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Recent epidemiologic studies have found that most patients with mental illness are seen exclusively in primary care medicine. These patients often present with medically unexplained somatic symptoms and utilize at least twice as many health care visits as controls. There has been an exponential growth in studies in this interface between primary care and psychiatry in the last 10 years. This special section, edited by Jürgen Unutzer, M.D., will publish informative research articles that address primary care-psychiatric issues.

Collaborative care for pain results in both symptom improvement and sustained reduction of pain and depression ☆,☆☆,★

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ABSTRACT

Objective: Traditional analytic approaches may oversimplify the mechanisms by which interventions effect change. Transition probability models can quantify both symptom improvement and sustained reduction in symptoms. We sought to quantify transition probabilities between higher and lower states for four outcome variables and to compare two treatment arms with respect to these transitions.
Method: Secondary analysis of a year-long collaborative care intervention for chronic musculoskeletal pain in veterans. Forty-two clinicians were randomized to intervention or treatment as usual (TAU), with 401 patients nested within clinician. The outcome variables, pain intensity, pain interference, depression and disability scores were dichotomized (lower/higher). Probabilities of symptom improvement (transitioning from higher to lower) or sustained reduction (remaining lower) were compared between intervention and TAU groups at 0- to 3-, 3- to 6- and 6- to 12-month intervals. General estimating equations quantified the effect of the intervention on transitions.
Results: In adjusted models, the intervention group showed about 1.5 times greater odds of both symptom improvement and sustained reduction compared to TAU, for all the outcomes except disability.
Conclusions: Despite no formal relapse prevention program, intervention patients were more likely than TAU patients to experience continued relief from depression and pain. Collaborative care interventions may provide benefits beyond just symptom reduction.

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1. Introduction

Collaborative care interventions for depression have flourished in the last decade, demonstrating outcomes superior to usual care across a variety of treatment settings [1]. Collaborative or stepped care interventions for pain, or for both pain and depression, have similarly demonstrated improvements in pain-related disability and pain severity [2–6]. The average differences in outcomes between treatment and control groups in these studies have typically been ascertained by measuring changes between two time points, baseline and study completion. This provides an estimate of the overall effect of the intervention but fails to account for how symptoms changed during treatment.

The success of an intervention relies on both reducing symptoms among those who have them and ensuring that those without significant symptoms do not develop or resume having them. Changes between various degrees of symptoms are described as *transitions*. Studies of transitions in various outcomes such as mortality, exhaustion and pain have demonstrated that their balance influences population-level outcomes and that measuring only average differences between groups at a single endpoint often fails to explain *how* the group differences developed [7–10].

In the current study, we modeled and interpreted transitions between higher and lower symptom states among patients enrolled in a randomized controlled trial of collaborative care for chronic pain. We compared symptom improvement and sustained reduction for four of

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the study outcomes (pain intensity, pain interference, pain-related disability and depression) between intervention and treatment as usual (TAU) patients during three transition intervals. Because the intervention concentrated its efforts on patients in higher symptom states rather than on formal relapse prevention, we hypothesized that patients in the intervention group would be more likely to transition from higher to lower symptom states (defined here as symptom improvement) than TAU patients. Because the intervention did not specifically target relapse prevention, we hypothesized that intervention patients would be no more likely to remain in lower symptom states when they reached them (defined here as sustained reduction), for each outcome.

2. Methods

2.1. Setting, population and procedures

The Study of the Effectiveness of a Collaborative Approach to Pain (SEACAP) was a cluster-randomized trial of a collaborative care intervention for chronic musculoskeletal pain conducted at five primary care clinics of one Veterans Affairs Medical Center. Eligible patients had medical record documentation of musculoskeletal pain diagnosis, self-reported pain of at least 12 weeks duration prior to intake, scores of 4 or greater on both Chronic Pain Grade (CPG) Intensity and Interference scales and scores of 6 or greater on the Roland-Morris Disability Questionnaire (RMDQ). These scores represent moderate or greater levels of severity and disability [11–14]. Patients with documented diagnoses of fibromyalgia, chronic fatigue syndrome, somatization disorder, bipolar disorder, psychotic disorder, dementia or terminal illness were excluded, as were those with active suicidal ideation. Full details of study procedures are discussed elsewhere [5,15].

