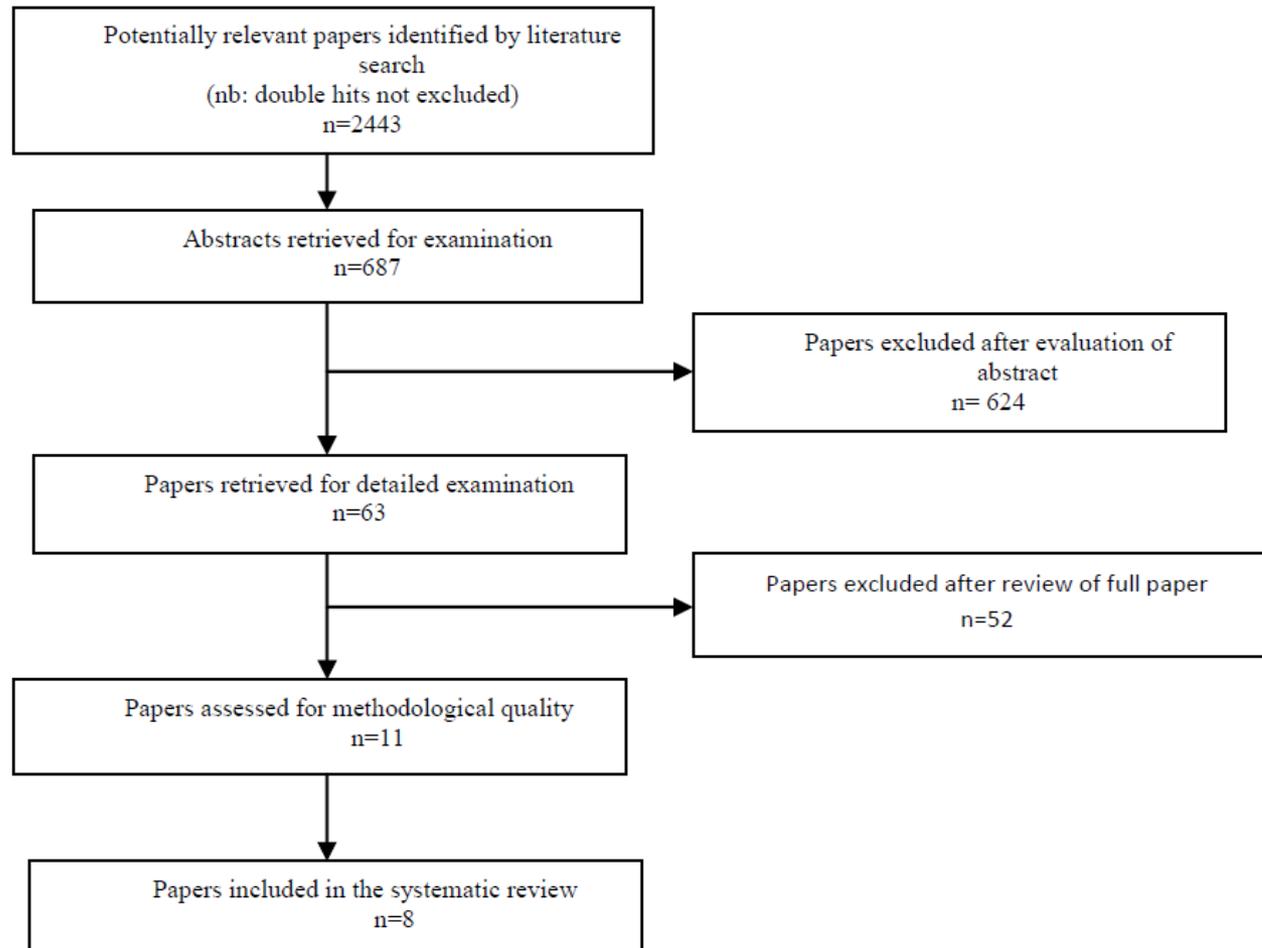
- Studies were appraised and data was extracted by two reviewers using the standardised critical appraisal and data extraction tools from the Joanna Briggs Institute (JBI)

