Chapter 30. Geriatric Evaluation and Management Units for Hospitalized Patients

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Background

Inpatient care of elders with multiple co-morbidities requires close attention to the special needs and geriatric syndromes that arise in this vulnerable population.[1,2] One strategy to address the risks of hospitalization is to provide care by a multidisciplinary team in a dedicated geriatric unit, principally *Geriatric Evaluation and Management (GEM) Units*. This model of care, in many ways similar to coordinated stroke units,[3] may improve mortality and other clinically relevant outcomes compared with outcomes achieved on a general medical ward. An alternative strategy, reviewed elsewhere in this Report, is the comprehensive geriatric consultation service, analogous to a typical medical consultation team (see Chapter 29).

In a GEM unit, a multidisciplinary team provides comprehensive geriatric assessment, detailed treatment plans, and attention to the rehabilitative needs of older patients. A typical team is composed of a geriatrician, clinical nurse specialist, social worker, and specialists from such fields as occupational and physical therapy, nutrition, pharmacy, audiology, and psychology. GEM units are typically separate hospital wards that have been redesigned to facilitate care of the geriatric patient. Multidisciplinary team rounds and patient-centered team conferences are hallmarks of care on these units, which, in contrast to geriatric consultation services, have direct control over the implementation of team recommendations.

Practice Description

In all the studies reviewed in this chapter, the GEM unit team included a physician experienced in geriatric medicine, skilled geriatric nurses and rehabilitation specialists. (The latter may not have been on site but were accessible). The teams completed multidimensional geriatric assessments, conducted interdisciplinary team rounds, and provided comprehensive discharge planning. Units were physically separate wards that were designed to facilitate geriatric care. *Acute Care of Elders (ACE) Units*[4] incorporate the GEM unit design with additional enhancements and admit patients with acute illnesses. ACE units often provide improved flooring and lighting, reorienting devices, and other environmental improvements such as common rooms for patient use. For example, in the ACE unit studied by Landefeld and colleagues[5] the GEM unit concept was enhanced by the use of more nurse-initiated protocols and a greater number of environmental and design modifications.

Both styles of unit emphasize the early assessment of risk factors for iatrogenic complications and the prevention of functional decline.[4,6] Studies of both are included in this chapter.

Prevalence and Severity of the Target Safety Problem

One-third of hospitalized patients are aged 65 years and older. In 1996, although comprising only 13% of the US population they accounted for 38% of the approximately 31 million discharges from non-government, acute care hospitals.[7] Since all hospitalized older patients are potentially at risk, the target population is quite large. Appropriate selection of patients who are at risk for hospital-related complications and who are likely to receive benefit from this practice, however, would decrease this number.[8]

The target safety problems are preventable deaths and hospital-related functional decline in older persons. The number of deaths that could be prevented if the practice were to be widely implemented is unknown. On the other hand, since hospital-related functional decline occurs in 25 to 60% of older hospitalized patients, there is substantial opportunity to improve clinical outcomes.[9] Other clinical problems explicitly studied in controlled trials include cognitive status and nursing home placement.

Opportunities for Impact

Data from the American Hospital Association (AHA)[10] indicate that fewer than half of hospitals providing care for the elderly have geriatric acute care units or offer comprehensive geriatric assessment. (see footnote in Chapter 29). Researchers in the field believe the number is increasing. The Department of Veterans Affairs reports that in 1997 there were 110 active GEM units, although some concentrate solely on outpatient assessment.[11] A recent national survey[12] identified at least 15 active ACE units, with average daily censuses ranging from 5 to 25 patients. Depending on the screening and targeting criteria used to identify eligible patients, the potential for impact could be quite large and raises the question of the physical and manpower capacity of these units to meet the apparent demand.

Study Designs

A structured literature search identified a systematic review[13] that included 6 studies (4 randomized controlled trials,[14-17] one retrospective cohort study with historical controls,[18] and one published abstract of a randomized controlled trial[19]). We also identified 2 randomized controlled trials of ACE units[5,20] that were published later (see Table 30.1). All of the cited studies were single center in design. Five of the studies[5,14,16,17,20] provided sufficient data to evaluate the baseline level of function of enrolled patients.

