Can Team-Based Care Improve Patient Satisfaction? A Systematic Review of Randomized Controlled Trials

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Abstract

Background: Team-based approaches to patient care are a relatively recent innovation in health care delivery. The effectiveness of these approaches on patient outcomes has not been well documented. This paper reports a systematic review of the relationship between team-based care and patient satisfaction.

Methods: We searched MEDLINE, EMBASE, Cochrane Library, CINAHL, and PSYCHOINFO for eligible studies dating from inception to October 8, 2012. Eligible studies reported (1) a randomized controlled trial, (2) interventions including both team-based care and non-team-based care (or usual care), and (3) outcomes including an assessment of patient satisfaction. Articles with different settings between intervention and control were excluded, as were trial protocols. The reference lists of retrieved papers were also evaluated for inclusion.

Results: The literature search yielded 319 citations, of which 77 were screened for further full-text evaluation. Of these, 27 articles were included in the systematic review. The 26 trials with a total of 15,526 participants were included in this systematic review. The pooling result of dichotomous data (number of studies: 10) showed that team-based care had a positive effect on patient satisfaction compared with usual care (odds ratio, 2.09; 95% confidence interval, 1.54 to 2.84); however, combined continuous data (number of studies: 7) demonstrated that there was no significant difference in patient satisfaction between team-based care and usual care (standardized mean difference, −0.02; 95% confidence interval, −0.40 to 0.36).

Conclusions: Some evidence showed that team-based care is better than usual care in improving patient satisfaction. However, considering the pooling result of continuous data, along with the suboptimal quality of included trials, further large-scale and high-quality randomized controlled trials comparing team-based care and usual care are needed.

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Introduction

Team-based care has been offered as an improvement in care delivery, especially for the treatment of patients with complicated medical conditions. When properly implemented, team-based approaches have been shown to improve clinical decision making [1,2]. In practice, team-based care takes many forms, such as inpatient care management teams or multidisciplinary disease-oriented care programs. Teams may be large or small and are found in a variety of practice settings, from private clinics to academic medical centers [3–5]. Given this variation, it is therefore difficult to define team-based care. Mitchell et al [6] defined team-based care as “the provision of health services to individuals, families, and/or their communities by at least 2 health providers who work collaboratively with patients and their caregivers—to the extent preferred by each patient—to accomplish shared goals within and across settings to achieve coordinat-ed, high-quality care.”

Team-based care has been reported as an important attribute of patient-centered care [7]. In particular, 1 practice model that has been promoted as a way to improve patient care delivery is the patient-centered medical home (PCMH). The Agency for Healthcare Research and Quality defined the PCMH by five attributes: (1) a patient-centered orientation, (2) comprehensive, team-based care, (3) coordinated care, (4) access to care, and (5) a systems-based approach to quality and safety [8].

Additionally, patient satisfaction has become an increasingly important and commonly used indicator for measuring the quality of health care. Patient satisfaction has also become a proxy, and an effective indicator, to measure the success of doctors and hospitals. In the United States, physician bonuses are linked to patient evaluations of a doctor’s personal interaction with them. In the
United Kingdom, general practitioner contracts have been implemented, which provide bonuses of up to 30% of a general practitioner’s income for reaching quality targets [9]. The point system offers rewards not only for clinical performance measures of quality, but also for conducting patient surveys and acting on patient feedback to improve care. These developments highlight how higher patient satisfaction leads to benefits for the health industry in a number of ways, which have been documented by various studies [10,11].

One of the main purposes of team-based health care interventions is improving the patient experience [12]. However, some uncertainty remains about the relationship between team-based care and patient satisfaction [13–15]. Moreover, to our knowledge, there has not been a systematic review exploring the link between the team approach to patient care and patient satisfaction. Considering the popularity of team-based interventions and the importance of the patient experience, we sought to systematically review the relationship between these 2 factors.

**Methods**

**Search Strategies**

The institutional review board of the Duke University Health System approved the study. We conducted systematic literature searches using MEDLINE, EMBASE, the Cochrane Library, CINAHL, and PSYCHOINFO. We searched all databases from inception to October 8, 2012. We also evaluated the reference lists of retrieved papers for potential inclusion of additional articles.