Data synthesis

- A meta-analysis could not be conducted as there were no comparable RCTs
- Data were presented in a narrative summary



Results of the search





Key results

- Included studies represent an international perspective on PACU discharge
 - 4 US; 2 Canada; 1 Denmark; 1 Wales
- 1 RCT- compared routine recovery (control group, n=97) to the use of a discharge tool (fast-track group, n=110) with the aim of determining eligibility for bypassing PACU ⁴

- 4 descriptive observational studies^{5,6,7,8}, of moderate to high risk of bias, investigated the use of various PACU discharge assessment tools. All were conducted using convenience samples of PACU patients; the assessment tools were generally not validated and analysis was often limited
- 2 observational^{9,10} and 1 retrospective records analysis¹¹ investigated the recovery of patients in PACU and provided data useful for the development of a PACU assessment tool



Summary of variables assessed in included studies

	Blood pressure	Respiratory status	Pulse	O ₂ sat	Pain	Nausea / vomiting	Conscious state	Activity	Bleeding	Oral intake	Urine output	Laboratory values	Anxiety/ happiness	Temperature	Psychomotor
Song et al, 2004 *	√	√		√	√	√	√	√							
Chung et al, 1995 #	combined				combined		combined	√	combined						
Brown et al, 2008 #	√	√	√	√	√	√	√			√	√				
Feliciano et al, 2008 +										√					
Gartner et al, 2010 #	√	√	√	√	√	√	√								
Stephenson, 1990 +					√	√	√	√	√			√			
Waddle et al, 1998 #	√		√	√	√	√	√	√		√			√		
Willey et al, 2002 +															√

* RCT, # observational study investigating PACU discharge tool, + study assessing relevance of specific variables



Fast track tool used by Song et al. 2004

	Score
I. Level of consciousness	
Awake and oriented	2
Arousable with minimal stimulation	1
Responsive only to tactile stimulation	0
II. Physical activity	
Able to move all extremities on command	2
Some weakness in movement of extremities	1
Unable to voluntarily move extremities	0
III. Haemodynamic stability	
Blood pressure <15% below baseline MAP value	2
Blood pressure within 15–30% of baseline MAP value	1
Blood pressure >30% below baseline MAP value	0
IV. Respiratory stability	
Able to breathe deeply	2
Tachypnoea with good cough	1
Dyspnoeic with weak cough	0
V. Oxygen saturation	
Maintains value >90% on room air	2
Requires supplementary oxygen (nasal prongs)	1
Saturation <90% with supplementary oxygen	0
VI. Postoperative pain assessment	
None or mild discomfort	2
Moderate to severe pain controlled with i.v. analgesics	1
Persistent severe pain	0
VII. Postoperative emetic symptoms	
None or mild nausea with no active vomiting	2
Transient vomiting or retching	1
Persistent moderate-severe nausea and vomiting	0
Total score	
A minimum of 12 (with no score less than 1 in any individual category) would be required for a patient to be fast-tracked (i.e. to bypass the postanaesthesia care unit) after general anaesthesia	



Post anaesthetic discharge scoring system (PADSS) used by Chung et al. 1995

1. **Vital signs**
 - 2 = Within 20% of preoperative value
 - 1 = 20–40% of preoperative value
 - 0 = >40% of preoperative value
2. **Activity and mental status**
 - 2 = Oriented x3 AND has a steady gait
 - 1 = Oriented x3 OR has a steady gait
 - 0 = Neither
3. **Pain, nausea and/or vomiting**
 - 2 = Minimal
 - 1 = Moderate, having required treatment
 - 0 = Severe, requiring treatment
4. **Surgical bleeding**
 - 2 = Minimal
 - 1 = Moderate
 - 0 = Severe
5. **Intake and output**
 - 2 = Has had PO fluids AND voided
 - 1 = Has had PO fluids OR voided
 - 0 = Neither

