Centre for Clinical Effectiveness
Enhancing patient outcomes through clinical application of the best available evidence

EVIDENCE CENTRE
CRITICAL APPRAISAL
Series 2001: Therapy

Day of surgery admission for cardiac surgery compared to day before admission

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SUMMARY STATEMENT

Disclaimer - please refer to Appendix 1 for information.

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Publication of materials – please use the following format when citing this article:

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REQUEST

Day of surgery admission for cardiac surgery compared to day before admission

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:	Day of surgery admission
Comparison:	Day before surgery admission
Outcomes:	Patient outcomes, length of stay, costs, patient satisfaction

Search terms

(see Appendix 2 for exact search strategy)

Patient (Subject):	thoracic surgical procedures, cardiovascular procedures, thoracic surgery, surgery cardiovascular, heart surg$, cardi$ surg$, myocardi$ surg$, coronary surg$, angioplast$ surg$, percardi$ surg$, operat$,
Intervention:	same day, same-day, day of surgery, day of procedure, day-case, admission$, admit$, patient admission

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Resources Searched

We searched the following databases and internet websites:

The Cochrane Library (CD-ROM) 2001 Issue 3

Medline (OVID)- 1966 to September Week 1 2001

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

Clinical Evidence (OVID)- July 2001

CINAHL (OVID)- 1982 to August Week 4 2001

Current Contents (OVID)- 1993 Week 26 to 2001 Week 39

PREMEDLINE (OVID)- September 20, 2001

Australasian Medical Index- September 21, 2001

National Guideline Clearinghouse- September 21, 2001

Scottish Intercollegiate Guidelines Network (SIGN)- September 21, 2001

Refinements, Searching & Reporting Constraints

We included items of evidence that were available to us on 21 September 2001. We only included articles published since 1985. A related articles search was performed using PubMed.

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RESULTS

From our sources we identified 16 potentially relevant articles.

After examination of these 16 abstracts/citations, the following were excluded as follows:

Reason for exclusion	Number
Consensus Guideline	1
Level IV evidence	6
Opinion	2
Unknown relevance (no abstract)	3
Total	**12**

Four articles 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
Controlled trials, cohort or case-control analytic studies	**4**
Total	**4**

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-2 evidence- Comparative study with concurrent controls

Anderson RP, Guyton SW, Paull DL & Tidwell SL (1993). Selection of patients for same-day coronary bypass operations. Journal of Thoracic & Cardiovascular Surgery **105:** 444-451; discussion 451-442.

Level III-3 evidence- Comparative study with historical controls

Arom KV, Emery RW, Petersen RJ & Schwartz M (1996). Patient characteristics, safety, and benefits of same-day admission for coronary artery bypass grafting. *Ann Thorac Surg* **61:** 1136-1139; discussion 1139-1140.

Calligaro KD, Dandura R, Dougherty MJ, DeLaurentis DA & Raviola CA (1997). Same-day admissions and other cost-saving strategies for elective aortoiliac surgery. *J Vasc Surg* **25:** 141-144.

Musser DJ, Calligaro KD, Dougherty MJ, Raviola CA & Delaurentis DA (1996). Safety and cost-efficiency of 24-hour hospitalization for carotid endarterectomy. *Annals of Vascular Surgery* **10:** 143-146.

ARTICLES NOT CRITICALLY APPRAISED

Consensus Guideline

Anonymous (1993). Same-day surgical admission. American College of Cardiology Cardiovascular Surgery Committee. *Journal of the American College of Cardiology* **22:** 946-947.

Level IV evidence- Case series and pre post studies

Cella AS, Bush CA & Codignotto B (1993). Same-day admission for cardiac surgery: a benefit to patient, family, and institution. *J Cardiovasc Nurs* **7:** 14-29.
Collier PE (1995). Are one-day admissions for carotid endarterectomy feasible? *American Journal of Surgery* **170:** 140-143.

Duncan HD, Hodgkinson L, Deakin M & Green JR (1997). The safety of diagnostic and therapeutic ERCP as a daycase procedure with a selective admission policy. *European Journal of Gastroenterology & Hepatology* **9:** 905-908.

Murdock CJ, Ireland MA, Davis MJ & Platell M (1988). Day case cardiac catheterisation--a safe and economic alternative. *Australian & New Zealand Journal of Medicine* **18:** 833-835.

