

# Postoperative management in the recovery room compared to ICU for cardiac surgery patients

Kim Dalziel

Centre for Clinical Effectiveness  
Monash Institute of Health Services Research  
Monash Medical Centre  
Locked Bag 29  
Clayton VIC 3168  
Australia

Telephone: +61 3 9594 2726  
Fax: +61 3 9594 6970  
Email: [cce@med.monash.edu.au](mailto:cce@med.monash.edu.au) (quote author of report)  
URL: <http://www.med.monash.edu.au/healthservices/cce/>

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## SUMMARY STATEMENT

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## REQUEST

Postoperative management in the recovery room compared to ICU for cardiac surgery patients

## REQUESTED BY

**Anne Mennen**, Director of Nursing, Heart and Chest Program, Monash Medical Centre, Clayton.

## METHODOLOGY

### Search Strategy

The Centre for Clinical Effectiveness defines the 'best available evidence' as that research we can identify that is least susceptible to bias. We determine this according to pre-defined National Health and Medical Research Council (NHMRC, 2000) criteria (see Appendix 1).

First, we search for systematic reviews, evidence based clinical practice guidelines, health technology assessments and randomised controlled trials. If we identify sound, relevant material of this type, the search stops. Otherwise, our search strategy broadens to include studies that are more prone to bias, less generalisable or have other methodological difficulties. We include case-control and longitudinal cohort studies in our critical appraisal reports. While we cite observational and case series studies, and narrative reviews and consensus statements, in our reports we do not critically appraise them. Such studies can produce accurate results but they are generally too prone to bias to allow determination of their validity beyond their immediate setting.

### Details of Evidence Request

Patients (Subjects): Patients undergoing cardiac surgery  
Intervention: Post operative management in the recovery room  
Comparisons: Post operative management in ICU  
Outcomes: Patient outcomes, length of stay

### Search terms

(see Appendix 2 for exact search strategy)

Patient (Subject): thoracic surgical procedures, cardiovascular procedures, thoracic surgery, heart surg\$, cardi\$ surg\$, myocardi\$ surg\$, coronary surg\$, angioplast\$ surg\$, percardi\$ surg\$, operat\$,  
Intervention: recover\$, intermediate care  
Comparison: intensive care units, coronary care units, intensive care units pediatric, intensive care units neonatal, ICU, CCU, ITU, intensive therapy, intensive care

## **Resources Searched**

We searched the following databases and internet websites:

The Cochrane Library (CD-ROM) 2001 Issue 3

Medline (OVID)- 1966 to July Week 4 2001

Best Evidence (OVID)- 1991 to March/April 2001

CINAHL (OVID)- 1982 to July Week 2 2001

Current Contents (OVID)- 1993 Week 26 to 2001 Week 32

PREMEDLINE (OVID)- August 2, 2001

Australasian Medical Index- 3 August, 2001

National Guideline Clearinghouse- 3 August, 2001

## **Refinements, Searching & Reporting Constraints**

We included items of evidence that were available to us on 3 August 2001. We only included articles published in the last 10 years.

## RESULTS

From our sources we identified 26 potentially relevant articles.

After examination of these 26 abstracts/citations, the following were excluded as follows:

Reason for exclusion	Number
Level IV evidence	10
Opinion	1
Unknown relevance (no abstract)	14
<b>Total</b>	<b>25</b>

One article then remained for appraisal. This studies was classified as follows:

Study Design	Number included
Systematic reviews or meta-analyses	0
Evidence-based clinical practice guidelines	0
Randomised controlled trials	0
Psuedorandomised controlled trials	0
<b>Controlled trials, cohort or case-control analytic studies</b>	<b>1</b>
<b>Total</b>	<b>1</b>

Based on our refinements, searching and reporting constraints we are reasonably confident these articles represent the most relevant findings published to date.

## EVIDENCE SUMMARIES

### Format

Evidence summaries are presented as spreadsheets attached to this report. Each spreadsheet contains the article citation, details of the study design, patient description, scientific validity of the article, results, and pertinent remarks from the authors and Centre for Clinical Effectiveness reviewer.

## REFERENCES

### ARTICLES CRITICALLY APPRAISED FOR THIS REPORT

#### *Level III-3 evidence- Comparative study with historical controls*

Chong JL, Grebenik C, Sinclair M, Fisher A, Pillai R and Westaby S (1993). The effect of a cardiac surgical recovery area on the timing of extubation. *Journal of Cardiothoracic & Vascular Anesthesia* 7: 137-141.

