

Cognitive Impairment and Reduced Early Readmissions in Congestive Heart Failure?

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ABSTRACT

OBJECTIVES: Cognitive impairment is: a) a known prospective predictor of hospital admissions and adverse medical outcomes; b) common in those medical populations identified by CMS as having high 30-day readmissions rates (eg, congestive heart failure [CHF]); and c) known to adversely impact adherence, particularly for medication regimens. Our objective was to examine early (30-day) readmission rates in hospitalized patients with CHF on a cardiology service where a health psychology liaison/consult service was instituted relative to the patients with CHF in the remainder of the hospital.

STUDY DESIGN: Nonrandomized, comparative effectiveness intervention study.

METHODS: Monthly readmission rates for patients with CHF were observed on an inpatient cardiology service where a health psychology liaison/consult service was instituted compared with CHF patients admitted to the general medicine floors and a separate cardiology service.

RESULTS: We observed an average readmission rate of 16% compared with a sister cardiac service (21.5%) and the remainder of the hospital (22.8%)—a 30% reduction in early readmissions.

CONCLUSIONS: In addition to the improved clinical outcomes (avoidance of recurrent medical crises) for every 100 such patients admitted, we estimate savings of \$151,200, at a cost of \$33,500, for the first month after discharge for the insurer. A randomly assigned, controlled clinical trial test of this hypothesis is warranted.

Cognitive impairment (CI) is highly prevalent in patients with chronic illnesses identified as having high readmission rates by CMS,^{1,2,3} such as congestive heart failure (CHF),^{4,5} end-stage renal disease,^{6,7} and chronic obstructive pulmonary disease.⁸⁻¹⁴ CI is also a known prospective predictor of longer-term hospital admissions and deaths.¹⁵⁻¹⁸ Poor adherence is a frequent consequence of cognitive impairment,^{19,20} particularly when the family and/or patient have not yet recognized and intervened for the evolving problem, or the patient is not in a setting (eg, nursing home) that supervises medication administration. According to the largest epidemiological study ever done of cognitive impairment in the United States in the 1980s, about 11% of people over age 55 have cognitive impairment and 80% of these are undiagnosed.²¹ Recognition rates for CI by medical practitioners have been documented to be astonishingly poor, averaging about 10% to 20%.^{4,22,23}

Most comorbid conditions that predispose to chronic illness also adversely affect brain tissue (eg, hypertension, diabetes, smoking, sedentariness, obstructive sleep apnea) and, thus, cognitive functioning. Therefore, it should not surprise us that CI is common in populations with chronic illness. In addition, many other conditions associated with aging also adversely affect brain tissue. Several alternative causes and factors have been found to prospectively predict medical outcomes: depression/anxiety, substance abuse, and health illiteracy all may be confounded with CI.⁷

Astonishingly, CI is usually ignored in discussions of adherence and readmissions appearing in major journals.²⁴⁻³⁴ Efforts to date have succeeded in reducing readmissions if, and only if, they have

(inadvertently) compensated for the patient's limitations by having ongoing involvement of external personnel (generally nurses) who, among other tasks, check medication refills and adherence.³⁵⁻⁴² The simplest and most plausible explanation for these results is that self-care (ie, prescription renewals, pill-taking, symptom-monitoring, and coping) is beyond the cognitive ability of these patients to do consistently and reliably.^{19,20} Because such programs are manpower-intensive, they are also expensive and likely to fail if insurance does not support them, the scheduling of personnel fails, or other hiatuses occur. Educating and involving family and significant others to compensate for the patient's "forgetfulness" may be both a more effective, and more cost-effective, strategy.

Using the Mini-Cog screening exam with the cut-off proposed here, we found that the prevalence of CI in hospitalized CHF patients is at least 54% and that CI is the strongest single predictor of early readmission compared with disease severity (measured by British natriuretic peptide levels and ejection fraction), age, educational level (a strong correlate of health literacy), comorbid conditions, and substance abuse.⁴ A history of having been prescribed an antidepressant medication, usually for nonpsychiatric reasons, such as stress, pain, or sleep, was a significant secondary predictor of early readmission in this sample.