Total PADSS score is 10, ≥ 9 considered fit for discharge

Discharge criteria tool used by Brown et al. 2008

- (a) Activity: voluntary movement of all 4 extremities similar to preoperative conditions
- (b) Respirations: 12 to 25 breaths/min or, if out of this range, $\pm 10\%$ of preoperative
- (c) Pulse: 60 to 100 beats/min or, if out of this range, $\pm 10\%$ of preoperative
- (d) Blood pressure: two consecutive blood pressures 15 mins apart, $\pm 20\%$ of preoperative blood pressure taken
- (e) Oxygen saturation: greater than 96% on room air or with supplemental oxygen
- (f) Consciousness/Mental status: appropriately responsive or unchanged from preoperative status
- (g) Pain score:
 - I. ≤ 4 before discharge based on a 0 to 10 pain scale
 - II. < 12 y of age must be without any signs of significant pain or distress
- (h) Urine output: with indwelling Foley catheter, clear and adequate urine output (0.5–1.0 mL/kg per hour)
- (i) No intractable nausea or vomiting, anxiety or agitation, and no evidence of excessive bleeding
- (j) Any laboratory values or ancillary tests ordered by the anaesthesiologist must be reviewed.



DASAIM discharge assessment tool used by Gartner et al. 2010

Modality	Score	Criteria
Sedation (nurse evaluation)		
	0	The patient is fully awake
	1	The patient is asleep, aroused by verbal stimulation
	2	The patient is asleep, aroused by physical stimulation
	3	The patient is asleep, cannot be aroused
Respiration rate (nurse count)		
	0	Regular rate > 10
	1	Snoring, 10 > RR > 30
	2	RR < 10 or RR > 30/min
	3	Periods of apnoea or obstructive pattern
Oxygen saturation, no supplementary oxygen for 10 mins		
	0	SPO ₂ ≥ 94%
	1	90% ≤ SPO ₂ < 94%
	2	85% ≤ SPO ₂ < 90%
	3	SPO ₂ < 85%
Systolic blood pressure (automatic NIBP)		
	0	SBP ≥ 100mmHg
	1	90mmHg ≤ SBP < 100mmHg



DASAIM (continued)

2	80mmHg \leq SBP < 90mmHg or SBP > 220mmHg
3	SBP < 80 mmHg

Heart rate (automatically derived from ECG)

0	50 < HR \leq 100
1	100 HR \leq 120
2	40 HR \leq 50 or 120 < HR \leq 130
3	HR < 40 or HR > 130

Pain (patient evaluation)

0	No pain
1	Light pain
2	Moderate pain
3	Severe pain

Nausea (patient evaluation and nurse observation)

0	No nausea and not vomiting
1	Light nausea or vomiting without previous nausea
2	Moderate nausea and/or vomiting
3	Severe nausea and/or recurring vomiting

RR = respiration rate; SPO₂ = oxygen saturation; SBP systolic blood pressure; HR = heart rate; NIBP = non-invasive blood pressure; ECG = electrocardiography
Modified version of the discharge criteria scoring system recommended by the Danish Society of Anaesthesiology and Intensive Care Medicine. Patients were considered dischargeable from the post-anaesthesia care unit when the score sum of all criteria was four or less and the patients had no single score above one.



Modified Aldrete criteria used by Wiley et al. 2002

Time	Before	After	Discharge
Moves 4 extremities voluntarily or on command	2	2	2
Moves 2 extremities voluntarily or on command	1	1	1
Moves 0 extremities voluntarily or on command	0	0	0
Spontaneous, unlaboured respirations	2	2	2
Dyspnoea	1	1	1
Apnoea	0	0	0
BP \pm 20% of preanaesthetic level	2	2	2
BP \pm 20%-50% of preanaesthetic level	1	1	1
BP \pm 50% of preanaesthetic level	0	0	0
Awake and oriented x 3	2	2	2
Arousable to verbal stimuli	1	1	1
Not responsive	0	0	0
Maintaining O ₂ saturations >90% on room air	2	2	2
Needs O ₂ inhalation to maintain O ₂ saturations >90%	1	1	1
O ₂ saturation <90% even with O ₂ supplementation	0	0	0