Murray NH & Rothman MT (1989). Day case cardiac catheterisation using the Sones technique. *International Journal of Cardiology* **24:** 9-11.

Pollard JB, Garnerin P & Dalman RL (1997). Use of outpatient preoperative evaluation to decrease length of stay for vascular surgery. *Anesthesia & Analgesia* **85:** 1307-1311.

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Tovar EA (2001). One-day admission for major lung resections in septuagenarians and octogenarians: a comparative study with a younger cohort. *European Journal of Cardio Thoracic Surgery* ***20:*** *449-454.*

Opinions

Foulger V (1997). Patients' views of day-case cardiac catheterisation. *Prof Nurse* **12:** 478-480.

Leeper B (1994). Commentary on Same-day admission for cardiac surgery: a benefit to patient, family, and institution [original article by Cella A et al appears in J CARDIOVASC NURS 1993;7(4):14-29]. *AACN Nursing Scan in Critical Care* **4:** 5-6.

Unknown relevance

Anderson A & Zimbra C (1986). Same day surgery: coordinating the admission process. *Nurs Manage* 17: 23-25.

Gaughan M & Sweeney E (1997). Take heart: setting up a pre-admission day. *Paediatric Nursing* 9: 22-23.

Kohn RM (1994). Same-day surgical admission. *Journal of the American College of Cardiology* 23: 551.

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APPENDIX 1

Copyright

Disclaimer

The information in this report is a summary of that available and is primarily designed to give readers a starting point to consider currently available research evidence. Whilst appreciable care has been taken in the preparation of the materials included in this publication, the authors and Southern Health do not warrant the accuracy of this document and deny any representation, implied or expressed, concerning the efficacy, appropriateness or suitability of any treatment or product. In view of the possibility of human error or advances of medical knowledge the authors and Southern Health cannot and do not warrant that the information contained in these pages is in every aspect accurate or complete. Accordingly, they are not and will not be held responsible or liable for any errors of omissions that may be found in this publication. You are therefore encouraged to consult other sources in order to confirm the information contained in this publication and, in the event that medical treatment is required, to take professional expert advice from a legally qualified and appropriately experienced medical practitioner.

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.

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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	exp surgery, cardiovascular/
5	or/1-4
6	(heart$ or cardi$ or thora$ or myocardi$ or coronary or angioplast$ or percardi).tw
7	surg$.tw
8	operat$.tw
9	procedur$.tw
10	surgery, elective/
11	surgical procedures, elective/
12	or/7-11
13	6 and 12
14	5 or 13
15	admission$.tw
16	admit$.tw
17	patient admission/
18	or/15-17
19	same day.tw
20	same-day.tw
21	day of surgery.tw
22	day of procedure.tw
23	day-case.tw or day case.tw
24	or/19-23
25	18 and 24
26	14 and 25
27	Limit 26- 1985 to 2001

