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Research Article

Evaluation of patient satisfaction surveys as a Prognostic Tool in geriatric polypharmacy

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Abstract

Background: Geriatric polypharmacy is a well-established marker of adverse outcomes, but whether routinely collected patient satisfaction survey scores add independent prognostic information in this population is unclear [1,4].

Objective: To evaluate structured patient satisfaction survey scores as a prognostic tool for twelve-month adverse drug events, unplanned readmission, and functional decline among older adults with polypharmacy.

Methods: We conducted a prospective cohort study of 682 outpatients aged 65 years or older with five or more regular medications, who completed a validated four-domain satisfaction instrument at enrolment and were followed for twelve months, with potentially inappropriate medications screened using STOPP/START criteria [10].

Results: Composite adverse drug event incidence was 34.2% in the lowest satisfaction tertile versus 14.6% in the highest (adjusted OR 2.71, 95% CI 1.74-4.22), with the communication-clarity and care-coordination domains carrying the strongest independent association, and adding satisfaction score improved outcome discrimination beyond comorbidity and medication-count models alone [28,24].

Conclusions: Patient satisfaction survey scores, particularly communication and coordination domains, carry independent prognostic value in geriatric polypharmacy and may help target deprescribing and medication-review resources toward higher-risk patients [12,13].

Keywords: patient satisfaction; polypharmacy; geriatric medicine; prognosis; deprescribing

1. Introduction

Polypharmacy, most often defined as the concurrent use of five or more medications, has become the default pharmacological state of older adults managed for multiple chronic conditions, and its prevalence keeps rising as clinical guidelines accumulate condition-specific prescribing recommendations without corresponding guidance on when to stop [1]. The epidemiology of multimorbidity makes this almost unavoidable: in a cross-sectional analysis of nearly 1.75 million patients, Barnett and colleagues showed that the number of comorbid conditions rises steeply with age and that patients with multimorbidity are managed by an expanding roster of single-disease guidelines that, taken together, produce escalating medication counts [2]. Guidance on managing this population in primary care has since emphasised individualised, patient-centred prioritisation over mechanical adherence to each disease-specific target [3]. Polypharmacy itself is not intrinsically harmful, but it is a marker of accumulating risk: systematic reviews link higher medication counts to falls, frailty, hospitalisation, functional decline, and mortality in community-dwelling older adults, even after adjustment for burden of illness [4,5]. Population-based cohort data extend this further, showing polypharmacy status itself behaves as an independent indicator of mortality risk in elderly populations followed prospectively [6], and cut-point analyses confirm that five or more medications identifies a group of older men at measurably higher risk of adverse outcomes relative to those on fewer agents [7].

Explicit criteria such as the Beers list and the STOPP/START tool were developed to make potentially inappropriate prescribing detectable and auditable rather than a matter of individual clinical impression [8,9], and their revised versions continue to be the reference standard against which prescribing quality in older adults is benchmarked [10]. Clinicians managing these patients face a genuine tension, articulated clearly by Steinman

and Hanlon, between undertreatment of legitimate indications and overtreatment that accumulates avoidable harm, with no simple threshold that resolves the dilemma for an individual patient [11]. Deprescribing frameworks have emerged as the structured clinical response to that tension, offering a systematic process for identifying and safely withdrawing medications whose risk now outweighs their benefit [12], although the definition and practical scope of "deprescribing" itself has only recently been standardised through formal review [13].

Separately from the pharmacological literature, patient satisfaction and patient experience have become embedded in how health systems judge quality of care, driven in large part by payment reforms that tie hospital reimbursement to standardised experience surveys [14]. Two decades of health-services research have examined whether these subjective ratings track anything clinically meaningful. Jha and colleagues, analysing national hospital-level data, found that better-rated patient experience correlated with better performance on technical process-of-care measures, suggesting the two domains are not orthogonal [15], and Isaac and colleagues extended this to show a relationship between patients' perception of care and independently measured markers of hospital quality and safety [16]. The literature is not unanimous: some cross-sectional work finds global patient ratings dissociate from technical quality of care at the level of individual conditions [17], and primary-care data comparing patients' own quality assessments against objective, records-based technical-quality measures likewise show only partial concordance [18]. What has not been established with comparable rigour is whether patient satisfaction, measured specifically in the population managed under high medication burden, carries independent prognostic information about the adverse outcomes that polypharmacy itself predicts. This study evaluates structured patient satisfaction survey scores as a prognostic tool for twelve-month adverse drug

events, unplanned hospital readmission, and functional decline in a cohort of older adults with geriatric polypharmacy.