Study Outcomes

All-cause mortality was reported in each study. For this outcome, most patients were followed 6 or more months after hospitalization. Other clinically important outcomes measured in some studies were functional status,[5,14,16,17,20] cognitive status,[14,16,17] length of stay,[5,14-16,18,20] and discharge rates to institutional settings.[5,14-20]

Evidence for Effectiveness of the Practice

In some studies mortality during hospitalization, at 3 months, or at 6 months was reduced in the intervention group but the differences failed to achieve statistical significance. A meta-analysis[13] of 6 studies[14-19] found the summary odds ratio for 6-month mortality was 0.65 (95% CI: 0.46-0.91), using both published and unpublished data from the included trials. Tests for heterogeneity across studies were reported with $p<0.10$ for the pooled analyses.

Cognitive function, as measured by the Kahn-Goldfarb Mental Status Questionnaire,[21] showed no statistical improvement over the course of one study,[17] nor did 2 other studies[14,16] demonstrate improvement, using the Mini-Mental State Examination[22] to assess mental status. Two trials of ACE units examined functional status, using the basic activities of daily living (ADL).[23] Landefeld et al[5] reported statistically significant improvements, while Counsell et al[20] found benefit in a composite outcome of ADL improvement and nursing home placement, but not in discharge ADL levels alone. Two other studies also demonstrated statistically improved functional status in the six months after randomization[14] and at 12 months follow-up.[17]

In individual studies, GEM units were associated with a higher likelihood of home residence, rather than in an institutional setting (skilled nursing facility or nursing home).[5,14, 17] The meta-analysis by Stuck et al calculated a combined odds ratio that revealed a statistically significant increase in patients discharged from GEM units who were living at home at 6 months (summary odds ratio 1.80, 95% CI: 1.28-2.53) and 12 months (summary odds ratio 1.68, 95% CI: 1.17-2.41) thereafter.[13] ACE unit trials in a community hospital[20] and a university hospital[5] were also both successful in decreasing patient placement in institutional settings and would likely have strengthened the summary estimate if included. Extrapolating their study findings to the US population, Rubenstein and colleagues[17] estimated that approximately 200,000 nursing home admissions per year could be avoided using their geriatric evaluation unit approach. Winograd noted that this multidisciplinary practice would potentially be more effective if target populations were better identified and enrolled using specific criteria.[8]

Potential for Harm

No data suggest that GEM units were associated with harm.

Costs and Implementation

Implementation of the practice requires construction or redesign of hospital ward(s) to create a suitable environment, training or recruiting experienced staff, establishing selection criteria to determine patient eligibility, and implementing a continuous evaluation process to assess clinical and non-clinical outcomes.

A working group has recommended including costs as an important outcome measure in future studies of GEM units.[24] Applegate and colleagues reported in a later analysis[25] of their randomized controlled trial[14] that the increased costs associated with their intervention study were not balanced by savings in subsequent health care spending, but if charges were adjusted for days spent at home (versus in long-term care) the charges were similar. Lower direct costs were demonstrated by one intervention study,[17] particularly after adjusting for differences in survival (mean institutional-care costs per year survived, $22,597 for intervention patients vs. $27,826 for control-group patients). The study by Landefeld et al[5] reported mean hospital charges of $10,289 for intervention patients compared with $12,412 for control patients, with similar median charges (p=0.3). Additional costs of about $75,000 attributable to staffing and physical redesign of the unit resulted in a cost of about $230 per patient in the intervention group. Counsell et al,[20] in a recent large randomized trial of an ACE intervention, reported no difference in hospital costs for patients in the intervention group compared with the usual care group ($5640 vs. $5754, respectively; p=0.68). Included in the costs was $28 per hospital day per intervention patient, representing costs of the geriatric nurse specialist, unit medical director, and unit renovations ($300,000).