Evidence Summary Therapy / Intervention Same day admission for cardiac surgery	**Study 1** Anderson RP, Guyton SW, Paull DL & Tidwell SL. (1993) Journal of thoracic Cardiovascular Surgery. 105:444-52	**Study 2** Calligaro KD, Dandura R, Dougherty MJ, DeLaurentis DA & Raviola CA. (1997) Same-day admissions and other cost-saving strategies for elective aortoiliac surgery. Journal of Vascular Surgery 25:141-4
STUDY DESIGN & NHMRC LEVELS OF EVIDENCE	Comparative study with concurrent controls Level III-2	Comparative study with historical controls Level III-3
DESCRIPTION: Patients (subjects), Intervention, Comparisons, Outcomes, Inclusion & Exclusion Criteria	**Patients (subjects):** Patients with chronic, stable, angina pectoris who had prior coronary arteriography presenting for coronary bypass operations. **Intervention:** Same day admission **Comparison:** Admission one day before procedure **Outcomes:** Adverse outcomes, length of stay, hospital charges, complications, death **Incl & Excl Criteria:** None stated	**Patients (subjects):** Patients admitted for elective infrarenal aortoiliac surgery (AoIS) **Intervention:** Admission on the day of surgery **Comparison:** Admission before the day of surgery **Outcomes:** Morbidity and mortality rates, length of hospital stay, hospital costs **Incl & Excl Criteria:** Patients were excluded for the following reasons: patients requiring admission before the day of surgery to optimise their medical status, patients that could not undergo preoperative testing on an elective outpatient basis, or transfers from another service or hospital.
VALIDITY: Methodology, rigour, selection	**Randomisation:** No **Blinding:** No **All patients accounted for:** Yes **Patients treated equally:** Yes for the operations. It is not clear whether the postoperative clinical pathway was applied to both groups. **Similar groups:** Allocation to groups was based on a preoperative evaluation performed by surgeons. Patients with high operative risk, comorbid conditions, or sicker were more likely to be allocated to the day before surgery admission.	**Randomisation:** No **Blinding:** No **All patients accounted for:** Yes **Patients treated equally:** With strategy to admit patients the day of surgery came a large concerted effort commencing Jan 1994 to decrease hospital costs in many other ways. This large hospital initiative may have resulted in patients being treated differently than the control group (admission prior to 1994) in ways other than the day of admission. More patients in the intervention group had surgery performed by the retroperitoneal approach and had epidural anaesthesia. **Similar groups:** Yes, for age, sex, race, diabetes, hypertension , hypercholesterolemia, pulmonary disease, cardiac disease, preoperative cardiac testing, renal insufficiency.
RESULTS: Generally favourable or unfavourable, specific outcomes of interest, estimate of experimental effect and precision if appropriate	There was no statistically significant difference in adverse outcomes (death, minor or major complications or pathway deviations) between the two groups. Mean length of stay was statistically significantly longer in the preoperatively admitted group than the same day admission group [7.55 (sd2.71) vs 6.02 (sd1.94), $p<0.001$]. There was no statistically significant difference in hospital charges between the two groups.	There were no statistically significant differences between the two groups for mortality; cardiac, pulmonary or renal complications; or readmission rates within 30 days. There were significant decreases in total length of stay (6.4 vs 11.2 days; $p<0.0001$), length of stay in intensive care unit (1.2 vs 2.3 days; $p<0.0001$) and hospital cost per patients ($34,198 vs $45,694; $p=0.001$) for the intervention group compared to the control group.

Evidence Summary Therapy / Intervention Same day admission for cardiac surgery	**Study 1 (cont…)** Anderson RP, Guyton SW, Paull DL & Tidwell SL. (1993) Journal of thoracic Cardiovascular Surgery. 105:444-52	**Study 2 (cont…)** Calligaro KD, Dandura R, Dougherty MJ, DeLaurentis DA & Raviola CA. (1997) Same-day admissions and other cost-saving strategies for elective aortoiliac surgery. Journal of Vascular Surgery 25:141-4
AUTHOR(S) CONCLUSIONS: Limitations, implications for practice and research	"Patients admitted selectively for same-day coronary bypass are not at risk for an increased number of complications. Although their hospital stay is reduced, the reduction of their hospital charges is minimal. Preoperative admission of patients with comorbidity requiring medical management or with physical incapacity remains justified, and admitting decisions should remain with the operating surgeons, not third parties."	"The majority of patients who require elective infrarenal aortoiliac surgery can be admitted the day of surgery and undergo early discharge with significant hospital cost savings and without apparent increase in morbidity or mortality rates."
OUR COMMENTS: Opportunity for bias, weakness and strength	**Weakness/es:** • The patients allocated to same-day surgery were the less serious cases so the results may be biased in favour of this group. • Groups were not randomised • The groups received potentially different post operative treatment **Strength/s:** • All patients were accounted for and there appears to be no loss to follow up.	**Weakness/es:** • Patients in the two groups were treated differently in ways other than the intervention • The groups were not randomised and controls were historical **Strength/s:** • It appears that there was no loss to follow up