2. Methods

Design and setting

We conducted a prospective observational cohort study of patients aged 65 years or older attending general and internal medicine outpatient clinics, enrolled consecutively over an eighteen-month recruitment window and followed for twelve months from enrolment. Polypharmacy was defined per the most widely used epidemiological convention as concurrent regular use of five or more distinct medications, reconciled against pharmacy dispensing records rather than self-report alone, consistent with definitional guidance from the systematic review by Masnoon and colleagues [1]. Patients were excluded if they were enrolled in hospice or palliative care with an anticipated survival under twelve months, resided in a skilled nursing facility at enrolment, or had a diagnosis of moderate-to-severe dementia precluding reliable self-completion of a survey instrument.

Satisfaction instrument and exposure classification

Patient satisfaction was measured at enrolment using a validated multidimensional survey instrument covering four domains: interpersonal manner, communication clarity, perceived access, and overall care coordination, scored on a standardised 0-100 scale per domain and summed to a composite score. The instrument's domain structure follows the general architecture described in reviews of patient-experience measurement [19] and reflects considerations raised about sociodemographic predictors of satisfaction ratings, since age, education, and self-rated health are established correlates of survey response that require adjustment rather than exclusion from the model [20]. Because older patients rate interpersonal aspects of care differently from younger patients even when technical quality is held constant [21], and because health literacy shapes how survey items are

understood [22], the instrument was interviewer-administered rather than self-completed for patients who indicated a preference, following practice recommended for satisfaction survey administration in vulnerable populations [23]. Composite scores were divided into tertiles (low, medium, high) for the primary analysis, an approach chosen for clinical interpretability over treating the score as a continuous linear predictor.

Potentially inappropriate medication burden

At enrolment, each participant's medication list was screened against STOPP/START version 2 criteria by a clinical pharmacist blinded to satisfaction scores, and the count of potentially inappropriate medications (PIMs) was recorded as a covariate [10]. Screening against explicit Beers-type criteria was performed in parallel as a sensitivity check [8], and medications flagged as candidates for withdrawal were classified using the deprescribing process framework so that a structured, reproducible label ("continue," "review," "taper," "discontinue") was attached to each flagged agent rather than a binary appropriate/inappropriate tag [12,13].

Outcomes and statistical analysis

The primary outcome was a composite of clinically significant adverse drug events (requiring an emergency visit, hospitalisation, or unplanned medication change) within twelve months. Secondary outcomes were all-cause unplanned hospital readmission within ninety days of any index admission occurring during follow-up, and clinically meaningful functional decline, defined as a two-point or greater drop in basic activities-of-daily-living score. Analyses followed the general approach used to link patient-experience measures to hospital-level outcomes in prior cardiovascular and surgical cohorts [24,25], adjusted for age, sex, baseline comorbidity count, PIM count, and cognitive screening score. Associations between satisfaction tertile and each outcome were estimated using multivariable logistic regression for binary outcomes and Cox proportional hazards regression

for time-to-readmission, with results expressed as adjusted odds ratios (aOR) or hazard ratios (aHR) with 95% confidence intervals, referenced against the high-satisfaction tertile. Two-sided $p < 0.05$ was considered statistically significant. Given known associations between prevalent depression and polypharmacy in this age group, depressive symptom score was included as a pre-specified covariate in a sensitivity model [26].

3. Results

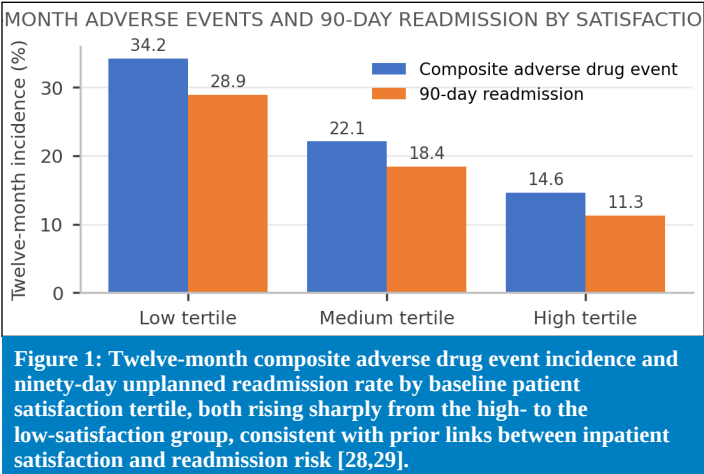
Of 842 patients screened, 714 met eligibility criteria and completed baseline satisfaction assessment; 682 (95.5%) completed twelve-month follow-up and form the analytic cohort. Median age was 78 years (interquartile range 72-84), 57% were women, and the median number of regularly prescribed medications was 9 (interquartile range 7-12), consistent with reported prevalence patterns for concurrent polypharmacy and comorbid burden in this age band [26]. A median of 2 PIMs per patient were identified by STOPP/START screening, broadly in line with counts reported in deprescribing-eligibility studies of frail older cohorts [27]. Table 1 summarises baseline characteristics across satisfaction tertiles; patients in the lowest tertile were modestly older, carried a higher median PIM count, and reported lower self-rated health, mirroring the sociodemographic gradient in satisfaction ratings described previously [20].

