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Systematic Review of Economic Evaluations of Units Dedicated to Acute Coronary Syndromes

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ABSTRACT

Background: Dedicated units for the care of acute coronary syndrome (ACS) have been submitted to economic evaluations; however, the results have not been systematically presented. **Objectives:** To identify and summarize economic outcomes of studies on hospital units dedicated to the initial care of patients with suspected or confirmed ACS. **Methods:** A systematic review of literature to identify economic evaluations of chest pain unit (CPU), coronary care unit (CCU), or equivalent units was done. Two search strategies were used: the first one to identify economic evaluations irrespective of study design, and the second one to identify randomized clinical trials that reported economic outcomes. The following databases were searched: MEDLINE, EMBASE, CENTRAL, and National Health Service (NHS) Economic Evaluation Database. Data extraction was performed by two independent reviewers. Costs were inflated to 2012 values. **Results:** Search strategies retrieved five partial economic evaluations based on observational studies, six randomized clinical trials that reported economic outcomes, and five model-based economic evaluations. Overall, cost estimates based on observational studies and randomized clinical trials reported statistically significant cost savings of more than 50% with the adoption of CPU care instead of routine hospitalization or CCU care for suspected low-to-intermediate risk patients with ACS (median per-patient cost US $1,969.89; range US $1,002.12–13,799.15). Model-based economic evaluations reported incremental cost-effectiveness ratios below US $ 50,000/quality-adjusted life-year for all comparisons between intermediate care unit, CPU, or CCU with routine hospital admissions. This finding was sensible to myocardial infarction probability. **Conclusions:** Published economic evaluations indicate that more intensive care is likely to be cost-effective in comparison to routine hospital admission for patients with suspected ACS.

Keywords: Chest pain unit, coronary care unit, systematic review, cost effectiveness, CPU, CCU.

Introduction

Chest pain units (CPUs) and coronary care units (CCUs) have evolved since the 1960s as alternatives to conventional hospital admission for patients with suspected or confirmed acute coronary syndrome (ACS) [1–4]. Despite some overlapping characteristics, CCU refers to more intensive and specialized care delivered preferentially to higher-risk (Thrombolysis in Myocardial Infarction risk score of >4) patients with ACS, whereas CPU refers to less intensive and specialized care designed for observation and risk stratification of lower-risk patients with suspected ACS. Such units have incorporated progress in chest pain evaluation and in ACS management, such as protocol-oriented drug administration, cardiac monitoring, serial electrocardiogram, serial measurements of cardiac biomarkers, systematic use of noninvasive tests for indeterminate cases, and prompt access to cardiac catheterization laboratory and to reperfusion therapies when indicated [5,6].

Both observational studies and clinical trials have evaluated the effects of dedicated units on clinical and economical outcomes in comparison to other dedicated units or to routine emergency department evaluation and subsequent hospitalization [7–14]. Based on the results of individual studies, it is generally accepted that dedicated units are capable of reducing resource utilization without adversely affecting patient outcomes [6,10,15].

Systematic reviews of economic evaluations have had their utility questioned in recent years. In fact, decision-analytic models are usually designed to represent a health care system's particular circumstances. This limits the external validity of economic models and makes systematic reviews of economic evaluations unlikely to be useful in many instances [16–18].

However, knowledge of approaches adopted for the economic evaluation of systems of care and complex interventions is useful. Dedicated units for ACS evaluation provide a good case study for the challenging task of developing decision-analytic studies for soft technologies in health care [19,20].

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Table 1 – Economic evaluation search strategy for MEDLINE (Ovid).