### ARTICLES NOT CRITICALLY APPRAISED

#### *Level IV evidence*

Aps C, Hutter JA & Williams BT (1986). Anaesthetic management and postoperative care of cardiac surgical patients in a general recovery ward. *Anaesthesia* 41: 533-537.

Byrick RJ, Power JD, Ycas JO & Brown KA (1986). Impact of an intermediate care area on ICU utilization after cardiac surgery. *Crit Care Med* 14: 869-872.

Cheng DCH, Byrick RJ & Knobel E (1999). Structural models for intermediate care areas. *Critical Care Medicine* 27: 2266-2271.

Chong JL, Pillai R, Fisher A, Grebenik C, Sinclair M & Westaby S (1992). Cardiac surgery: moving away from intensive care. *British Heart Journal* 68: 430-433.

Hadjinikolaou L, Cohen A, Glenville B & Stanbridge RD (2000). The effect of a 'fast-track' unit on the performance of a cardiothoracic department. *Annals of the Royal College of Surgeons of England* 82: 53-58.

Heland M & Retsas A (1999). Establishing a cardiac surgery recovery unit within the post anaesthesia care unit. *Collegian* 6: 10-13.

Hutter JA, Aps C, Hems D & Williams BT (1989). The management of cardiac surgical patients in a general surgical recovery ward. *J Cardiovasc Surg (Torino)* 30: 273-276.

Jindani A, Aps C, Neville E, Sonmez B, Tun K, Williams BT & Tung K (1993). Postoperative cardiac surgical care: an alternative approach. *British Heart Journal* 69: 59-63; discussion 63-54.

Massey D & Meggit G (1994). Recovery units: the future of postoperative cardiac care. *Intensive & Critical Care Nursing* 10: 71-74.

Westaby S, Pillai R, Parry A, O'Regan D, Giannopoulos N, Grebenik K, Sinclair M & Fisher A (1993). Does modern cardiac surgery require conventional intensive care? *European Journal of Cardio-Thoracic Surgery* 7: 313-318; discussion 318.

#### *Opinions*

Aps C (1995). Fast tracking in cardiac surgery. *British Journal of Hospital Medicine* 54: 139-142.

#### *Unknown relevance*

Anonymous (1983). Recovery room care. *Int Anesthesiol Clin* 21: 1-208.

Baldwin JC (1998). Hospital readmission after cardiac surgery - does fast track cardiac surgery result in cost saving or cost shifting - editorial comment. *Circulation* 98: II 40.

Brown MM (2000). Implementation strategy: one-stop recovery for cardiac surgical patients. *AACN Clinical Issues* 11: 412-423.

- Cheng DC (1998). Fast track cardiac surgery pathways: early extubation, process of care, and cost containment. *Anesthesiology* 88: 1429-1433.
- Coriat P & Beaussier M (2001). Fast-tracking after coronary artery bypass graft surgery. *Anesthesia & Analgesia* 92: 1081-1083.
- Cotton P (1993). Fast-track improves CABG outcomes. *Jama* 270: 2023.
- Engelman RM (1997). Fast-track recovery in the elderly patient. *Annals of Thoracic Surgery* 63: 606-607.
- Engelman RM, Chiscano A, Modry DL, Westaby S, Verrier ED & Walji (1999). Ultra-fast track hospital discharge using conventional cardiac surgical techniques - Discussion. *Annals of Thoracic Surgery* 67: 369-370.
- Ley A (1998). Fast tracking in cardiac surgery: the St. Francis experience. *Nursing Case Management* 3: 155-159.
- London MJ, Shroyer AL & Grover FL (1999). Fast tracking into the new millennium: an evolving paradigm. *Anesthesiology* 91: 911-915.
- Marquez J, Magovern J, Kaplan P, Sakert T & Gravlee GP (1995). Cardiac surgery "fast tracking" in an academic hospital. *Journal of Cardiothoracic & Vascular Anesthesia* 9: 34-36.
- Riley J (1995). Fast track cardiac care. *Nursing Standard* 9: 55-56.
- Sirio CA & Martich GD (1999). Who goes to the ICU postoperatively? *Chest* 115: 125S-129S.
- Taggart DP (1993). Cardiac surgery: moving away from intensive care. *Br Heart J* 69: 276.

