

# Chapter 19. Care Models

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## Background

The organization of care delivery is determined by a variety of factors such as economic issues, leadership beliefs, and the ability to recruit and retain staff. Ideally, evidence of the effect of care models on quality and patient safety would also be a major factor in decisionmaking.

Historically, four traditional care models have dominated the organization of inpatient nursing care. Functional and team nursing are task-oriented and use a mix of nursing personnel; total patient care and primary nursing are patient-oriented and rely on registered nurses (RNs) to deliver care.<sup>1,2</sup> In the late 1980s, a number of nontraditional nursing care delivery models emerged that use various mixes of licensed and unlicensed nursing personnel.<sup>3-5</sup>

Care models do not exclusively pertain to the organization of nursing care, however, or the inpatient setting. Models have been examined for medical housestaff,<sup>6</sup> pharmacy services,<sup>7</sup> and social workers.<sup>8</sup> They have been considered for ambulatory care,<sup>9-12</sup> home care,<sup>13-15</sup> and nursing homes.<sup>16</sup> Care models also exist for specific patient populations such as elderly patients,<sup>17-20</sup> people with mental health needs,<sup>21</sup> and individuals with chronic conditions<sup>22</sup> to include disease management models<sup>23,24</sup> and the use of technology.<sup>25</sup>

## Research Evidence

Despite the interest in a variety of care models, it is difficult to discern which models work best. Neither the traditional nor the nontraditional inpatient nursing care models have been evaluated rigorously for their effects on patient safety.<sup>2,4,26</sup> Emerging models from other care disciplines, other settings, and particular patient populations are also lacking rigorous empirical assessments of their relationship to patient safety.

A number of investigations examining care models addressed nurses' perceptions of the care model.<sup>1,27-38</sup> Only two investigations combined the nurses' perceptions with patient safety measures.<sup>39,40</sup>

Several studies did not meet the criteria for inclusion in this review, largely due to weak designs. Of these, some reported pilot data,<sup>6,7,13,24,41,42</sup> some were quality-improvement projects,<sup>14,17,43</sup> and others used qualitative methods.<sup>32,36,44-48</sup> Like the quantitative studies, the rigor of the qualitative investigations varied. However, these qualitative studies illuminate important aspects of care models not evident in quantitative investigations. For example, Ingersoll<sup>32</sup> and Redman and Jones<sup>36</sup> were among the first investigators to assess the effects of patient-centered care models on nurse managers. The data from both of these studies expose the pressure and role confusion experienced by nurse managers. Subsequently, a quantitative investigation found nurse managers experienced a high level of emotional exhaustion, a key component of burnout.<sup>49</sup>

Among the quantitative studies of care models included in the evidence table, only one used a design that combined systematic review and meta-analytic techniques.<sup>23</sup> No randomized controlled trials were identified. The remaining seven studies used Level 3 designs. In two of

these studies, large databases were used to examine different care models for home-based long-term care<sup>15</sup> and mental health services.<sup>21</sup>

All five studies of nursing care models meeting inclusion criteria focused on acute care work redesigns in which the mix of nursing personnel was altered in some way. For each of these five investigations, data were reported from only one hospital.<sup>39, 40, 50–52</sup> Of these studies, one evaluated changes in care delivery models at one university teaching hospital with two campuses in the same city.<sup>39</sup> The remaining studies were smaller in scale focusing data collection on one,<sup>50, 51</sup> two,<sup>52</sup> or three units<sup>40</sup> in the same facility. Most often, measurements were done at three points in time—pre-implementation, and at 6 and 12 months after the model was introduced.<sup>39, 40, 52</sup>

## **Evidence-Based Practice Implications**

The eight studies in Table 1 illustrate two main clusters of research. The first pertains to studies of inpatient nursing care models. Statistically discernible differences were rarely evident, and when they were, there was no clear pattern to guide practice.<sup>39, 40, 50–52</sup> For example, there were statistically fewer falls reported in two studies after units implemented care models using fewer RNs, presumably because there were more staff to assist patients.<sup>50, 51</sup> Fewer medication errors were detected in only two reports.<sup>39, 52</sup> However, quite unexpectedly and counter intuitively, postoperative pain scores were statistically higher on a unit after the number of RNs increased.<sup>50</sup>

There were no consistent patterns visible in findings among the studies that followed changes in the care model over time—before implementation and at 6 and 12 months.<sup>39, 40, 52</sup> However, the studies with multiple measurements showed that initial indicators of success were rarely sustained over time. This is similar to results from the study by Greenberg and colleagues<sup>21</sup> in which most positive effects of change lasted only one year. Despite the growing number of work redesign studies, the findings are too disparate even among those with stronger designs to offer a clear direction about practice changes to improve patient safety.

The second cluster of care model studies consists of three investigations that were conducted by other disciplines.<sup>15, 21, 23</sup> These studies demonstrate that the interest in determining which care models operate best is not isolated to nursing. The improved ability to detect statistical differences in these models may derive from their large sample sizes, their statistical techniques, or their use of different outcomes. The systematic review and meta-analysis of disease management programs for individuals with depression offers the strongest evidence for guiding care delivery.<sup>23</sup> With only one study of consumer-directed home-based long-term care,<sup>15</sup> and one of service-line delivery of mental health services,<sup>21</sup> practice changes for these areas should be considered carefully.

