Specialist or generalist care? A study of the impact of a selective admitting policy for patients with cardiac failure

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Abstract

Context. The debate on the respective roles of medical specialists and generalists has tended to portray them as alternatives, rather than seeking ways to build on the complementary skills of these professional groups.

Objective. We wished to evaluate the impact of a selective admitting policy that attempts to exploit the complementary strengths of specialists and generalists.

Design. Prospective cohort study of patients admitted to hospital with congestive heart failure.

Setting. Public hospital in New South Wales, Australia.

Patients. Subjects aged 60 years or more with congestive heart failure defined by the Framingham criteria (see Appendix).

Intervention. A selective admission policy which referred patients with identifiable single system disorders to the relevant subspecialist, while patients with multiple medical problems were admitted under a general physician.

Main outcome measures. Length of hospital stay, survival, quality of life and satisfaction with care.

Results. Two-hundred and seventy-five patients with congestive heart failure were followed up from admission to 1 year after discharge from hospital. Of these, 102 were cared for by cardiologists and 154 by generalists. The patients under the generalists were older, had greater co-morbidity, but appeared to have less severe cardiac disease than those cared for by cardiologists. The use of cardiac drugs and investigations was similar in the two groups. The generalists’ patients had a longer length of hospital stay, but the cardiologists’ patients had a higher mortality during the early follow-up period. There were no differences in levels of satisfaction with care or in health-related quality of life between the two groups of patients. Multivariate analysis suggested that any differences in outcomes between the two groups of patients were due to the severity of underlying disease, and co-morbidity, rather than the quality of care that was provided by the physicians.

Conclusions. It is possible to implement a hospital admission policy that selectively refers patients with congestive heart failure to specialists or generalists, according to the presence of co-morbid conditions, without adversely affecting the outcomes of care. Such a policy should represent optimum use of the complementary skills of these professional groups.

Keywords: cardiac failure, generalist, hospital admitting policy, specialist

In many countries general internal medicine specialists have been the mainstay of medical care, particularly in district general and small to medium-sized teaching hospitals. However, the last two decades has seen a shift to subspecialization, with a weakening of the role of the generalist. Ironically, this has come at a time when the underlying trend in the population of hospital in-patients has been towards complex, multisystem disorders requiring medium and long-term care, rather than patients with single system disease for whom rapid investigation and treatment by procedural specialists is appropriate [1].

The major differences between these two approaches to care lie in their knowledge, skills and attitude to patient management. Generalists’ skills are predominantly non-invasive, and their approach to the investigation and management of patients with chronic and/or multi-disciplinary...
problems is holistic. Specialists have knowledge in depth and apply a reductionist approach, and often invasive skills, to a single discipline [2,3].

The debate on the role of the two disciplines has tended to focus on the differences between these disciplines, rather than looking at ways in which health care services can utilize the strengths of both [4–6]. In developing and assessing referral policies that aim to capitalize on the strengths of different clinical disciplines, congestive heart failure (CHF) is an appropriate condition to study. It is a chronic disorder, is a common reason for admission to hospital, and is associated with high morbidity and markedly impaired survival. The costs of managing patients with CHF are high, and there have been substantial improvements in management in recent years [7–11].

As part of a study of the epidemiology of CHF [12] an opportunity arose to measure the effects of a newly implemented, selective admitting policy within the Division of Medicine at John Hunter Hospital (New South Wales, Australia). The policy was designed to provide a framework for the admission of medical patients under either specialists or generalists as an alternative to a ‘gatekeeper’ model. In the ‘gatekeeper’ model all patients are admitted under a generalist and triaged to specialist care or remain under the care of the generalist who makes the final decision on whom the caring physician should be. This model was unacceptable to local specialists. Under the policy at John Hunter patients in whom the admitting diagnosis seems to be confined to conditions in one subspeciality are referred for admission by the emergency department to the care of the appropriate subspecialist, whereas patients in whom the significant management issues lie in more than one subspecialty field are admitted under the care of general internal medicine specialists (generalists). Patients cared for by a named physician within the last 12 months usually return to the care of that physician. When the policy was introduced, some staff expressed concern as to whether the policy could be implemented, and whether it might lead to adverse outcomes for patients. To address these questions we compared the patterns and outcomes of care provided to cohorts of patients with CHF treated by generalists and specialists.