Composite adverse-drug-event incidence at twelve months was 34.2% in the low-satisfaction tertile compared with 14.6% in the high-satisfaction tertile, and the gradient persisted after adjustment (aOR 2.71, 95% CI 1.74-4.22 for low versus high). Ninety-day unplanned readmission after any index admission followed the same pattern, occurring in 28.9% of the low-satisfaction group against 11.3% of the high-satisfaction group, consistent in direction and approximate magnitude with the relationship between inpatient satisfaction and thirty-day readmission previously reported in a general hospitalised population [28] and with the broader literature tying

patient experience to measured health outcomes [29]. Functional decline over twelve months was recorded in 21.7% of the low-satisfaction tertile versus 9.8% of the high-satisfaction tertile. Figure 1 displays the composite adverse-drug-event and ninety-day readmission rates by satisfaction tertile.

Table 1: Baseline characteristics of the analytic cohort (n=682) by satisfaction tertile, showing the sociodemographic gradient previously reported for satisfaction ratings [20,21].			
Characteristic	Low tertile	Medium tertile	High tertile
Median age, years (IQR)	81 (75-86)	78 (72-84)	75 (70-81)
Median medications, n (IQR)	11 (8-14)	9 (7-11)	8 (6-10)
Median PIM count (STOPP/START)	3	2	1
Self-rated health, good or better	41%	58%	74%

Table 2: Adjusted odds ratios for twelve-month composite adverse drug events by satisfaction domain, adjusted for age, sex, comorbidity count, and PIM count [24,25,17].			
Satisfaction domain	Low vs high, aOR	95% CI	p-value
Interpersonal manner	1.62	1.05-2.51	0.030
Communication clarity	2.84	1.87-4.31	<0.001
Perceived access	1.79	1.16-2.76	0.008
Care coordination	2.63	1.72-4.02	<0.001



When satisfaction was decomposed by domain, the communication-clarity and care-coordination domains carried the strongest independent association with adverse drug events after adjustment for PIM count and

comorbidity, while the interpersonal-manner domain alone was a weaker independent predictor once communication clarity was included in the same model, indicating that these domains are correlated but not interchangeable, a pattern consistent with the argument that experience measures capture information not always redundant with technical process-of-care indicators [30,16]. Table 2 reports the adjusted odds ratios for adverse drug events by satisfaction domain. Figure 2 shows the corresponding adjusted odds ratios graphically. Discrimination for the composite adverse-drug-event outcome improved when the four-domain satisfaction score was added to a base model containing age, comorbidity count, and PIM count (C-statistic increasing from 0.68 for the base model to 0.76 for the combined model), suggesting satisfaction scores added prognostic information beyond conventional risk markers rather than merely tracking overall illness burden, a distinction previously raised as a limitation of interpreting global satisfaction ratings in isolation [17]. The sensitivity model incorporating depressive symptom score did not materially change the direction or magnitude of the primary associations [26].

4. Discussion

In this prospective cohort of older adults with geriatric polypharmacy, lower patient satisfaction survey scores at enrolment were independently associated with a higher twelve-month risk of adverse drug events, ninety-day unplanned readmission, and functional decline, and this association was strongest for the communication-clarity and care-coordination domains rather than for interpersonal manner alone. These findings extend a body of evidence, developed largely in acute cardiovascular and surgical populations, that patient-reported experience of care tracks clinically important outcomes beyond what conventional satisfaction-as-a-marketing-metric framing would suggest [24,25,29]. They also align with hospital-level analyses linking perceived quality of care to independently measured safety and quality indicators

[15,16], while adding a medication-focused mechanism largely unexplored in that literature: patients who rate communication and coordination poorly may be less likely to understand, adhere to, or flag problems with a complex regimen, plausibly mediating some of the excess adverse-event risk observed here.