Comment

Reasonable evidence supports the use of GEM units, despite varying findings across individual studies with respect to their effectiveness at preventing outcomes such as mortality. Nonetheless, mortality appears to be improved after pooling results of smaller trials. There is good evidence that this model of care decreases nursing home placements, which in itself is a noteworthy finding. Furthermore, the intervention costs may not be significantly higher in these specialized units. The generalizability of the practice requires further examination, and the need for multicenter studies, as advocated by a previous consensus group,[26] has thus far not been undertaken.

Limitations of this practice compared with multidisciplinary geriatric consultation teams (Chapter 29) include limited bed availability in most units, decreased transferability of geriatric practices throughout a hospital, and a larger resource commitment compared with a hospital-wide consultation team. The advantages of the GEM and ACE unit model are direct control over implementation of clinical recommendations, the presence of dedicated geriatric nursing and rehabilitative staff associated with the unit, and the beneficial effects of a ward designed to address older patients' needs. In sum, the practice of a dedicated GEM or ACE unit carries much promise.

Table 30.1. Randomized Controlled Trials of Geriatric Evaluation and Management Units*

Study	Study Setting	Study Design	All-Cause Mortality and Other Outcomes†
Stuck, 1993[13]	6 studies (published 1983-1991) in the US, UK, Australia, and Canada, involving 1090 patients (meta-analysis of Refs. 14-19)	Level 1A	6-month mortality: summary odds ratio 0.65 (95% CI: 0.46-0.91); 12-month mortality: summary odds ratio 0.77 (95% CI: 0.56-1.06)
Applegate, 1990[14]	155 patients in a university-affiliated community hospital, 1985-1987	Level 1	6-month mortality: 10% vs. 21% (p=NS); After 6 months: greatest difference p=0.08 by log-rank test; Improvement in ADLs: 3 of 8 ADLs better in intervention group (p<0.05)
Counsell, 2000[20]	1531 patients in a community hospital, 1994-1997	Level 1	Inpatient mortality: 3% vs. 4% (p=0.30); Length of stay: no significant difference; Long-term placement or decline in ADLs At discharge: 34% vs. 40% (p=0.027); At 12 months: percentages not reported (p=0.022)
Gilchrist, 1998[15]	222 women on an orthopedic-geriatric service in the UK, 1984-1986	Level 1	Inpatient mortality: 4% vs. 10% (p=0.06); 6-month mortality: 14% vs. 18% (p>0.1)
Harris, 1991[16]	267 patients in an Australian hospital, 1985-1986	Level 1	Inpatient mortality: estimated from Figure 1 in paper, 8% vs. 6% (p=NS); 12-month mortality: 23% vs. 29% (p=NS)
Landefeld, 1995[5]	651 patients in a university-affiliated hospital, 1990-1992	Level 1	Inpatient mortality: 7% in both groups (p=NS); 3-month mortality: 14% vs. 13% (p=NS); Improvement in ADLs at discharge: 34% vs. 24% (p=0.009); Discharged to nursing home: 14% vs. 22% (p=0.01)
Powell, 1990[19]	203 patients in two Canadian teaching hospitals, year not stated	Level 1	Mortality: lower in intervention group; timing not stated (p not stated); Transferred to long-term care: fewer in intervention group (p not stated)

Rubenstein, 1984[17]	123 patients in a VA hospital, 1980-1982	Level 1	Inpatient mortality: 14.3% vs. 15.0% (p=NS); 12-month mortality: 23.8% vs. 48.3% (p<0.005) 12-month improvement in basic functional status: 48.4% vs. 25.4% (p<0.01) 12-month improvement in mental status: 35.6% vs. 22.4% (p=NS)
Teasdale, 1983[18]	124 patients in a VA hospital, 1981-1982	Level 3	Inpatient mortality: 12% vs. 14% (p=NS); 6-month mortality: 28% vs. 35% (p=NS)

* ADL indicates activities of daily living; NS, not statistically significant.
† Comparisons are reported as intervention group vs. control group.

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