### Methods

This was a prospective cohort study of all patients admitted over a 7-month period to the John Hunter Hospital in whom CHF was considered to be the main reason for hospitalization. Full details of the methods used in this study have been published elsewhere [12,13]. In evaluating the outcomes of care for CHF in this study, we recognized that differences in case-mix would probably confound the relationships between care and outcomes. We attempted to adjust for this using multivariate modelling to assess the importance of certain factors in explaining differences in outcome. The outcomes we studied were: length of stay (LOS), unplanned readmission, disease-specific quality of life (QOL), patient satisfaction and survival. Our main hypothesis was that cardiologists would manage CHF more effectively than generalists. This would be confirmed by a shorter LOS, lower unplanned readmission rates, higher disease-specific QOL and patient satisfaction. We also hypothesized that specialists would investigate and treat their patients more aggressively than generalists.

### Study hospital and admissions policy

The John Hunter Hospital is a 495-bed teaching hospital with both district general hospital and tertiary referral roles. Medical patients are cared for either by specialists or general physicians. The admission policy preferentially refers patients treated by generalists and specialists. Those with predominantly single organ disease are cared for by specialists (see Table 1). General physicians have extended training in internal medicine as well as a medical specialty and invite consultation from fellow specialists as necessary.

### Case definition and identification

Patients over the age of 60 years admitted as medical emergencies and living in the Hunter Region of New South Wales were included. In the study hospital physicians make the diagnosis of CHF on the basis of clinical and radiological criteria, and do not routinely perform investigations of ventricular function. Consequently we used a ‘pragmatic’ case definition. Eligible cases were consecutive patients admitted to the study hospital where the resident medical officer and the consultant in charge of the case were in agreement that admission was necessary for the management of CHF. Having
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identified potential cases through this process two research nurses applied the Framingham criteria to determine eligibility for the study [14].

Case recruitment

An intensive case finding strategy was developed, and has been described previously [12]. Informed consent was obtained from all participants after oral and written explanation of the purpose and requirements of the study. Study methods were approved by the Hunter Area Research Ethics Committee. At the end of the study, medical records of all patients were audited to confirm study eligibility.

Data collection methods

Full descriptions of the data collection methods are provided elsewhere [12,13]. A data collection form was developed after review of the relevant literature to identify possible predictors of outcome of management of CHF. Study nurses extracted data from medical records and carried out structured interviews to obtain additional information on past medical history, social support, and recent medication use. Subjects were questioned about recent symptomatology in order to grade their functional status according to the New York Heart Association (NYHA) classification [15]. Patients received QOL and satisfaction questionnaires [13]. The former was based on an instrument originally developed by Guyatt et al. [16], and subsequently developed, and validated, for use in Australia by Lim et al. [17]. The patient satisfaction instrument was specially developed for use in this study [13]. We derived a weighted co-morbidity index using a modification of the method described by Charlson [12,18].

Follow-up

QOL questionnaires were posted to patients, and family practitioners (who provide all routine care outside hospital) were contacted at 28 days, 6, 12 and 24 months, to identify deaths and confirm current medication and intervening hospital admissions, and any cardiac investigations. Deaths were also identified from the death and funeral notices of the local newspaper. Routinely collected ICD9-CM and Australian National Diagnosis Related Group data were abstracted from the hospital central computer system which was also used to confirm data on re-admissions at John Hunter and other hospitals in the area.