In each database, we searched for English-language articles that included the following 3 concepts: (1) patient satisfaction, (2) team-based care, and (3) a randomized controlled trial design. In MEDLINE, we use Medical Subject Headings (MeSH) for all search terms unless otherwise noted, and we searched for the terms related to the 3 concepts of interest (Appendix S1). For patient satisfaction, we used the search terms “patient satisfaction” and “consumer satisfaction.” For team-based care, we used the search terms “patient care team,” “nursing team,” “teamwork,” “team work,” “multidisciplinary team,” “interdisciplinary team,” “interdisciplinary care,” and “team approach.” For randomized controlled trials, we used the search terms “randomized controlled trial” and “randomized trial.”

**Figure 1. Flow Diagram of Trial Selection Process for the Systematic Review.**

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**Table 1. Characteristics of Included Studies.**

| Study        | Patient Characteristics                  | Setting          | Study Length | Intervention                                      |
|--------------|------------------------------------------|------------------|--------------|--------------------------------------------------|
| Zimmer 1985  | Older patients with chronic or terminal illness | Home             | 6 mo         | Home health care team vs control group            |
| Williams 1987| Frail patients ≥65 years                  | PHC              | 12 mo        | GACS vs traditional group                        |
| Hughes 1992  | Patients with terminal illness            | Home             | 6 mo         | Hospital-based home care vs customary care       |
| Turnbull 1996| Pregnant women                            | Hospital         | 7 mo         | Shared care vs midwife managed care              |
| Ronald 1996  | Patients ≥55 years with multiple chronic illnesses | PHC              | 8 mo         | GEM vs UPC                                       |
| Beck 1997    | Patients ≥65 years with chronic illness   | PHC              | 12 mo        | Cooperative health care clinic vs usual care     |
| Coleman 1999 | Frail patients ≥65 years                  | PHC              | 24 mo        | Chronic care clinic vs usual care                |
| Sadur 1999   | Patients 16 to 75 years with diabetes     | PHC              | 6 mo         | DCCC vs usual care                               |
| Rost 2001    | Adults with depression                    | PHC              | 6 mo         | QuEST vs usual care                              |
| Tijhuis 2002 | Patients with rheumatoid arthritis       | PHC              | 13 mo        | Inpatient team care vs clinical nurse specialist |
| Unutzer 2002 | Patients ≥60 years with depression        | PHC              | 12 mo        | IMPACT vs usual care                             |
| Litaker 2003 | Patients with hypertension and diabetes   | Hospital         | 12 mo        | Nurse practitioner-physician team vs physician only usual care |
| Scott 2004   | Patients ≥60 years with chronic illness   | PHC              | 24 mo        | Cooperative health care clinic vs control group  |
| Byng 2004    | Patients with mental illness              | PHC              | 18 mo        | Mental health link intervention vs usual service provision |
| Smith 2004   | Adults with diabetes                      | PHC              | 18           | Diabetes shared care model vs usual care         |
| Preen 2005   | Inpatients with chronic cardiorespiratory illness | Hospital     | 0.25 mo      | Care plan group vs control group                 |
| Johnson 2005 | Patients 18 to 65 years with acute mental illness | Community     | 2 mo         | Crisis resolution team vs standard care          |
| Scott 2005   | Patients with gastrostomy                 | Hospital and home | 12 mo      | Nutrition support team vs standard practice group |
| Garety 2006  | Patients 16 to 40 years with early psychosis | South London and NHS Trust | 18 mo  | Lambeth early onset team care vs standard care    |
| Garcia-Aymerich 2007 | Patients with chronic obstructive pulmonary disease | Hospital     | 12 mo        | Integrated care vs conventional care             |
| Brumley 2007 | Patients with terminal illness            | HMO              | 4 mo         | IHPC vs usual care                               |
| Gade 2008    | Adults with life-limiting illness         | Hospital         | 6 mo         | IPCS vs usual care                               |
| Hunt 2008    | Patients with uncontrolled hypertension   | PHC              | 12 mo        | Physician pharmacist collaborative care vs usual care |
| Pape 2011    | Adults with diabetes                      | PHC              | 24 mo        | Physician-pharmacist team-based care vs control arm |
| Fihn 2011    | Patients with stable ischemic heart disease | PHC              | 12 mo        | Collaborative care vs usual care                 |
| Ell 2011     | Adults with cancer                        | PHC              | 24 mo        | ADAPi-C collaborative care vs enhanced usual care |

Abbreviations: DCCC, diabetes cooperative care clinic; GACS, geriatric ambulatory consultative service; GEM, geriatric evaluation and management; HMO, health maintenance organization; IHPC, in-home palliative care; IMPACT, improving mood-promoting access to collaborative treatment; IPCS, interdisciplinary palliative care service; PHC, primary health center or clinic; QuEST, quality enhancement by strategic teaming; UPC, usual primary care.