# APPENDIX 1

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## Levels Of Evidence

Based on "How to use the evidence: assessment and application of scientific evidence" (National Health & Medical Research Council, Canberra, 2000):

Level I		Evidence obtained from a systematic review (or meta-analysis) of all relevant randomised controlled trials.
Level II		Evidence obtained from at least one randomised controlled trial.
Level III	-1	Evidence obtained from pseudorandomised controlled trials (alternate allocation or some other method).
	-2	Evidence obtained from comparative studies (including systematic reviews of such studies) with concurrent controls and allocation not randomised, cohort studies, case control studies or interrupted time series with a control group.
	-3	Evidence obtained from comparative studies with historical control, two or more single-arm studies or interrupted time series without a parallel control group.
Level IV		Evidence obtained from case series, either post-test or pretest/post-test.

## APPENDIX 2

### Search strategy

	Search terms for MEDLINE, CINAHL, EBM- Best Evidence, PREMEDLINE, Current Contents
1	thoracic surgical procedures/
2	exp cardiovascular surgical procedures/
3	thoracic surgery/
4	or/1-3
5	heart\$.tw
6	cardi\$.tw
7	thora\$.tw
8	myocardi\$.tw
9	coronary.tw
10	angioplast\$.tw
11	percardi\$.tw
12	or/5-11
13	surg\$.tw
14	operat\$.tw
15	13 or 14
16	12 and 15
17	4 or 16
18	intensive care units/ or coronary care units/ or intensive care units, pediatric/ or intensive care units, neonatal/
19	(ICU or CCU or ITU or coronary care or intensive care or intensive therapy).tw
20	18 or 19
21	recover\$.mp
22	intermediate care.tw
23	21 or 22
24	17 and 20 and 23
25	fast track\$.tw
26	17 and 25
27	24 or 26
28	Limit 27- 1990 to 2001

<p style="text-align: center;"><b>Evidence Summary Therapy/Intervention</b></p> <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p>Cardiac surgery postoperative management in recovery room compared to ICU</p> </div>	<p style="text-align: center;"><b>Study 1</b></p> <p style="text-align: center;">Chong JL, Grebenik C, Sinclair M, Fisher A, Pillai R and Westaby S (1993). The effect of a cardiac surgical recovery area on the timing of extubation. Journal of Cardiothoracic &amp; Vascular Anesthesia 7: 137-141.</p>
<p><b>STUDY DESIGN &amp; NHMRC LEVELS OF EVIDENCE</b></p>	<p>Comparative study with historical controls Level III-3</p>
<p><b>DESCRIPTION:</b> Patients (subjects), Intervention, Comparisons, Outcomes, Inclusion &amp; Exclusion Criteria</p>	<p><b>Patients (subjects):</b> Patients undergoing elective cardiac surgery  <b>Intervention:</b> Post operative management in a cardiac surgical recovery area (CSRA) over a 4 month period  <b>Comparison:</b> Conventional recovery in the intensive care unit (ICU) in the two months immediately prior to the intervention  <b>Outcomes:</b> Duration of ventilation, time to extubation, post operative complications, post operative morbidity, respiratory gas exchange, length of hospital stay, requirement for reintubation.  <b>Incl &amp; Excl Criteria:</b> Patients were excluded if their preoperative condition was so poor that they were deemed unsuitable for rapid recovery. Poor conditions included multi-organ dysfunction, severe chronic respiratory disease, or operative procedures requiring prolonged hypothermic cardiopulmonary bypass and circulatory arrest. Patients who were admitted to ICU because of lack of beds in the CSRA were also excluded.</p>
<p><b>VALIDITY:</b> Methodology, rigour, selection</p>	<p><b>Randomisation:</b> No  <b>Blinding:</b> No  <b>All patients accounted for:</b> Yes  <b>Patients treated equally:</b> The surgical techniques used were the same for both groups, medications were continued up until day of surgery for both groups and premedication was the same for both groups. The intervention group received an infusion of propofol on institution of CPB whereas the control group received fentanyl with midazolam.  <b>Similar groups:</b> Yes for age, gender, type of surgery and duration of surgery</p>
<p><b>RESULTS:</b> Generally favourable or unfavourable, specific outcomes of interest, estimate of experimental effect and precision if appropriate</p>	<p>Five patients from the intervention group were transferred to ICU after 24 hours in the CSRA and were excluded from further analysis. The CSRA group had a median ventilation time of 1 hour (range 0 to 12) compared to 5 hours (range 0 to 21) for the control group. Median time to extubation for the CSRA group was 2 hours (range 0 to 14) compared to 7 hours (range 0 to 22) for the control group. Five patients in the CSRA group required reintubation, no patients in the control group were reintubated.</p> <p>Median hospital stay in the CSRA group was 7 days (range 5 to 18) compared to 7 days (range 5 to 25) for the control group. Two patients in the CSRA group died in the hospital postoperatively, no patients died in the control group. Patients in the CSRA group had a higher PaCO<sub>2</sub> after extubation than the control group (although not statistically significant) which was also associated with a lower pH (see table 5 of the original paper for more details of Blood Gas Analysis results).</p>
<p><b>AUTHOR(S) CONCLUSIONS:</b> Limitations, implications for practice and research</p>	<p>"It was demonstrated that while using a moderately high-dose fentanyl anesthetic, the authors were able to wean 56% of patients who were undergoing routine cardiac surgery from the ventilator within 1 hour of operation and to extubate 53.5% of patients within 2 hours. These results were achieved by minor changes in the anesthetic technique together with a change in recovery philosophy. These changes did not result in an increase in postoperative morbidity with respect to respiratory gas exchange or hospital stay."</p>