Statistical analysis

We first carried out univariate analysis of study factors using LOS and unplanned re-admission and mortality as the outcome variables. These analyses included social factors and co-morbidity, as well as physical examination, laboratory tests, and drug use prior to admission and during hospitalization. For LOS, initial candidate factors were reduced to provide a simpler model based on univariate analyses and clinical relevance after review of the full logistic model. The original variables were evaluated in relation to unplanned 28-day readmission rates (including LOS quartiles in the model), readmission within 365 days, and mortality at 28 days and 365 days. In the case of data on QOL and patient satisfaction, factor analysis was carried out as described elsewhere [13] to confirm that the questionnaires performed according to the structure hypothesized. Data were normally distributed and differences between the mean values for the cohorts cared for by generalists and specialists were assessed by t-tests. LOS data were approximately log-normally distributed and analysed accordingly. Survival analysis methods were used to allow for censoring of patients who died in hospital. Multivariate logistic regression was used to model 28-day re-admission, 28-day mortality and 1-year mortality. Initially 19 variables were used as co-variates in the models. These variables represented social factors, co-morbidity, clinical findings, results of routine laboratory tests, and drug use prior to admission and during hospitalization. A stepwise (backstepping) process was then used to identify a reduced model. A number of factors were excluded because they were represented in the weighted co-morbidity index. All analyses were done using SAS (SAS Institute Inc. Cary, NC, USA).

Results

Two-hundred and fifty-seven patients were admitted to John Hunter Hospital during the study period and are the subject of this report. Results of the full study are published elsewhere [12]. Patient characteristics at John Hunter Hospital did not differ significantly from those in the whole study. One-hundred and fifty-four of these were cared for by six general physicians and 103 by 13 cardiologists. Data were incomplete, or consent not given, in 11 cases. Just over half of each group (52%) were well enough to complete QOL and satisfaction questionnaires, and agreed to repeat these at follow-up. At 2 years, follow-up was 99% of the whole cohort. The mean age of patients was 77 years (range 60–95 years). The sexes were almost equally represented, and 98% of patients had NYHA functional grades of 3 or 4 on admission. Forty-eight per cent reported that this was their first admission for heart failure.

Comparison of the two patient groups

There were considerable clinical differences between the patients cared for by the two groups of physicians (Table 2). Patients admitted under general physicians were older and more likely to have impaired renal function and chest infections. The prevalence of diabetes mellitus was higher in the patients cared for by generalists, but this difference did not reach statistical significance. Forty-seven per cent of patients admitted under the cardiologists had a co-morbidity score greater than one, whereas 70% of patients admitted under the general physicians had an elevated score. Sixteen per cent of patients admitted under the general physicians had either previously seen a cardiologist or were seen by one during or after admission.

Patients admitted under the cardiologists appeared to have
Table 2  Comparison of clinical variables for patients with CHF cared for by generalists and specialists

<table>
<thead>
<tr>
<th>Variable</th>
<th>Specialists (n = 102)</th>
<th>Generalists (n = 154)</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean age (years)</td>
<td>75.5</td>
<td>77.6</td>
<td>0.007</td>
</tr>
<tr>
<td>Mean serum creatinine (µmol/l) (range)</td>
<td>0.11 (0.04–0.33)</td>
<td>0.17 (0.05–1.04)</td>
<td>0.0001</td>
</tr>
<tr>
<td>Chest infection on admission</td>
<td>12 (12%)</td>
<td>35 (23%)</td>
<td>0.027</td>
</tr>
<tr>
<td>Diabetes mellitus</td>
<td>16 (16%)</td>
<td>31 (21%)</td>
<td>0.46</td>
</tr>
<tr>
<td>First admission with heart failure</td>
<td>58 (57%)</td>
<td>70 (47%)</td>
<td>0.10</td>
</tr>
<tr>
<td>Previous acute myocardial infarction</td>
<td>44 (44%)</td>
<td>46 (31%)</td>
<td>0.04</td>
</tr>
<tr>
<td>Recent acute myocardial infarction</td>
<td>21 (21%)</td>
<td>7 (5%)</td>
<td>0.0001</td>
</tr>
<tr>
<td>Left ventricular fractional shortening</td>
<td>27% (SD = 11.6)</td>
<td>31% (SD = 11.9)</td>
<td>0.11</td>
</tr>
<tr>
<td>Atrial fibrillation</td>
<td>24 (25%)</td>
<td>50 (34%)</td>
<td>0.16</td>
</tr>
<tr>
<td>Left bundle branch block</td>
<td>21 (22%)</td>
<td>20 (13%)</td>
<td>0.09</td>
</tr>
</tbody>
</table>

1 n = 40 for specialists, 37 for generalists.