## **Research Implications**

We actually know very little about the relationship between care models and patient safety. Randomized controlled trials (RCTs) might contribute evidence that would help investigators, administrators, and policy makers sort through the confusion. RCTs would be particularly difficult to conduct, however, given the need to have longitudinal data. The rapidly changing health care environment is not conducive to such endeavors.

The most glaring need relates to clarifying the work that needs to be done for patients and then determining which clinicians are best suited to provide it. Looking only at the work of nurses, which has dominated studies of care models in acute care settings, fails to consider nonnursing staff who are critical to the patient care mission.

We also know very little about care models that promote patient safety in outpatient settings, home care, or long-term care. These are areas that remain to be explored.

## Conclusion

Care delivery models range from traditional forms, such as team and primary nursing, to emerging models. Even models with the same name may be operationalized in very different ways. The rationale for selecting different care models ranges from economic considerations to the availability of staff. What is glaring in its absence, however, is the limited research related to care models. Even more sparse is research that examines the relationship between models of care and patient safety. Ideally, future studies will not only fill this void, but the models tested will be developed based on a comprehensive view of patient needs, taking the full complement of individuals required to render quality care into account.

## Search Strategy

Both MEDLINE<sup>®</sup> and CINAHL<sup>®</sup> databases were searched from 1995 to 2005 to identify research-based articles published in the English language that were pertinent to this review. Search terms were identified with the guidance of a reference librarian. The term “care models” was not a search option in CINAHL<sup>®</sup>. Therefore the CINAHL<sup>®</sup> search terms included “care delivery modules,” “nursing care delivery systems,” and “care modules.” The MEDLINE<sup>®</sup> search was based on two terms, “care models” and “organizational models.” Together, these searches yielded 549 citations, 55 in CINAHL<sup>®</sup> and 494 in MEDLINE<sup>®</sup>.

The abstracts for each of the 549 citations were reviewed. From this assessment it was determined that 82 of the articles were sufficiently focused on nursing or patient care models and should be considered further. Most of the 467 papers that were omitted used the word “model” in their title, but the work was not related to care models per se. For example, articles about medical management models were not used in this review. Additionally, a number of papers addressed topics with no discernible connection to care models (e.g., life support decisions for extremely premature infants).

The 82 articles were located and carefully read. As a result, 31 additional papers were omitted from the actual analysis. Reasons for these omissions included the lack of sufficient detail about the study, duplicate publications, and studies of advanced practice nurses. This left 51 articles for consideration in this review.

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## Acknowledgment

Tremendous gratitude is expressed to the staff of the Armed Forces Medical Library for their considerable support of this work. They conducted the database searches and assisted in acquiring numerous papers considered in this review.

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**Table 1. Evidence Table for Care Models**

Source	Safety Issue Related to Clinical Practice	Design Type	Study Design, Study Outcome Measure(s)	Study Setting & Study Population	Study Intervention	Key Finding(s)
Barkell 2002 <sup>50</sup>	Inpatient nursing work redesign	Pretest (January–June 1999) and post-test (January–June 2000) (6)	Design: Level 3 Patient outcomes: pneumonia, urinary tract infection (UTI), postoperative pain perception (Level 2), patient satisfaction	A surgical unit in a 508-bed teaching hospital in the Midwest, all patients under DRGs 148 (major small and large bowel procedures with comorbidities or complications) & 149 (bowel resection without complications); 59 patients pre-, 37 patients post; 59% female pre- and post	Total patient care. In this intervention, the ratio of RNs to unlicensed assistive personnel increased as compared to the ratio in the previous model of team nursing. The total budgeted full-time employees decreased with the total patient care model.	Pain scores for postoperative days 1 and 2 were higher with total patient care ( $P = 0.017$ ). Pneumonia and UTIs occurred too infrequently to analyze. There was no detectable statistical difference in patient satisfaction.
Benjamin 2000 <sup>15</sup>	Home-based long-term care	Cross-sectional (4)	Design: Level 3 Patient outcomes: safety (physical and psychological risk, sense of security), unmet needs (activities of daily living) (Level 2), patient satisfaction	In-Home Supportive Services (IHSS) program in California; 1,095 IHSS Medicaid beneficiaries with disabilities in professional agency models (PAMs) and consumer-directed models (CDMs): about half the recipients were over age 65 (50% PAM, 54% CDM), most were female (77% PAM, 70% CDM); CDM recipients had more functional impairments	Professional agency model vs. consumer-directed model	Both models had positive outcomes. Absolute differences were small but statistically significant for safety, unmet needs, and service satisfaction, with the CDM scores more positive.