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“shared care,” “collaborative care,” and “integrated care.” For randomized controlled trial design, we applied the Scottish Intercollegiate Guidelines Network search filter [16]. In the remaining databases, we defined the search terms as keywords only.

**Study Selection**

We reviewed the abstracts of all citations and retrieved studies based on the following inclusion criteria: (1) the study was designed as a randomized controlled trial; (2) interventions included team-based care and non-team-based care (or usual care); and (3) outcomes included an assessment of patient satisfaction. We defined team-based care as a provision of health services by at least 2 disciplines and 2 health providers who work collaboratively with shared goals. Because the description of instructions and information provided in usual care was often insufficient [17], we defined usual care as: (1) an intervention by a provider alone, or (2) “usual care,” “routine care,” “standard care,” “conventional care,” or similar terms as a control group mentioned in randomized controlled trials. We excluded articles and trial protocols with different settings between intervention and control.

**Data Extraction and Quality Assessment**

We considered trials for inclusion, assessed the quality of eligible studies, and extracted data using a standardized protocol and reporting form. Two reviewers independently reviewed each
For each study, 1 reviewer extracted the data and assessed the risk of bias while a second reviewer verified the accuracy. Disagreements were resolved by consensus. On the basis of prior work on patient satisfaction and a literature review, we chose 1 overall item (eg, “How do you rate the hospital overall?” or “How do you rate your overall satisfaction?”) to assess patients’ overall satisfaction with their hospital experience. If no “overall satisfaction” assessment was provided, we took the item “satisfaction with the care or similar” description as the overall satisfaction.

We assessed the quality of each trial according to the Cochrane Handbook for Systematic Reviews of Interventions [18]. We used the following quality assessment items: random sequence generation, allocation concealment, blinding of participants and personnel, blinding of outcome assessors, incomplete outcome data, and other sources of bias. We rated each item on a 1-to-3 scale, where 1 represented a low risk of bias, 2 a high risk of bias, and 3 an unclear risk of bias.

### Data Analysis

We express dichotomous data as odds ratios (OR) with 95% confidence intervals (CIs). We express continuous data as standardized mean differences (SMDs) with 95% CIs. We tested statistical heterogeneity using the $I^2$ test. If results showed substantial heterogeneity ($I^2 > 60\%$), we conducted a subgroup or random-effects analysis to examine potential sources of heterogeneity (eg, length of follow-up, trial quality, and intervention variation). Results were considered statistically significant at 2-sided $P < .05$. We used RevMan 5.1 (Cochrane Collaboration) for all analyses.

### Results

Our literature search yielded 319 citations, of which 77 were screened for further full-text evaluation. Of those, we included 27 citations [13–15,19–42] this systematic review. [Table 1](#), [Figure 1](#) shows an overview of the study selection process. Of the 27 included papers, 2 [27,35] reported on the same trial, but the...
outcome data were from different follow-up periods. Table 2 shows that trial quality varied among the 26 trials. Twelve reported sequence generation, 6 described allocation concealment, 9 reported blinding of outcome assessors, 8 reported a low risk of bias on incomplete outcome data, and 4 were judged to have low risk of other sources of bias.

A total of 15,526 participants are represented in the 26 trials. Of these, 6768 participants (43.6%) were assigned to team-based care and 8758 (56.4%) to usual care. All but 9 of the trials conducted statistical analyses based on the intention-to-treat principle. Table 1 summarizes the main characteristics of each trial. Study length varied from 1 week to 24 months. The overall median follow-up period was 12 months. Thirteen trials focused on frail older adults or patients with chronic disease, 5 enrolled patients with mental health conditions, 5 studied terminal illness or patients with cancer, and the remaining 3 enrolled other patients.

### Structure and Process of Team-Based Care and Usual Care

Table 3 shows the characteristics of the structure and process of the interventions. Fourteen articles reported the number of team members for team-based care, with a median of 4 (range, 2–12). Five articles reported the number of team members for usual care, with a median of 1 (range, 1–2). Nine papers reported that team members for team-based care had credentials, and 3 papers reported that members exercising usual care were certified. Similar proportions were found in task deployment between the interventions (25 for team-based care, 8 for usual care). Although there was no information on response time for usual care, 8 papers reported the response time for team-based care, with a median response time of 120 minutes (range, 90–540).