Hypothesis: Clinical Effectiveness

We hypothesized that the addition of a health psychology service to an inpatient cardiology service will result in a reduction of 30-day readmissions for CHF patients. This service would be tasked with proactively identifying cognitively impaired patients, conducting psychoeducation with patients/families, and eliciting compensatory assistance for the patient.

METHODS

Subjects

Patients admitted to the Henry Ford Hospital Cardiology Teaching Service (I5) for new onset CHF, or CHF exacerbation, were identified as being "at risk" for having CI (or somatized anxiety/depression) in 3 ways: 1) routine IT scans of less than 30-day readmissions were run every 24 hours by use of the electronic health record (EHR); 2) a cardiology nurse practitioner identified new admissions with risk factors for CI based on our prospective data⁴; and 3) episodic resident education regarding characteristics likely related to CI (including being a "poor" historian, otherwise unexplained fluid imbalances, blood pressure excursions, or glucose dyscontrol, medically unexplained physical symptoms).

A health psychology liaison/consult service was initiated at I5 in mid-December 2013. Because of manpower limitations, for calendar year 2014, only about 17% of all admissions to I5 were seen by the health psychology service (n = 489 of 2870 total admissions).

Patients identified as at-risk for CI were approached during their

hospital stay and offered participation in a program intended to "help you stay healthy and out of the hospital." Patients were eligible for the intervention if they assented and displayed: a) symptoms of anxiety, depression, irritability (eg, panic-like events, worry, poor sleep, sad mood, tearfulness, passive suicidal ideation, chronic frustration, or aggravation), or medically unexplained/excessive physical symptoms (eg, chest pain, palpitations, dyspnea, presyncope, chronic fatigue) (n = 83); b) symptoms suggestive for substance abuse (mostly cocaine) and confirmed by toxicology screens (n = 23); c) loud snoring and excessive daytime sleepiness (n = 12); or d) cognitive impairment (as defined by the Mini-Cog test) while not delirious/encephalopathic (ie, difficulties awakening or staying awake, acutely confused, hallucinating, waxing/waning behavior per observation by floor staff or family, or "not him/herself" per family) (n = 486).

Patients were excluded if they refused to participate (n = 6) or delirium did not resolve during the hospital stay (n = 2). If the patient was delirious/encephalopathic on initial contact, recruitment was delayed until they were at baseline. Given the pre-selection based on risk factors for CI, it is still notable that only 3 of 489 patients (<1%) did not display at least mild cognitive impairment. Institutional review board approval for use of quality improvement de-identified nomothetic data was obtained.

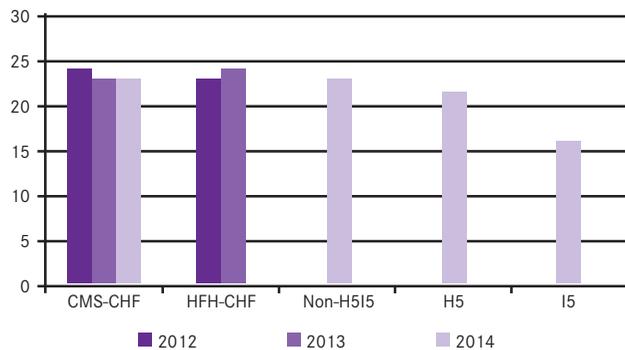
If not delirious/encephalopathic, or when delirium had resolved, patients were administered the Mini-Cog (described below) or the Montreal Cognitive Assessment test (MOCA) to determine the presence or absence of cognitive impairment. Patients and families were eligible for psychoeducation for the study if the patient met any of the following criteria: a) was unable to repeat 3 simple nouns after the recruiter on the first try—assuming no environmental distractions and adequate hearing (immediate memory); b) was unable to name the current month, year, and building they were in (orientation); c) made 2 or more mistakes on the clock-drawing test (executive function); or d) could not remember at least 2 of the 3 items after 3 to 5 minutes of distraction (short-term memory). Early identification permitted recruitment visit(s) as needed, as well as time to involve family and conduct the psychoeducational intervention.