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Source	Safety Issue Related to Clinical Practice	Design Type	Study Design, Study Outcome Measure(s)	Study Setting & Study Population	Study Intervention	Key Finding(s)
Greenberg 2003 <sup>21</sup>	Changed organizational structure	Nonrandomized trial (3)	Design: Level 3 Patient outcomes: continuity of care, readmission (Level 2)	139 Veterans Administration Medical Centers; facility-level data for patients receiving mental health services over a 6-year period	Service-line organization (interdisciplinary) v. profession-based leadership	Statistically significant effects were demonstrated in care continuity and readmission rates within 180 days during the first year after implementing a mental health service line. A few continuity effects lasted 3 or more years, but most positive effects lasted only 1 year.
Grillo-Peck and Risner 1995 <sup>51</sup>	Inpatient nursing work redesign	Pretest (January–June 1992) and post-test (January–June 1993) (6)	Design: Level 3 Patient outcomes: falls, medication errors, procedure errors, nosocomial infections (Level 2), length of stay	A neuroscience unit in an 800-bed not-for-profit hospital in Ohio, all patients under DRG 14 (cerebrovascular disease excluding transient ischemic attack): 71 patients pre-, 85 patients post; 56% female pre-, 55% post	Nursing partnership model (fewer RNs, more unlicensed assistive personnel)	The only statistically detectable differences related to fewer falls ( $\chi^2 = 4.77, P \leq 0.05$ ).



Source	Safety Issue Related to Clinical Practice	Design Type	Study Design, Study Outcome Measure(s)	Study Setting & Study Population	Study Intervention	Key Finding(s)
Heinemann 1996 <sup>52</sup>	Inpatient nursing work redesign	Nonrandomized trial with the same variables measured at 3 points in time using different patients (6 months before the change, 6 and 12 months after the change) (3)	Design: Level 3 Patient outcomes: falls, medication errors, intravenous (IV) infections (Level 2), patient satisfaction	A 518-bed private, not-for-profit hospital in Florida, all patients on two randomly selected medical-surgical units; pilot unit had 36 beds for general surgery/trauma patients ( <i>M</i> patient days for a 6-month period = 5,477), control unit had 34-beds for orthopedic/trauma patients ( <i>M</i> patient days for a 6-month period = 4,654).	Partners in patient care (PIPC)—experimental (pilot) unit; Total patient care—control unit.	Significant differences between the units were evident only when the ratio of events to patient days was examined: medication errors ( $P = 0.008$ ) and falls ( $P = 0.037$ ), but not for IV infections ( $P = 0.309$ ). Patient satisfaction scores were higher on the pilot unit.
Neumeyer-Gromen 2004 <sup>23</sup>	Models of care for patients with depression	Systematic review (11) and meta-analysis (1)	Design: Level 1 Patient outcomes: depression severity (Level 1), adherence to treatment regimen, (Level 2), patient satisfaction	Only randomized controlled trials published from 1992 to 2002; 10 studies met the inclusion criteria; patients had a mean age of 43 years, 71% were women, and about 70% were white, 75% were diagnosed with major depression	Disease management programs (DMP) to implement guideline-driven care	Relative risk (RR) for the effect of DMP on depression severity was 0.75 (95% confidence interval [CI] = 0.70–0.81, $P < 0.00001$ ). The study with an ongoing intervention over 2 years showed a significant advantage of DMP (RR = 0.44, 95% CI = 0.28–0.67). Adherence to medication for at least 90 days favored DMP (RR = 0.59, 95% CI = 0.46–0.75, $P = 0.00001$ ). The overall effect for patient satisfaction favored DMP (RR = 0.57, 95% CI=0.37–0.87, $P = 0.009$ ).

Source	Safety Issue Related to Clinical Practice	Design Type	Study Design, Study Outcome Measure(s)	Study Setting & Study Population	Study Intervention	Key Finding(s)
Seago 1999 <sup>39</sup>	Inpatient nursing work redesign	Cross-sectional, same variables measured at 3 points in time using different patients (6 months before the change, 6 and 12 months after the change) (4)	Design: Level 3 Patient outcomes: medication errors, falls, pressure ulcers, (Level 2), patient satisfaction	A large university teaching hospital with two campuses: patient days—30,462 at time 1, 29,584 at time 2, 29,210 at time 3	Change in care model from primary care to patient-focused care	A statistically significant decrease was found only for medication errors (0.97% before the change; 0.78% at 6 months, $P = 0.016$ ; 0.80% at 12 months, $P = 0.027$ ).
Tourangeau 1999 <sup>40</sup>	Inpatient nursing work redesign	Nonrandomized trial with the same variables measured at 3 points in time using different patients (6–7 months before the change, 6 and 12 months after the change) (3)	Design: Level 3 Patient outcomes: IV therapy outcomes, falls, medication incidents, call bell usage	A 258-bed acute care community hospital in Toronto; all patients on three medical-surgical units; the experimental units had 57 beds (general medicine/surgery) and 70 beds (medicine/geriatric rehabilitation); the control unit had 38 beds (postcoronary)	Unlicensed assistive personnel (UAP)-RN partnership model on two experimental units; Total patient care with an all-RN staff on the control unit	Adverse IV outcomes decreased in all units; falls decreased initially on the experimental units and then increased; falls declined on the control unit at all measurement points; on all units, medication incidents increased from baseline to 6-months and then decreased below baseline; call bell usage declined dramatically at 6-months then increased to a rate similar to baseline.