Twenty-four articles reported that there was a care protocol for team-based care, and 2 articles reported that there was a care protocol for usual care. Ten papers reported that those conducting team-based care were trained before issuing care, and 2 papers reported that those conducting usual care were trained before

| Item                                | Team-Based Care       | Usual Care         |
|-------------------------------------|-----------------------|--------------------|
| Structure                           |                       |                    |
| Number of team members, median (range) | 4 (2–12)<sup>a</sup> | 1 (1–2)<sup>b</sup> |
| Credential, No. (%)                 | 9 (33.3)              | 3 (11.1)           |
| Not applicable                      | 18 (66.7)             | 24 (88.9)          |
| Deployment, No. (%)                 | 25 (92.6)             | 8 (29.6)           |
| Not applicable                      | 2 (7.4)               | 19 (70.4)          |
| Response time, median (range), min  | 120 (90–540)<sup>c</sup> | —<sup>d</sup>      |
| Process                             |                       |                    |
| Care protocol, No. (%)              | 24 (88.9)             | 2 (7.4)            |
| Not applicable                      | 3 (11.1)              | 25 (92.6)          |
| Training, No. (%)                   | 10 (37.0)             | 2 (7.4)            |
| Not applicable                      | 17 (63.0)             | 25 (92.6)          |
| Medication administration, No. (%)  | 14 (51.9)             | 1 (3.7)            |
| Not applicable                      | 13 (48.1)             | 26 (96.3)          |
| Regular meetings, No. (%)           | 16 (59.3)             | 2 (7.4)            |
| Not applicable                      | 11 (40.7)             | 25 (92.6)          |
| Interdependent, No. (%)             | 16 (59.3)             | 1 (3.7)            |
| Not applicable                      | 11 (40.7)             | 26 (96.3)          |
| Shared decision, No. (%)            | 10 (37.0)             | 1 (3.7)            |
| Not applicable                      | 17 (63.0)             | 26 (96.3)          |

<sup>a</sup>Fourteen of 27 papers reported the number of team members for team-based care.

<sup>b</sup>Five of 27 papers reported the number of team members for usual care.

<sup>c</sup>Eight of 27 papers reported the response time for team-based care.

<sup>d</sup>No papers reported the response time for usual care.

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issuing care. Fourteen papers reported that the team-based approach included administering medications, and 1 reported that usual care included medications. Sixteen articles reported that team-based care included regular team meetings to review care, whereas 2 reported that usual care included regular meetings. Sixteen articles reported that members of team-based care were interdependent, whereas 1 reported interdependence in usual care. In addition, 10 articles reported that team-based care adopted a “shared decision” model, while 1 stated this approach was used in usual care.

Overview of Patient Satisfaction

Six articles (22.2%) reported that patient satisfaction was a primary outcome, 2 (7.4%) described satisfaction as a secondary outcome, and the remaining 19 (70.4%) did not define the order of patient satisfaction as an outcome measure. Eighteen papers (66.7%) described the satisfaction measurement tool items, of which 5 used 1 item to measure patient satisfaction. The maximum number of items was 35, and the median number of items was 8. Of the 18 papers that described satisfaction measurement tools, 13 clearly stated that the satisfaction assessment measure had been validated prior to use in the study.

Effect Sizes of Patient Satisfaction: Dichotomous Data

Thirteen studies reported dichotomous data of patient satisfaction, of which 7 reported no statistical difference ($P > .05$) in patient satisfaction between team-based care and usual care. The remaining 6 papers showed that patients who received team-based care reported higher satisfaction than those treated by usual care. However, 3 papers did not provide primary data and were therefore excluded from the analysis. The test of overall heterogeneity for the 10 included trials resulted in $I^2 = 78\%$ and $P < 0.001$. Figure 2 shows that team-based care had a positive effect on patient satisfaction compared with usual care for papers which measured patient satisfaction as a dichotomous outcome (OR, 2.09; 95% CI, 1.54 to 2.84).