Instruments

A semi-structured clinical, demographic interview was conducted to determine the patient's age, sex, ethnicity (Caucasian, African-American, Middle East/Asian, other), living circumstances (homeless, alone, with friend, with family, nursing home/group home/adult foster care home/home healthcare), years of education, insurance status, comorbid medical conditions, major psychiatric disorder, history of substance abuse, history of antidepressant use/recommendation or history of soporific use/recommendation, chronic pain, number of past-year admissions, symptoms of sleep apnea.

These data were checked against the EHR and, if available, the family report to determine and maximize accuracy. Because this sort of

Figure. First Full Year of a Health Psychology Service Targeting Cognitively Impaired Patients With Congestive Heart Failure and Measuring Percentage of 30-Day Readmissions



CHF indicates congestive heart failure; HFH, Henry Ford Hospital; H5, Hospitalist Cardiology Service at HFH; I5, Cardiology Teaching Service at HFH; non-H5I5, general medicine floors at HFH.

data can be denied, confabulated, or frequently misreported—even by cognitively intact patients^{43,44}—it is important to check available history against these alternate sources. Only 3 patients in our sample did not have at least a mild degree of CI; therefore, our sample was even more likely to comprise unreliable historians, some of whom likely minimized/denied stigmatized information, such as psychiatric history or substance abuse,⁴⁵ making it even more critical that we used all 3 sources.

The MOCA or the Mini-Cog test was used to detect CI when the patient was at baseline. The Mini-Cog is a widely used cognitive screening exam that is both validated and reliable.⁴⁶⁻⁴⁸ It has the advantage of assessing executive function over the more widely used Mini-Mental State Examination⁴⁹ and brevity and ease-of-use over the MOCA.^{50,51} We have used the Mini-Cog exam to identify at-risk patients in our studies to date, with success at predicting early readmission.⁴

Procedures

Recruitment and demographic/clinical evaluation. At-risk, CI-identified patients admitted to the cardiology teaching floor of Henry Ford Hospital with a diagnosis of new onset CHF or exacerbation of CHF were approached, the purpose of the consult explained (“to help you stay healthy and out of the hospital”), and a psychosocial history and mental status exam were obtained, including the Mini-Cog or the MOCA. If the patient was delirious, the history and baseline mental state were obtained from family.

Intervention. Patients with documented substance abuse were educated about the cardiac toxicity of the drug and offered referral to treatment programs. Patients with somatized anxiety or depression were recommended for a trial of a low-dose serotonin selective reuptake inhibitor, chosen to avoid drug-drug interactions and weight gain (typically 10 mg of citalopram [AM with food]), and referred for outpatient psychiatric follow-up, if receptive. Patients

with symptoms of sleep apnea were referred to the Sleep Disorders Center for consideration of a polysomnogram and continuous positive airway pressure.

For patients displaying baseline CI, all members of the patient’s treatment team (attending physician, resident, fellow, nursing, and case manager) were encouraged to convey concern about the effect of CI on adhering to the complex medication regimens. Patients and/or families were approached with “Destigmatized Cognitive-Behavioral Psychoeducation”—educating the patient/family member(s) about the frequency and nature of CI and encouraging them to participate as collaborators in coping with this cognitive complication of the illness. An extended description of our strategy for engaging and educating patients/families is available upon request.

Outcomes. Henry Ford Hospital’s 30-day readmission rates are routinely tracked by our IT system, providing feedback to practitioners and services regarding performance on this measure. We took our monthly average rates for CHF readmissions to our I5, our other hospitalist-run cardiac floor (H5), and those for the remainder of the hospital (non-I5H5) as our outcome measure.

Analyses

Unless otherwise stated, a P value of $<.05$, 1-tailed test was used.