Table 3  Use of cardiac drugs at discharge by patients cared for by generalists and specialists

<table>
<thead>
<tr>
<th>Drug use on discharge</th>
<th>Specialists</th>
<th>Generalists</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACE inhibitors</td>
<td>68%</td>
<td>65%</td>
<td>0.75</td>
</tr>
<tr>
<td>Digoxin</td>
<td>44%</td>
<td>39%</td>
<td>0.49</td>
</tr>
<tr>
<td>Aspirin</td>
<td>33%</td>
<td>45%</td>
<td>0.09</td>
</tr>
<tr>
<td>β-blockers</td>
<td>6%</td>
<td>14%</td>
<td>0.06</td>
</tr>
<tr>
<td>Antiarrhythmics</td>
<td>5%</td>
<td>5%</td>
<td>0.85</td>
</tr>
</tbody>
</table>

Outcomes

Patient’s perceptions of their QOL on discharge from hospital are shown in Table 4. Higher scores indicate better QOL. The relatively low scores in the physical domain reflect the poor overall health of these patients. Neither in this domain, nor overall, were there any differences between the two groups at discharge, nor at any time during follow-up. Both groups of patients expressed satisfaction with the level of physical and emotional care received while in hospital, with 64% of respondents expressing full satisfaction with the overall level of care. There were no differences in average levels of satisfaction reported by the patients of the two physician groups: cardiologists, 1.39, generalists, 1.47 (P = 0.186; range 1–4; 1 = highly satisfied) There was some dissatisfaction regarding information about discharge. Forty-two per cent of patients cared for by cardiologists and 46% of those cared for by generalists felt that they were given all of the information about what level of health they could expect in coming months. Forty-nine per cent of cardiologists’ patients and 43% of generalists’ patients felt that they had received all of the information they needed about what activities they would be capable of after discharge. Neither of these differences was statistically significant.

Investigations and treatment

A total of 62 patients cared for by cardiologists (61%) and 96 patients cared for by general physicians (62%) had either an echocardiogram or radionuclide scan to determine left ventricular ejection fraction either during hospital admission or in the year prior to admission. General physicians were more likely to order a radionuclide scan (26 tests, 17%) than cardiologists (six tests, 6%). From admission to follow-up at 12 months, cardiologists (40 tests, 39%) did more echocardiograms than general physicians (37 tests, 24%). Only four patients underwent coronary artery bypass grafting during the study period; a cardiologist cared for all. The use of cardiac drugs by cardiologists and general physicians was similar (see Table 3).
Table 4  Quality of life at discharge from hospital in patients cared for by generalists and specialists

<table>
<thead>
<tr>
<th>Domain</th>
<th>Specialists</th>
<th>Generalists</th>
</tr>
</thead>
<tbody>
<tr>
<td>Help/physical (11–77)</td>
<td>32 (8)</td>
<td>37 (9)</td>
</tr>
<tr>
<td>Emotional (13–91)</td>
<td>45 (15)</td>
<td>51 (18)</td>
</tr>
<tr>
<td>Social (7–49)</td>
<td>20 (6)</td>
<td>24 (8)</td>
</tr>
<tr>
<td>Global score (25–175)</td>
<td>102 (28)</td>
<td>118 (35)</td>
</tr>
</tbody>
</table>

Table 5  Comparison of unadjusted outcomes for patients cared for by generalists and specialists

