The intermediate CCU admission: a preliminary study
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Record Status
This is a critical abstract of an economic evaluation that meets the criteria for inclusion on NHS EED. Each abstract contains a brief summary of the methods, the results and conclusions followed by a detailed critical assessment on the reliability of the study and the conclusions drawn.

Health technology
The health intervention examined in the study was intermediate coronary care unit (ICCU) admission of patients at risk of coronary disease.

Type of intervention
Treatment (hospital care unit).

Economic study type
Cost-effectiveness analysis.

Study population
The study population comprised intermediate-risk patients, defined as those having a high likelihood of coronary disease and characterised by having rest pain or progressive Canadian Cardiovascular Society (CCS) Scale Class III or IV angina, or having minor electrocardiogram changes. In particular, the diagnosis of unstable angina was based on the following criteria: development of an ischemic type of chest pain, lasting more than 20 minutes and occurring when the patient was at rest; presence of progressive angina characterised by exert ional ischemic pain increasing in frequency, duration, or at decreasing levels of physical exertion; and shortness of breath associated with ST depression or T wave inversion felt by the attending physician to be an angina equivalent. Patients were excluded if: aged over 70 years with either recent myocardial infarction (MI) or any two of either ongoing pain, ST depression greater than 1 mm, or diabetes; presenting heart failure or hypotension (systolic blood pressure less than 90 mm Hg).

Setting
The setting was hospital. The economic study was carried out at the Rush-Presbyterian-St. Luke's Medical Center, Chicago, Illinois, USA.

Dates to which data relate
Data on effectiveness and resource use were gathered between June 1992 and April 1994. No price year was reported.

Source of effectiveness data
A single study was used as the source of the effectiveness evidence.

Link between effectiveness and cost data
The costing was performed retrospectively on the same patient sample as that used in the effectiveness study.

Study sample
Power calculations were not performed. Patient allocation to the study groups was made at the moment of admission by
the attending physician. Of a total of 393 patients, a final sample of 243 patients was included in the study: 109 patients (mean age: 60 +/- 17 years, 55% men; 66% with hypertension) in the ICCU group and 134 patients (mean age: 57 +/- 17 years; 56% men; 58% with hypertension) in the CCU group.

Study design
This was a case-control study, carried out in a single centre, the Rush-Presbyterian-St. Luke's Medical Center, Chicago, Illinois, USA. Although patients were prospectively admitted to the CCU or ICCU, the authors stated that the study was carried out retrospectively as auditing of data collection was conducted retrospectively. Patients were not followed after discharge from the hospital.

Analysis of effectiveness
The analysis was based on treatment completers only. The primary health outcome assessed in the analysis was a composite end point of death or MI after the first 24 hours. Secondary health outcomes were death, MI after the first 24 hours, major cardiac complications, such as congestive heart failure, ventricular tachycardia, or ventricular fibrillation. Study groups were shown to be comparable at baseline in terms of age, gender, and most clinical conditions. However, there was a statistically significantly higher frequency of tobacco users and a minor frequency of T-wave inversions in the ICCU group in comparison with CCU patients.

Effectiveness results
The effectiveness results were as follows:

The incidence of the composite end point of death or MI after the first 24 hours was 5% in the ICCU group and 3% in the CCU group, (p=0.511).

The incidence of MI was 5% in the ICCU group and 2% in the CCU group, (p=0.151).

The incidence of death was 0 in the ICCU group and 2% in the CCU group, (p=0.2).

The incidence of major cardiac complications was 17% in the ICCU group and 10% in the CCU group, (p=0.113).

Clinical conclusions
There was no statistically significant difference in any of the outcome measures used in the effectiveness analysis.

Measure of benefits used in the economic analysis
No summary benefit measure was used in the economic analysis, as there were no statistically significant differences in any of the outcome measures. The benefits were, however, those reported in the effectiveness results above. The economic analysis was based, therefore on a cost-minimisation approach.