TOTAL*

Total* *A score of 10 was required for discharge from the endoscopy/recovery room



Variables assessed for PACU discharge readiness

- Agreement re
 - Pain
 - Nausea and vomiting
 - Conscious state
- Vital signs
 - Agreement re BP
 - ? Re other vitals



- The value of including urine output, oral intake or psychomotor testing was doubtful and requires further investigation.



DEAKIN
UNIVERSITY AUSTRALIA



Recommendations





JBI Levels of Evidence ¹²

Level of Evidence	Feasibility F (1-4)	Appropriateness A (1-4)	Meaningfulness M (1-4)	Effectiveness E (1-4)	Economic Evidence EE (1-4)
1.	Metasynthesis of research with unequivocal synthesised findings	Metasynthesis of research with unequivocal synthesised findings	Metasynthesis of research with unequivocal synthesised findings	Meta-analysis (with homogeneity) of experimental studies (eg RCT with concealed randomisation) OR One or more large experimental studies with narrow confidence intervals	Metasynthesis (with homogeneity) of evaluations of important alternative interventions comparing all clinically relevant outcomes against appropriate cost measurement, and including a clinically sensible sensitivity analysis
2.	Metasynthesis of research with credible synthesised findings	Metasynthesis of research with credible synthesised findings	Metasynthesis of research with credible synthesised findings	One or more smaller RCTs with wider confidence intervals OR Quasi-experimental studies (without randomisation)	Evaluations of important alternative interventions comparing all clinically relevant outcomes against appropriate cost measurement, and including a clinically sensible sensitivity analysis
3.	<ul style="list-style-type: none"> a. Metasynthesis of text/opinion with credible synthesised findings b. One or more single research studies of high quality 	<ul style="list-style-type: none"> a. Metasynthesis of text/opinion with credible synthesised findings b. One or more single research studies of high quality 	<ul style="list-style-type: none"> a. Metasynthesis of text/opinion with credible synthesised findings b. One or more single research studies of high quality 	<ul style="list-style-type: none"> a. Cohort studies (with control group) b. Case-controlled c. Observational studies (without control group) 	Evaluations of important alternative interventions comparing a limited number of appropriate cost measurement, without a clinically sensible sensitivity analysis
4.	Expert opinion	Expert opinion	Expert opinion	Expert opinion, or physiology bench research, or consensus	Expert opinion, or based on economic theory

Implications for practice

- The following assessments should be conducted when assessing adult patient readiness for discharge from PACU (JBI Level 2 evidence)
 - Conscious state
 - Blood pressure
 - Pain assessment
 - Nausea and vomiting
- Assessment of other vital signs should be considered (JBI Level 2 evidence)

Implications for research

The synthesised evidence suggests there is limited consensus on criteria for PACU discharge assessment

- Further research should investigate the validity & reliability of assessment variables on PACU discharge tools, the implementation of validated PACU discharge criteria for assessment of patient readiness for discharge, and, the relationship between PACU discharge assessment and patient safety.



Research program

1. Systematic review identified some evidence-based criteria, & importantly gaps regarding criteria, for the safe discharge of patients from PACU
2. Achieve expert consensus on the essential components of an effective Discharge Scoring Tool (in progress), leading to development of a Post-Anaesthetic Care Tool (PACT)
3. Pilot study to evaluate the PACT
4. Data collection- incidence & nature of adverse events relating to PACU at large health organisation in Australia (in progress)
5. RCT to evaluate the effectiveness & impact of the PACT



Achieving expert consensus- Post-anaesthetic care consensus study (PACCS)