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Specialists</th>
<th>Generalists</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOS (mean, SD)</td>
<td>9.6 (7.8)</td>
<td>12.3 (12.9)</td>
<td>0.03</td>
</tr>
<tr>
<td>Re-admissions at 28 days¹</td>
<td>18 (20%)</td>
<td>25 (18%)</td>
<td>0.75</td>
</tr>
<tr>
<td>Re-admissions at 1 year²</td>
<td>26(29%)</td>
<td>55(37%)</td>
<td>0.16</td>
</tr>
<tr>
<td>Deaths in hospital</td>
<td>12 (11%)</td>
<td>6 (4%)</td>
<td>0.03</td>
</tr>
<tr>
<td>Deaths 28 days after discharge</td>
<td>16 (16%)</td>
<td>8 (6%)</td>
<td>0.01</td>
</tr>
<tr>
<td>Deaths 180 days after discharge</td>
<td>30 (29%)</td>
<td>32 (22%)</td>
<td>0.15</td>
</tr>
<tr>
<td>Deaths 365 days after discharge</td>
<td>38 (37%)</td>
<td>47 (32%)</td>
<td>0.33</td>
</tr>
</tbody>
</table>

¹ Excludes patients who died during index admission and day only admissions.

**Multivariate analysis**

The difference in LOS between the two cohorts was not significant after adjustment for the other study factors that differed between the two groups of patients. If a specialist cardiologist was the principal care giver, adjusted LOS was reduced by only 5% [95% confidence interval (CI) 23–17%; \( P=\text{n.s.} \)] when adjusted for factors including co-morbidity, use of angiotensin converting enzyme inhibitors, NYHA grade and whether or not the admission was the first with heart failure. The principle factor affecting LOS was co-morbidity, which increased LOS by 33%.

After adjustment, early mortality remained significantly higher amongst patients cared for by cardiologists, both in hospital [odds ratio (OR), 3.1; 95% CI, 1.1–8.6], and at 28 days after discharge (OR, 4.3; 95% CI, 1.5–12.2). The difference was no longer significant by 1 year after hospital discharge (OR, 1.6; 95% CI, 0.85–3.2).

**Discussion**

Our aim was to determine whether our hospital admitting policy led to specialists and generalists caring for different cohorts of patients with CHF. We were also interested in the outcomes of care. Our data show that generalists cared for patients who had a greater degree of co-morbidity than did specialists, probably had less severe underlying heart disease, and were less likely to have had a recent myocardial infarction. The generalists’ patients stayed in hospital longer, had slightly higher unplanned readmission rates, but were less likely to die during follow-up. Most of these findings were probably due to the different baseline characteristics of the patients rather than variation in the quality of care that was provided. The relatively low rate of angiotensin converting enzyme inhibitor use (65–68%) and aspirin (33%) reflects the pattern of usage at the time of the study in 1993.

While, in our view; generalists and specialists have complementary skills, the debate about their respective roles is often polarized as a choice between the two groups. A review [19] over the last 5 years revealed 21 articles comparing specialist and generalist care. Recent studies of differences between cardiologists and generalists suggest that generalists have inflated perceptions of cardiovascular risk [20], are less aware of key advances in treatment [21], and offer less intensive investigation and treatment [22] than cardiologists, and that this may result in a poorer QOL [23]. The Medical Outcomes Study [24] suggested that specialists use more resources than general internists and family physicians. Two recent studies [25,26] have examined the effect of the specialty of the attending physician on resource use and survival. The results are consistent with the hypothesis that for conditions such as chronic obstructive pulmonary disease in which specific treatments have not been demonstrated to improve survival in seriously ill patients, specialist care is unlikely to result in a survival benefit. For conditions such as CHF for which specific effective therapy exists, specialist treatment, while more resource intensive, may confer a survival benefit. This Australian study cannot address this hypothesis because of the differences in case-mix that it was designed to produce. Unlike the SUPPORT [25] study, early mortality was higher amongst patients cared for by cardiologists. This is likely to reflect the success of the admitting policy in selection of cases with more severe heart disease for admission under cardiologists. Our study suggests that patients with CHF may be cared for successfully by generalists if carefully selected.
We found no clear difference in the pattern or outcomes of care between specialists and generalists. However, the level of use of investigations in the present study appears to be lower than in the USA, for both cardiologists and general physicians, and reflects the usual pattern in Australia. In this respect, practice patterns are more like those of Canada [22]. As there was no clear difference in practice patterns, it is unlikely there were significant differences in resource use.