Direct costs
Discounting was not conducted as costs were incurred over a short period of time. Unit costs were not reported, but quantities of resources used were. The health services included in the economic evaluation were cardiac medications (aspirin, heparin, intravenous nitroglycerin, and beta-blockers), coronary angiography, percutaneous transluminal coronary angioplasty, coronary surgery, and length of hospital stay. The cost/resource boundary adopted was that of the hospital. The estimation of quantities was based on the effectiveness study. The main source of cost data was the hospital financial information system, which reported charges. A cost-to-charge ratio, specific to the study hospital, was then used to assess true costs of the service. Quantities of resources used were gathered between June 1992 and April 1994. No price year was reported.
**Statistical analysis of costs**
Standard statistical analyses of costs were conducted to test for statistical significance of the estimated costs.

**Indirect Costs**
Indirect costs were not included in the analysis.

**Currency**
US dollars ($).

**Sensitivity analysis**
No sensitivity analyses were performed.

**Estimated benefits used in the economic analysis**
Please refer to the effectiveness results reported earlier.

**Cost results**
The cost results were as follows:

Among the resources used, only the use of intravenous nitroglycerin was significantly higher in the CCU in comparison with the ICCU.

Total hospital costs were $10,619 +/- $8,732 in the ICCU group and $13,481 +/- $9,450 in the CCU group and the difference was statistically significant, (p=0.015).

When charges per cost centre were considered, expenses were generally lower in the ICCU group: total charges were $20,216 +/- $17,537 in the ICCU group and $24,898 +/- $20,216 in the CCU group, (p=0.049).

**Synthesis of costs and benefits**
Costs and benefits were not combined as a cost-minimisation analysis was carried out.

**Authors’ conclusions**
The authors concluded that their preliminary analysis confirmed the feasibility of AHCPR guidelines. The ICCU admission proved to be a safe alternative to standard CCU admission for patients at risk of coronary disease. It also led to significant cost-savings from the perspective of the hospital.

**CRD COMMENTARY - Selection of comparators**
The rationale for the choice of the comparator was clear. CCU admission was selected as it represented the standard management procedure for patients at risk of coronary disease. You, as a user of this database, should decide whether it is a widely used admission procedure in your own setting.

**Validity of estimate of measure of effectiveness**
The analysis of the effectiveness was based on a case-control study, which was appropriate for the study question, although the retrospective design may have limited the internal validity of the analysis. The study sample appears to have been representative of the study population. The authors noted that selection bias may have occurred and study groups were not perfectly comparable at baseline, thus the study results may have been affected. No statistical analyses were conducted to assess the possible impact of confounding factors, such as T-wave inversion, which is generally
considered as a potential identifier of coronary disease and "may have influenced the decision of where to admit the patients". Indeed, the recommendation to admit the patients to the ICCU was based on AHCPR guidelines, which, as the authors acknowledge, were based on consensus, and not on any real clinical evidence.

Validity of estimate of measure of benefit
The authors did not derive a summary measure of health benefit as no statistically significant difference was found in terms of outcome measure across the study groups. The analysis was therefore categorised as a cost-consequences study (see validity of effectiveness comments above).

Validity of estimate of costs
The analysis of costs appears to have been conducted from the perspective of the hospital and all relevant categories of costs were included in the analysis. Quantities of resources were appropriately reported, but unit costs were not. The source of cost data was given and a cost-to-charge ratio was applied to derive the true costs of the interventions, making the results more representative of opportunity costs and therefore more generalisable. Statistical analyses were conducted on costs and quantities of resources used. No price year was reported, thus making reflation exercises to other settings difficult to perform. The authors noted that the estimated costs were quite specific to the study setting. Sensitivity analyses were not performed on costs.

Other issues
Although the authors made several comparisons of their findings with those from other studies, the issue of the generalisability of the study results was not addressed. As neither unit costs nor price year were reported, the external validity of the analysis was somewhat limited. A sample of patients at intermediate risk of coronary disease was enrolled in the study and this was reflected in the conclusions of the analysis. The authors noted the main potential limitation of the study, which was selection bias, as reported above.

Implications of the study
The authors noted that, although their study showed the safety and convenience of ICCU admission, "CCU admission should always be considered for higher risk patients with hemodynamic instability, heart failure, and refractory pain". Further research should be based on a large trial.

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