- Findings of the SR informed this subsequent study
- Expert Panel- to review evidence-based criteria & achieve consensus on a PACU discharge tool
 - **Specialist groups:** Australian & New Zealand College of Anaesthetists (ANZCA), Australian Society of Post Anaesthesia & Anaesthesia Nurses (ASPAAN), Australian College of Operating Room Nurses (ACORN), Association of periOperative Registered Nurses (AORN), Australian Day Surgery Nurses Association (ADSNA), Australian Society of Anaesthetists (ASA), British Anaesthetic and Recovery Nurses Association (BARNA), Perioperative Nurses College of New Zealand (NZNO), European Operating Room Nurse Association (EORNA), International Federation of Perioperative Nurses (IFPN) and Association for Perioperative Practice (AfPP)

- Participants
 - Members representing the specialist groups
- Delphi technique
 - Online survey
 - 3 rounds
- Findings of SR presented to participants in an online survey (Round 1)
- Outcome- PACU Discharge Tool, which can be used primarily, but not exclusively, by nurses in the PACU to assess a patient's readiness for discharge following anaesthesia and surgery



- Pilot study to evaluate the Post-Anaesthetic Care Tool (PACT)

Published full systematic review:

- Phillips NM, Haesler E, Street M, Kent B, 2011 Post-anaesthetic discharge scoring criteria: A systematic review, *JBI Library of Systematic Reviews* 9(41):1679-1713.

References

1. Aldrete J & Kroulik D, *A postanesthetic recovery score*. *Anesth Analg* 1970. **49**(6): p. 924-934.
2. Truong L, Moran J & Blum P, *Post anaesthesia care unit discharge: a clinical scoring system versus traditional time-based criteria*. *Anaesth Intensive Care*, 2004. **32**(1): p. 33-42.
3. Riley R, *Personal verbal communication*. 2010: Operating Suite Manager, Box Hill Hospital, Eastern Health.
4. Song D, Chung F, Ronayne M, Ward B, Yogendran S & Sibbick C, *Fast-tracking (bypassing the PACU) does not reduce nursing workload after ambulatory surgery*. *Br J Anaesth* 2004. **93**(6): p. 768-774.
5. Waddle J, Evers A & Piccirillo J, *Postanesthesia care unit length of stay: quantifying and assessing dependent factors*. *Anesth Analg*, 1998. **87**(3): p. 628-633.
6. Brown I, Jellish W, Kleinman B, Fluder E, Sawicki K, Katsaros J & Rahman R, *Use of postanesthesia discharge criteria to reduce discharge delays for inpatients in the postanesthesia care unit*. *J Clin Anesth*, 2008. **20**(3): p. 175-9.
7. Chung F, Chan V & Ong D, *A post-anesthetic discharge scoring system for home readiness after ambulatory surgery*. *J Clin Anesth*, 1995. **7**(6): p. 500-6.
8. Gartner R, Callesen T, Kroman N & Kehlet H, *Recovery at the post anaesthetic care unit after breast cancer surgery*. *Dan Med Bull* 2010. **57**(2): p. 1-5.
9. Stephenson M, *Discharge criteria in day surgery*. *J Adv Nurs* 1990. **15**(5): p. 601-13.
10. Willey J, Vargo J, Connor J, Dumot J, Conwell D & Zuccaro G, *Quantitative assessment of psychomotor recovery after sedation and analgesia for outpatient EGD*. *Gastrointest Endosc Clin N Am*, 2002. **56**(6): p. 810-6.
11. Feliciano T, Montero J, McCarthy M & Priester M, *A retrospective, descriptive, exploratory study evaluating incidence of postoperative urinary retention after spinal anesthesia and its effect on PACU discharge*. *Journal of PeriAnesthesia Nursing*, 2008. **23**(6): p. 394-400.
12. *Joanna Briggs Institute Levels of Evidence*. Available from (retrieved 15 April 2012):
<http://www.joannabriggs.edu.au/About%20Us/JBI%20Approach/Levels%20of%20Evidence%20%20FAME>.