Several factors have to be considered when interpreting the results of this study. The first is that speciality training in Australia tends to minimize differences in practice patterns. General physicians and cardiologists in Australia both undergo 36 months of basic physician training rotating through a range of medical specialities, prior to at least 3 years of advanced training, following satisfactory completion of the examination for the first part of the Fellowship of the Royal Australian College of Physicians. It should be noted that this pattern of training means that all cardiologists have 3 years training in general medicine, as well as general physicians having had 6 years speciality training. Advanced training in general medicine does not preclude a speciality interest; the general physicians in this study have a range of speciality interests, although this does not include cardiology.

A second consideration is that in order to meet the requirements for this basic training, all junior medical staff rotate through the medical speciality units and general medicine. This may significantly influence patterns of care.

Thirdly, joint continuing education activities at our hospital, including Grand Rounds and Morning Report (which are run by general medicine but attended by cardiologists and other specialists) may minimize differences in clinical practice by rapid diffusion of advances in clinical practice.

These differences in practice may have led to greater standardization of clinical practice than is usual in the USA, thus enhancing overall quality of care. If these arguments are valid, the admitting policy at John Hunter Hospital provides a good model for collaborative health care involving both specialists and generalists in a teaching hospital environment. The essential elements of this are: (i) a working environment which gives all physicians equal access to investigative and management services and encourages the sharing of clinical expertise and the evaluation of evidence; (ii) specialists provide a high level of care for patients with problems predominantly in one system; (iii) specialist general physicians can provide an equivalent level of care for patients with complex medical problems involving more than one system. The health care outcomes measured in this study provide support for this model of care that is still in place unchanged in John Hunter hospital.

This study suggests that at least in one major area of care, it is possible for generalists and specialists working within the framework of a defined admitting policy and with equal access to resources, to provide the same quality of care and clinical outcome. It provides clinical data in support of the drive for health care reform with a balance of care between generalists and specialists as suggested by US writers [19]. The relationship between level of training of general physicians, methods of diffusion of advances in health care and quality of care and health outcomes needs further investigation.

Acknowledgements

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References

14. McKee PA, Castelli WP, McNamara PM et al. The natural history


Appendix

**Framingham criteria for diagnosis of congestive heart failure**

**Major criteria.** Paroxysmal nocturnal dyspnoea; neck vein distension; rales; cardiomegaly; acute pulmonary oedema; S3-gallop; increased venous pressure (> 16 cm water); circulation time ≥ 25 seconds; hepatojugular reflex.

**Minor criteria.** Ankle oedema; night cough; hepatomegaly; pleural effusion; vital capacity reduced one-third from maximum; tachycardia ≥ 120.

**Major or minor criterion.** Weight loss > 4.5 kg over 5 days in response to treatment.

CHF: two major or one major and two minor criteria.


**Weighted co-morbidity index**

The following conditions were assigned a weight of one: myocardial infarction; peripheral vascular disease; cerebrovascular disease; dementia; chronic pulmonary disease; connective tissue disease; ulcer disease; mild liver disease; diabetes mellitus.

The following conditions were assigned a weight of two: hemiplegia; moderate/severe renal disease; diabetes with end-organ damage; any tumour; leukaemia; lymphoma.

The following conditions were assigned a weight of three: moderate/severe liver disease.

The following conditions were assigned a weight of six: metastatic solid tumour; AIDS.

Total co-morbidity score obtained by summation.

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