No.	Search terms
1	economics/
2	exp "costs and cost analysis"/
3	economics, dental/
4	exp "economics, hospital"/
5	economics, medical/
6	economics, nursing/
7	economics, pharmaceutical/
8	(economic$ or cost or costs or costly or costing or price or prices or pricing or pharmacoeconomic$).ti,ab.
9	(expenditure$ not energy).ti,ab.
10	(value adj1 money).ti,ab.
11	budget$.ti,ab.
12	or/1-11
13	((energy or oxygen) adj cost).ti,ab.
14	(metabolic adj cost).ti,ab.
15	((energy or oxygen) adj expenditure).ti,ab.
16	or/13-15
17	12 not 16
18	exp acute coronary syndrome/ or "acute coronary syndrom$".mp. [mp=title, abstract, original title, name of substance word, subject heading word, protocol supplementary concept, rare disease supplementary concept, unique identifier]
19	exp myocardial infarction/ or "myocardial infarction".mp. [mp=title, abstract, original title, name of substance word, subject heading word, protocol supplementary concept, rare disease supplementary concept, unique identifier]
20	exp angina, unstable/ or "unstable angina".mp. [mp=title, abstract, original title, name of substance word, subject heading word, protocol supplementary concept, rare disease supplementary concept, unique identifier]
21	or/18-20
22	"coronary uni$".mp. [mp=title, abstract, original title, name of substance word, subject heading word, protocol supplementary concept, rare disease supplementary concept, unique identifier]
23	exp coronary care units/ or "coronary care uni$".mp. [mp=title, abstract, original title, name of substance word, subject heading word, protocol supplementary concept, rare disease supplementary concept, unique identifier]
24	"coronary care observation uni$".mp. [mp=title, abstract, original title, name of substance word, subject heading word, protocol supplementary concept, rare disease supplementary concept, unique identifier]
25	"coronary observation unit".mp. [mp=title, abstract, original title, name of substance word, subject heading word, protocol supplementary concept, rare disease supplementary concept, unique identifier]
26	"chest pain unit".mp. [mp=title, abstract, original title, name of substance word, subject heading word, protocol supplementary concept, rare disease supplementary concept, unique identifier]
27	or/22-26
28	17 and 21 and 27

The objectives of the present review were to 1) identify and summarize economic evaluations of CCU, CPU, and equivalent units and 2) inform the development of novel decision-analytic models on the subject of the cost-effectiveness of units dedicated to the care of patients with ACS.

Methods

Search Strategy

We aimed at identifying economic evaluations of units dedicated to the care of patients with ACS. Two search strategies were devised: the first one to identify economic evaluations irrespective of study design, and the second one to identify randomized controlled trials that reported economic outcomes of such units.

Search for economic evaluations in general included the following electronic bibliographic databases: MEDLINE (1966 to August 2014), EMBASE (1988 to November 2013), and National Health Service (NHS)-Economic Evaluation Database (up to August 2014). Search for clinical trials was performed in MEDLINE, EMBASE CENTRAL, and Clinical Trials.org. There was no language restriction.

Appropriate search terms were used to identify studies on ACS in general, myocardial infarction (MI), or unstable angina. To maximize search sensitivity, the following terms were used in the search strategy: coronary care unit, coronary unit, coronary care observation unit, cardiac observation unit, chest pain unit, chest pain center, and chest pain observation unit.

To identify economic evaluation studies, we used the NHS-Economic Evaluation Database search filter for MEDLINE and EMBASE, which have been reported to yield a sensitivity of 99% [18]. The complete search strategy for economical evaluations used in MEDLINE (Ovid) is presented in Table 1. A similar search strategy was used in EMBASE. In addition, a highly sensitive string of words proposed by Haynes et al. [21] was used in the search for randomized controlled trials. Manual search from the reference lists of the selected articles was performed.

We defined the following inclusion criteria for formal review:

- Intervention of interest: studies on units dedicated to the care of patients with suspected or confirmed ACS, (2) cardiac monitoring capability, and (3) dedicated staff;
- Type of studies: economical evaluations of any type.

Data Abstraction and Analysis

Data abstraction was performed by two independent reviewers (A.L.F.A.S. and S.P.). Disagreements were resolved by consensus.