The study enrolled 42 primary care clinicians, 20 of whom were randomized to the Assistance with Pain Management (APT) collaborative care intervention [15]. Collaborative care interventions apply a structured framework to educate and activate patients, track symptoms and treatment adherence and make treatment recommendations. The primary APT team consisted of a full-time psychologist care manager and an internist, who spent up to one half day per week in the intervention [15]. Intervention primary care clinicians were invited to participate in two 90-min workshops about the APT intervention, chronic pain treatment and shared decision making. Patients in the intervention received an initial phone call, written educational materials and a list of community resources and an assessment visit with the care manager in order to survey pain-related behaviors and treatment barriers, identify psychiatric comorbidities and develop individualized functional goals. Patients were invited to attend a four-session workshop that presented a brief activating approach to pain management and provided additional educational materials that focused on self-management. After the initial assessment, every 2 months, the care manager contacted patients by phone to administer screenings for pain, depression and substance abuse; to assess achievement of goals and to provide support. If participants showed clinically meaningful improvements or remission, a watchful waiting approach was taken until the next APT reassessment point. If there was no or inadequate improvement, or in the event of recurrence of symptoms, the care manager worked with clinicians to adjust the treatment plan or arrange for specialist care. Participants in the usual care arm were not restricted from using any services related to pain or mental health; upon enrollment, a note was placed in their medical records indicating their participation in the study.

2.2. Measures and data collection

At baseline, 3, 6 and 12 months, research assistants who were blinded to group assignment contacted patients by phone or mail to administer assessments of pain, disability, depression and other health outcomes. Research assessment results were not shared with the APT intervention team.

We analyzed four patient-level variables, dichotomizing each into higher and lower symptom states. The RMDQ is a well-validated 24-item self-report measure that assesses functional limitations in patients with chronic pain [12]. Scores are sensitive to changes during treatment [16]. It was initially developed for back pain, but the questions were modified to refer to pain in general [15]. Patients indicate whether, "today," their activities are limited by pain (e.g., "I get dressed more slowly than usual because of my pain"). Items are scored as yes=1 and no=0, and scores of 14 or greater define higher disability in patients with chronic musculoskeletal pain [12,16]. The Patient Health Questionnaire (PHQ-9) has been well validated as an outcome and severity measure for depression [17]. It encompasses nine items assessing depression symptoms over the past 2 weeks (e.g., "Little interest or pleasure doing things"), each with four response options (0, none of the days; −3, nearly every day); scores of 11 or greater indicate a higher degree of depression [18]. The CPG is a validated measure of current and prior 3-month pain intensity (3 items rated 0=no pain to 10=pain as bad as could be) and interference (4 items) [11]. The items are transformed to a scale of 0–100. While the CPG has been found to be a valid instrument for assessing change in pain over time [19], the cutoff between "high" and "low" pain has not been well established. We considered that >50 signified higher intensity or interference and ≤50 represented lower intensity or interference. For a sensitivity analysis to ascertain the importance of cutoffs on transitions, we classified ≥50 as higher intensity or interference.

Sociodemographic measures were obtained by self-report. Here we included marital status (married, yes/no), education (beyond high school, yes/no) and race/ethnicity (white, black and American Indian/Alaskan Native).

2.3. Analyses

Analyses were based on 12 transition intervals: 4 symptoms (pain intensity, pain interference, disability and depression) by 3 periods (0–3 months, 3–6 months and 6–12 months). Intervals for which both the stating state and the ending state were measured prior to patient drop-out, death or exclusion were included; pairwise deletion was used for intervals with missing data points. In order to avoid considering very small changes as transitions, minimally clinically important differences (MCIDs) were defined as ≥3 points change (out of 24 total) for the RMDQ, ≥3 points change (out of 27 total) for the PHQ-9 and ≥5 for each of the 100-point CPG scales. We chose these as minimums because they represented 10% or more percent of the value at the transition threshold (e.g., 50 points on the CPG scales) and corresponded roughly to other MCIDs in research [20,21]. Differences less than these cutoffs that generated a transition between states were considered to have remained in the starting state.

We first compared at a bivariate level the fraction of TAU and APT patients who had either symptom improvement or sustained reduction. Next, to test the effect of intervention on transitions, we created logistic regression models. The first model estimated the odds of symptom improvement among those who started in higher symptom states. The second estimated the odds of sustained reduction, for those who started in a lower symptom state. Odds ratios (ORs) were calculated using generalized estimating equations to account for nesting of time within patients and patients within providers. Models were adjusted for years of age, sex, education, marital status and race/ethnicity. Because we were interested in intervention effects rather than the predictors of transitions, we did not control for diagnoses or baseline values of the variables.

Because there is no consensus about cutoffs for higher pain intensity and pain interference on the 100-point CPG scales, and because a large number of participants rated their pain intensity or interference at a score of exactly 50, we constructed an alternate set of models using 50 or greater (instead of greater than 50) as an indicator of the higher state. We calculated the same transitions