Evidence Summary Therapy / Intervention Same day admission for cardiac surgery	**Study 3** Arom KV, Emery RW, Petersen RJ & Schwartz M. (1996) Patient characteristics, safety, and benefits of same-day admission for coronary artery bypass grafting. Annals of Thoracic Surgery 61:1136-40.	**Study 4** Musser DJ, Callifaro KD, Dougherty MJ, Raviola CA, DeLaurentis DA. (1996) Safety and cost efficiency of 24-hour hospitalisation for carotid endarterectomy. Annals of Vascular Surgery
STUDY DESIGN & NHMRC LEVELS OF EVIDENCE	Comparative study with historical controls Level III-3	Comparative study with historical controls Level III-3
DESCRIPTION: Patients (subjects), Intervention, Comparisons, Outcomes, Inclusion & Exclusion Criteria	**Patients (subjects):** Patients who underwent coronary artery bypass grafting without coronary angiographic study **Intervention:** Same day admission **Comparison:** Non-same day admission **Outcomes:** Mortality, length of stay and total charges **Incl & Excl Criteria:** None stated	**Patients (subjects):** Patients undergoing elective carotid endarterectomies (CEA) **Intervention:** Patients admitted after the introduction of a critical pathway for CEA (aiming to increase quality of patient care, improve efficiency and decrease cost) **Comparison:** Patients admitted prior to the introduction of a critical pathway for CEA **Outcomes:** Mortality, neurological and cardiac complications, same day admission, duration of stay and hospital charges. **Incl & Excl Criteria:** The following patients were excluded: patients undergoing emergency surgery, inpatients referred for surgery, those who required preoperative anticoagulation therapy, and patients undergoing combined CEA and coronary artery bypass grafting
VALIDITY: Methodology, rigour, selection	**Randomisation:** No **Blinding:** No **All patients accounted for:** Not stated, unable to determine **Patients treated equally:** Yes, although the historical nature of the study makes this difficult to assess **Similar groups:** No, patients in the same day admission group were in lower risk categories, younger, and included more males. Patients in the non-same day admission group were more often in the New York Heart Association functional class IV, had more existing chronic obstructive pulmonary disease, more acute infarcts within 7 days of the procedure, more intraoperative intraaortic balloon support, more ventilation, more pneumonia post operatively, and higher operative mortality.	**Randomisation:** No **Blinding:** No **All patients accounted for:** Yes **Patients treated equally:** The patients were admitted in different time periods and the critical pathway concerned many aspects of treatment other than same day admission. It is likely that the groups were treated differently in ways other than the intervention. **Similar groups:** Yes, for age, gender, type of stenosis and symptoms

Evidence Summary Therapy / Intervention Same day admission for cardiac surgery	**Study 3 (cont…)** Arom KV, Emery RW, Petersen RJ & Schwartz M. (1996) Patient characteristics, safety, and benefits of same-day admission for coronary artery bypass grafting. Annals of Thoracic Surgery 61:1136-40.	**Study 4 (cont…)** Musser DJ, Callifaro KD, Dougherty MJ, Raviola CA, DeLaurentis DA. (1996) Safety and cost efficiency of 24-hour hospitalisation for carotid endarterectomy. Annals of Vascular Surgery
RESULTS: Generally favourable or unfavourable, specific outcomes of interest, estimate of experimental effect and precision if appropriate	Total length of stay was lower for the same day admission group than the non same-day admission group (7.1 vs 9.9; p=0.01). ICU length of stay was lower for the same day admission group (1.4 vs 2.7; p=0.1). The shorter length of stay for same day admission patients translated into an average of US$6,600 less charge per patient.	Forty patients were included in the control group and 68 in the intervention group. The mortality rates were similar with one death occurring in each group. Neurological events occurred in one patient from the control group and two patients from the intervention group. No patient in either group had post operative cerebrovascular accident (CVA). There was one cardiac event in the control group and two in the intervention group. No patients in the control group were readmitted within 30 days and one patient in the intervention group was readmitted. The rate of same day admission increased from 5% in the control group to 94% in the intervention group. Hospital stay decreased from 5.1 days to 1.3 days (P<0.0001). The average hospital charge per patients was US$23,231 for the control group and US$17,721 for the intervention group.
AUTHOR(S) CONCLUSIONS: Limitations, implications for practice and research	"There was no increase in preoperative, intraoperative, or post operative complications in the same-day admission patients. Same-day admission was safe and cost-effective and could be carried out as a routine admission for several selected groups of patients."	"We conclude that hospital costs can be significantly reduced for most patients undergoing CEA when they are admitted on the day of surgery and discharged the following morning, with no negative impact on morbidity and mortality,"
OUR COMMENTS: Opportunity for bias, weakness and strength	**Weakness/es:** • The intervention group were younger and less sick than the control group which biases the results in favour of the same day admission group. • The study was retrospective and therefore more prone to bias	**Weakness/es:** • It is likely that the two groups were treated very differently in ways other than same day admission • The groups were not randomised • The study was retrospective **Strength/s:** • There was no loss to follow up • The groups appeared similar at the start of the study

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).