RESULTS

For I5, the average monthly 30-day readmission rate was 16%. For H5 it was 21.5%, and for the remainder of the hospital, it was 22.8%. Nationally reported figures from CMS average about 23%. A 1-tailed Student’s t test ($N = 12$) comparing average monthly 30-day rates for I5 versus non-I5H5 yielded $P = .007$. For I5 versus H5, $P = .052$ (see **Figure**).

DISCUSSION

Present results suggest a significant reduction in early (30-day) readmissions among hospitalized CHF patients on an inpatient service where patients were proactively identified and evaluated, and subsequently underwent intervention for cognitive impairment, relative to national averages reported by CMS and hospital averages. Present results are congruent with other studies documenting CI as a prospective predictor of readmissions and nonadherence. In addition, these results complement several dozen published studies that found spontaneously reduced medical utilization (eg, hospital stays, length-of-stay, overall costs), as well as our own finding of reduced early readmissions in patients with acute myocardial infarction who screened positive for anxiety/depression and were receiving a psychiatric consult versus those not receiving one.⁵²

We believe the present analyses represent a weak test of our hypothesis. Because we only intervened with about 20% of all CHF patients admitted to I5, when 50% or more were known to have CI,^{4,5,18} the present results may be a conservative test of the effect. Might a greater reduction have been observed if we saw 30%, 40%, or 50% of the CHF sample?

Cultural Contamination?

On the other hand, is there a plateauing of this effect by the “cultural change” caused by the presence of a behavioral clinician on the care provided by the team to other patients, sometimes referred to as a “cultural change,” “paradigm shift,” “contamination,” or “transfer effect.”⁵³ The presence of a behavioral clinician likely changes the care of not just the patients seen, but of the patients seen by collaborating clinicians whose interest and understanding is altered by cases shared with the behavioral clinician.

Proactive Identification

We believe it is likely that the apparent success of our intervention resulted, in part, because we were proactive about early case-finding of patients with various characteristics that made the presence of CI likely. These included early readmission, comorbid conditions, and clinical characteristics (eg, being a “poor historian,” unexplained metabolic derangements). Because spontaneous identification of CI is extremely poor^{4,21,22} such proactive identification of at-risk patients is almost certainly a necessity for timely recognition, evaluation, and intervention. Early identification enables time to evaluate the patient, educate the patient and family, and plan efforts to avoid another medical crisis.

Return on Investment

The professional time required for our proposal is currently reimbursable under all insurance programs, including Medicare and Medicaid. If the intervention reduces readmissions on 100 patients from about 23% to 9% in the first month, we project savings of \$151,200 (14 admissions avoided × 4.5 days/admission × \$2400/day) in the first month alone (not to mention a significant improvement in quality of life, reduced medical crises and, perhaps, deaths), for a net expenditure of \$33,500 (100 patients × \$335/patient for in-patient psychiatric care and first month’s costs). Net savings in the first month then would be \$117,700 to the payer. The net savings over longer periods can only be guessed at currently, but may prove substantial. Regardless of the net cost/savings, this intervention improves clinical outcomes for patients by decreasing potentially fatal medical crises. For the hospital, the cost of the system of care being provided is covered by billing for the psychological services rendered.

Thus, the introduction of a health psychology service to a treatment team caring for CHF patients produces a higher “value” of care—better outcomes with reduced costs. We do not yet know whether other populations with high early readmission rates (eg, end-stage renal disease, chronic obstructive pulmonary disease) would display a similar increase in value. We suspect the prevalence rates of various behavioral factors affecting readmission may vary across medical populations.

Limitations

We must note that the present study was not a randomly assigned,

controlled clinical trial. Therefore, we cannot be certain that all known or unknown potential selection/historical confounds (eg, average age, active smokers, exercisers, psychiatric history, number and kind of comorbidities, substance abuse, sex ratios, educational level) were not different across our groupings in a manner that biased the results in favor (or against) our results. For funding agencies, such a trial should have the highest priority.

CONCLUSIONS

If evidence-based care of CHF patients that maximizes effectiveness, safety, and efficiency is the goal, enhanced recognition of cognitive impairment and more proactive management of adherence is a necessity.

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