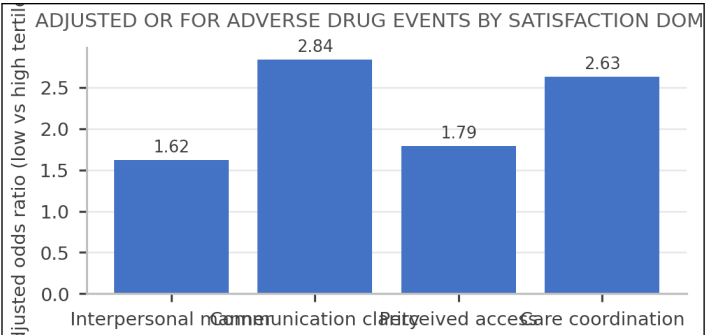


Figure 2: Adjusted odds ratios for twelve-month composite adverse drug events by patient satisfaction domain, referenced against the high-satisfaction tertile, with communication clarity and care coordination carrying the strongest independent association [30,16].

The magnitude of the gradient we observed is comparable to, though somewhat larger than, the relationship between inpatient satisfaction and thirty-day readmission reported in an unselected hospitalised population [28], which may reflect the particular vulnerability of a polypharmacy cohort to communication failures around medication changes, refill logistics, and cross-provider coordination, issues foregrounded in reviews of the clinical consequences of polypharmacy [5,31] and in commentary on the difficulty of achieving genuinely appropriate, rather than simply reduced, medication counts [32,33]. Our finding that the composite score meaningfully improved discrimination over a comorbidity- and PIM-based model, rather than duplicating it, is consistent with prior work cautioning against treating patient satisfaction and technical quality as simply substitutable [18] while also showing that, at least in this population, they are far from unrelated, unlike the null relationship reported for some single-condition technical-quality comparisons [17].

These results have direct implications for how PIM

screening and deprescribing programmes are targeted. Explicit-criteria tools such as STOPP/START and the Beers list remain the backbone of systematic inappropriate-prescribing detection [9,10,8], but they are typically applied uniformly rather than risk-stratified. A brief, validated satisfaction survey, administered at a routine visit, is inexpensive relative to comprehensive geriatric assessment and could plausibly be used to flag patients for earlier or more intensive deprescribing review under existing structured frameworks [12,13], particularly since payment models increasingly formalise the collection of patient-experience data as a matter of routine quality measurement [14,34]. Because polypharmacy itself functions as a mortality indicator in elderly populations even independent of individual drug-level harm [6,7], and because multimorbidity management guidance already emphasises individualised prioritisation over rigid disease-specific targets [3,2], a low-cost prognostic signal that can be captured during a routine consultation has practical appeal for triaging limited deprescribing and pharmacist-review capacity toward the patients most likely to benefit [4,35,11]. Sociodemographic and literacy-related determinants of satisfaction ratings need to be accounted for in any such application, since age-related differences in doctor-patient interaction [21], health-literacy gradients [22], and broader sociodemographic predictors of survey response [20] could otherwise bias which patients are flagged, and the general caution that global satisfaction should not be over-interpreted as a stand-alone quality metric [36,30] applies equally to its use as a prognostic screen: it is best understood as one input into risk stratification, not a replacement for structured pharmacological review, and consistent with observations that even routine survey instruments such as those benchmarked against HCAHPS were designed as quality-improvement tools rather than individual-patient risk calculators [23,19].

Limitations include the observational design, which

cannot establish that improving satisfaction causally reduces adverse events rather than both being downstream markers of unmeasured frailty or care complexity; reliance on a single-centre outpatient population, which may limit generalisability to inpatient or long-term-care settings where the satisfaction-outcome relationship has shown different magnitudes [36]; and the tertile-based analytic approach, which sacrifices some statistical power relative to a continuous specification in exchange for the clinical interpretability needed for a screening application.

5. Conclusion

Patient satisfaction survey scores, particularly in the communication-clarity and care-coordination domains, carried independent prognostic value for twelve-month adverse drug events, ninety-day readmission, and functional decline in this cohort of older adults with geriatric polypharmacy, improving risk discrimination beyond comorbidity and potentially-inappropriate-medication counts alone. Given the low cost and routine feasibility of survey administration relative to comprehensive pharmacological review, these findings support evaluating structured satisfaction assessment as a practical adjunct for targeting deprescribing and medication-review resources toward the geriatric patients at highest prognostic risk, while cautioning that it should complement rather than substitute for explicit-criteria medication screening and individualised multimorbidity management.

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