Effect Sizes of Patient Satisfaction: Continuous Data

Fourteen studies reported continuous data for patient satisfaction, of which 7 reported no statistical difference ($P > .05$) in patient satisfaction between team-based care and usual care. The remaining 6 papers showed that patients who received team-based care reported higher satisfaction than those treated by usual care. However, 3 papers did not provide primary data and were therefore excluded from the analysis. The test of overall heterogeneity for the 10 included trials resulted in $I^2 = 78\%$ and $P < 0.001$. Figure 2 shows that team-based care had a positive effect on patient satisfaction compared with usual care for papers which measured patient satisfaction as a dichotomous outcome (OR, 2.09; 95% CI, 1.54 to 2.04).
remaining 7 papers reported statistically significant differences between the 2 interventions. Seven papers did not provide means and/or standard deviations and thus were excluded from the analysis. The test of overall heterogeneity for the 7 included trials resulted in $I^2 = 93\%$ and $P < 0.001$.

Figure 3 shows that there was no significant difference in patient satisfaction between team-based care and usual care for papers reporting outcomes using a continuous measure (SMD, $2 = 0.02$; 95% CI, $2 = 0.36$ to 0.36).

**Discussion**

Team-based care is a growing trend in care delivery intended to have significant benefits for patients ranging from more informed decision making for complex conditions to improved access and reduced cost of care. Although these benefits have been described for team-based care, evidence for the impact of this approach on patient satisfaction remains underdeveloped. In this analysis, we found inconsistent results on the effectiveness of team-based care and usual care for papers reporting outcomes using a continuous measure (SMD, $-0.02$; 95% CI, $-0.40$ to 0.36).

As mean and standard deviation for the patient satisfaction outcome measure, which led to their exclusion from our analysis.

Teamwork is thought to be a prerequisite for good practice in health care. However, teams are diverse and range in a variety of factors, including number of members and disciplines. Therefore, it is necessary to clearly report the structure and process of team-based care and to explicitly describe the structure and process of usual care for comparison. These details are necessary for understanding the team-based concept being assessed, assessing the effectiveness of team performance, and understanding structural and procedural factors that may also affect the level of performance for comparative usual care. Unfortunately, many trials did not explicitly describe the care structure and process for team-based approaches, and most failed to do so for usual care. Generally, trial authors preferred depicting the structure and process of team-based care while omitting those of usual care. Measures of the process of care delivery for both intervention and comparison groups are required to adequately assess the effect of team-based care on clinical outcomes.

Patient satisfaction is increasingly the focus of research and evaluation of health care interventions and is identified as an important quality outcome indicator of health care in the hospital setting [45,46]. There are a number of methods available for assessing patient satisfaction. While multi-item questionnaires provide detail for rigorous studies, single-item measures offer simplicity and speed for the purposes of clinical audits. Whatever the method of assessment, authors should consider the performance of the assessment instrument in the design of their study. Over half of the trials included in this study failed to report the validation status of the measure used to assess patient satisfaction.
The purpose of teamwork is to improve communication and partnership among health providers and patients [47], promote quality and safety, and enhance patient satisfaction. While the merits of teamwork are well documented and the teamwork model is widely used, the positive relationship between teamwork and health care outcomes, particularly patient satisfaction, is not well documented. Our review provided some evidence to support the positive link between team-based care and patient satisfaction; however, this result is not consistent when assessing the literature based on how the outcome data were reported.

Our review has some limitations. First, there is no standard definition of a team. Studies evaluating collaborations of specific practitioners might not have described their model as a “team” and therefore would not be included in our study. Second, team-based care was not a consistent construct across the trials we reviewed. Moreover, measures of patient satisfaction as an outcome also varied significantly, as did the methods of reporting the outcome measures in the primary data. To address these concerns, we reported relative effect size indicators (ORs and SDMs) and performed a random effects meta-analysis. Third, the quality of trials was suboptimal. The results we report are inconsistent that team-based care might be better than usual care in achieving patient satisfaction. Nevertheless, considering the pooling result of continuous data, along with the suboptimal quality of included trials, further large-scale and high-quality randomized controlled trials comparing team-based care versus usual care, combined with clear definitions of usual and team-based care, are needed.

Supporting Information
Appendix S1 Search Strategy for MEDLINE. (DOCX)
Checklist S1 PRISMA Checklist. (DOC)

Author Contributions
Conceived and designed the experiments: JW KAS. Performed the experiments: JW KAS. Analyzed the data: JW KAS. Wrote the paper: JW KAS.

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