

ORIGINAL ARTICLE

Feasibility of Computerized Adaptive Testing for Collection of Patient-Reported Outcomes After Inpatient Rehabilitation



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Abstract

Objective: To evaluate the feasibility of computer adaptive testing (CAT) using an Internet or telephone interface to collect patient-reported outcomes after inpatient rehabilitation and to examine patient characteristics associated with completion of the CAT-administered measure and mode of administration.

Design: Prospective cohort study of patients contacted approximately 4 weeks after discharge from inpatient rehabilitation. Patients selected an Internet or telephone interface.

Setting: Rehabilitation hospital.

Participants: Patients (N=674) with diagnoses of neurologic, orthopedic, or medically complex conditions.

Interventions: None.

Main Outcome Measure: CAT version of the Community Participation Indicators (CAT-CPI).

Results: From an eligible pool of 3221 patients, 674 (21%) agreed to complete the CAT-CPI. Patients who agreed to complete the CAT-CPI were younger and reported slightly higher satisfaction with overall care than those who did not participate. Among these patients, 231 (34%) actually completed the CAT-CPI; 141 (61%) selected telephone administration, and 90 (39%) selected Internet administration. Decreased odds of completing the CAT-CPI were associated with black and other race; stroke, brain injury, or orthopedic and other impairments; and being a Medicaid beneficiary, whereas increased odds of completing the CAT-CPI were associated with longer length of stay and higher discharge FIM cognition measure. Decreased odds of choosing Internet administration were associated with younger age, retirement status, and being a woman, whereas increased odds of choosing Internet administration were associated with higher discharge FIM motor measure.

Conclusions: CAT administration by Internet and telephone has limited feasibility for collecting postrehabilitation outcomes for most rehabilitation patients, but it is feasible for a subset of patients. Providing alternative ways of answering questions helps assure that a larger proportion of patients will respond.

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Feedback from patients discharged from rehabilitation settings is critical for advancing rehabilitation services and research.¹ Medical rehabilitation and neurologic populations can expect to live close to

a normative life span because of improved medical services and technology.² However, they may experience recurring health issues that limit community participation. Therefore, tracking patients' postdischarge health status and measuring their long-term outcomes are becoming important activities for rehabilitation providers.^{3,4}

Patient-reported outcome (PRO) measures after discharge are typically administered via mailed questionnaires or telephone interviews with hospital staff members. Mailed surveys suffer from low response rates; interview methods are costly and time-consuming.⁵⁻⁷

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Measuring PROs using computerized adaptive testing (CAT) is an alternative data collection method that can maximize patient engagement and minimize costs.^{8,9} CAT is a process of test administration in which items are selected on the basis of respondents' answers to previously administered items. This process requires that the hierarchically ordered item pools are created by item response theory methods and use an algorithm to estimate person ability and choose the next best item to administer using test specifications (eg, content coverage, desired length of precision).¹⁰ Two modes of CAT administration are available¹¹: automated telephone technology using interactive voice response (IVR) systems and Internet websites. Because of its ability to restrict questioning to a limited number of discriminative items, CAT offers the opportunity to be more responsive than conventional, fixed-length assessment tools and reduce respondent burden without loss of precision.¹² In addition to improving efficiency and responsiveness, other CAT advantages over conventional methods include immediacy of feedback, communication on a common metric, and dynamic tailoring of test difficulty to the level of the individual.^{13,14} PROs collected via CAT platforms are recognized as an important method to enhance patient-centered treatment and decision-making.¹⁵ However, the higher upfront costs involved with developing and maintaining the CAT, staff training on CAT administration, and the technology associated with data security and privacy may be potential barriers that restrict PROs collected via CAT platforms.¹⁶ During the recent decades, CAT administration has demonstrated feasibility for collecting patient outcomes in primary care settings.^{17,18} Few studies have evaluated the feasibility of PRO data collection via CAT platforms with medical rehabilitation populations. Feasibility was assessed with regard to survey completion, acceptability, time to completion, and mode of survey administration.¹⁸ The heterogeneous nature of medical rehabilitation populations requires that careful consideration be given to the optimal CAT platform for measuring PROs. Given our limited knowledge, we aimed to examine the utility of CAT as a data collection strategy for collecting postrehabilitation PROs and investigate the patient characteristics related to the completion and selection of 2 CAT platforms. We used a CAT-administered measure to assess community participation, an important long-term outcome for rehabilitation research and practice,¹⁹⁻²¹ with a sample of patients after discharge from inpatient rehabilitation. We also evaluated their preferences for Internet or IVR administration. We sought to answer the following 2 questions: (1) What patient characteristics are associated with the completion of a CAT-administered participation measure? (2) What patient characteristics are associated with the likelihood of selecting either Internet or telephone administration?

Methods

Study design

We used a prospective cohort design to study patient characteristics associated with completing the CAT-administered measure

List of abbreviations:

CAT	computerized adaptive testing
CAT-CPI	CAT version of the Community Participation Indicators
CI	confidence interval
IVR	interactive voice response
LOS	length of stay
PRO	patient-reported outcome
OR	odds ratio

and the selected mode of administration. Our institutional review board approved the research procedures.

Setting and procedures

Patients received inpatient services from a 182-bed, Midwestern, freestanding urban hospital. The hospital's outcomes management department asks patients to participate in a satisfaction survey 1 month after discharge by telephone. The hospital has a recruitment quota of 40% of discharged patients. After completing the satisfaction survey, the hospital staff members asked patients if they would complete a CAT version of the Community Participation Indicators (CAT-CPI).²⁰ If they agreed, they were asked whether they preferred to do so on a secure website or using an IVR system. The manager of the outcomes management department agreed to invite all patients who provided self-reports on the satisfaction interview to complete the CAT-CPI between July 2009 and June 2011. Interviewers received reminders routinely to invite eligible patients and received notification and encouragement when they achieved recruitment milestones. Patients are called at different times (office and nonoffice hours and weekdays and weekends) to minimize selection bias. Patients who agreed to complete the CAT-CPI received a postcard with information about the login procedure; they received a reminder postcard if they had not logged on to the system 2 weeks after the first postcard was mailed.

Participants

Patients were eligible if they were aged ≥ 18 years, had a length of stay (LOS) > 1 day, and served as their own informant during the postdischarge interview. We excluded patients who were readmitted before they were eligible to complete the satisfaction survey, were < 18 years old, had a LOS ≤ 1 day, and for whom proxies completed the satisfaction survey. We also excluded patients who did not report correct contact information, those who were deceased, or those who did not answer the telephone when a staff member called for the postdischarge satisfaction survey. Because our selection criteria only included patients who served as their own informant, rather than included on a nonselected bias, it is likely that persons who were too cognitively impaired or unable to comprehend English-language study materials were excluded. Patients received no compensation for participation.

Measures

Patients completed the CAT-CPI.²⁰ Part I of the CAT-CPI is a fixed-length set of items measuring the frequency with which people participate in 20 activities, the importance of each activity, and the level of satisfaction with the activity frequency. Respondents saw only 1 item on each screen and could not skip questions. Part II consisted of 2 item banks measuring community enfranchisement.²² The first bank measures the importance of participation, and the second bank assesses control over participation. We used the same CAT algorithm for both banks. We set the minimum number of items to be administered for each bank at 5. Patients were able to log in to the system repeatedly to complete the CAT-CPI. We merged data from the CAT-CPI with the hospital database that included the Inpatient Rehabilitation Facility Patient Assessment Instrument²³ and satisfaction with hospital care data.

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