<p style="text-align: center;"><b>Evidence Summary Therapy/Intervention</b></p> <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p>Cardiac surgery postoperative management in recovery room compared to ICU</p> </div>	<p style="text-align: center;"><b>Study 1 (cont...)</b></p> <p style="text-align: center;">Chong JL, Grebenik C, Sinclair M, Fisher A, Pillai R and Westaby S (1993). The effect of a cardiac surgical recovery area on the timing of extubation. <i>Journal of Cardiothoracic &amp; Vascular Anesthesia</i> 7: 137-141.</p>
<p><b>OUR COMMENTS:</b> Opportunity for bias, weakness and strength</p>	<p><b>Potential for bias:</b> It is important that the intervention is seen as the whole package of how the CSRA group were treated, including: anaesthetic technique, the specialised care received in the CSRA, and dedicated staff to provide post operative care.</p> <p><b>Weakness/es:</b></p> <ul style="list-style-type: none"> <li>• The study was non-randomised which leads to potential selection bias, groups being treated differently in ways other than the intervention, and background differences not being evenly distributed between the two groups</li> <li>• We are unsure if the study had sufficient power to detect significant differences between the groups</li> <li>• The control group was historical and therefore there may have been differences other than the intervention</li> </ul> <p><b>Strength/s:</b></p> <ul style="list-style-type: none"> <li>• Patients in the control group who met the exclusion criteria outlined in the intervention phase were also excluded from the analysis</li> <li>• Patients in the intervention and control groups were similar on a number of baseline characteristics</li> <li>• There was no loss to follow up</li> </ul>

## EXPLANATION OF TERMINOLOGY USED IN SPREADSHEET

**Level of evidence:** A hierarchy of study evidence that indicates the degree to which bias has been eliminated in the study design.

**Intervention:** A therapeutic procedure such as treatment with a pharmaceutical agent, surgery, a dietary supplement, a dietary change or psychotherapy.

**Randomisation:** A process of allocating participants to treatment or control group within a controlled trial by using a random mechanism, such as coin toss, random number table or computer-generated random numbers. Study subjects have an equal chance of being allocated to an intervention or control group; thus, the two groups are comparable. Randomisation ensures that the results are not biased by the selection of particular types of patients to receive a specific therapy.

**Blinding:** Blinding or masking is a process used in epidemiological studies and clinical trials in which the observers and the subjects have no knowledge as to which treatment groups subjects are assigned. It is undertaken in order to minimise bias occurring in patient response and outcome measurement.

**All patients accounted for:** Once patients are randomly allocated to a specific group and withdraw before study conclusion, they have to be accounted for in order to ensure that patients withdrawing from the study are not significantly different from those continuing in the study. The final analysis should be conducted on an intention-to-treat basis, which includes the results of withdrawn patients in the analysis.

**Patients treated equally:** To be able to attribute any difference in the observed outcome to the intervention, study patients need to be treated equally in every way except for the intervention being evaluated.

**Similar groups:** Baseline characteristics of patients that are also likely to affect results should be evenly distributed between the intervention and control groups. Following proper randomisation, patients' attributes would be expected to be equally distributed between groups.

### **Validity:**

Of measurement: an expression of the degree to which a measurement measures what it purports to measure; it includes construct and content validity.

Of study: the degree to which the inferences drawn from the study are warranted when account is taken of the study methods, the representativeness of the study sample, and the nature of the population from which it is drawn (internal and external validity, applicability, generalisability).

**Potential for bias:** Bias is a systematic deviation of a measurement from the 'true' value leading to either an over (or under) estimation of the treatment effect. Bias can originate from many different sources (including allocation of patients, measurement, interpretation, publication and review of data).