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Discharge Instruction Comprehension and Adherence Errors: Interrelationship Between Plan Complexity and Parent Health Literacy

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Abstract

Objective—To examine associations between parent health literacy, discharge plan complexity, and parent comprehension of and adherence to inpatient discharge instructions.

Study design—This was a prospective cohort study of English/Spanish-speaking parents (n = 165) of children ≤12 years discharged on ≥1 daily medication from an urban, public hospital. Outcome variables were parent comprehension (survey) of and adherence (survey, in-person dosing assessment, chart review) to discharge instructions. Predictor variables included low parent health literacy (Newest Vital Sign score 0–3) and plan complexity. Generalized estimating equations were used to account for the assessment of multiple types of comprehension and adherence errors for each subject, adjusting for ethnicity, language, child age, length of stay, and chronic disease status. Similar analyses were performed to assess for mediation and moderation.

Results—Error rates were highest for comprehension of medication side effects (50%), adherence to medication dose (34%), and return precaution (78%) instructions. Comprehension errors were associated with adherence errors (aOR, 8.7; 95% CI, 5.9–12.9). Discharge plan complexity was associated with comprehension (aOR, 7.0; 95% CI, 5.4–9.1) and adherence (aOR, 5.5; 95% CI, 4.0–7.6) errors. Low health literacy was indirectly associated with adherence errors through comprehension errors. The association between plan complexity and comprehension errors was greater in parents with low (aOR, 8.3; 95% CI, 6.2–11.2) compared with adequate (aOR, 3.8; 95% CI, 2.2–6.5) health literacy (interaction term $P = .004$).

Conclusions—Parent health literacy and discharge plan complexity play key roles in comprehension and adherence errors. Future work will focus on the development of health literacy-informed interventions to promote discharge plan comprehension.

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Approximately 15% of children have unplanned healthcare use within 30 days of inpatient discharge, including readmissions, emergency department visits, and urgent care visits[1]; reuse rates are even higher for medically complex patients.[2] Adult studies estimate that 60% of postdischarge adverse outcomes are preventable or ameliorable.[3] In light of this, the American Academy of Pediatrics and experts in hospital medicine have made ensuring safe hospital-to-home transitions a top priority to decrease posthospitalization morbidity.[1,4,5]

The mechanisms through which preventable postdischarge complications occur are multifactorial,[4–6] but not well-understood. Studies have focused on discharge readiness, including assessments of self-perceived ability to execute discharge plans, finding inconsistent associations with readmissions.[7–13] Discharge instructions can be difficult for parents to comprehend and follow,[14] which may contribute to postdischarge adverse events.[4–6] However, most studies examining parent discharge plan comprehension and adherence involved emergency department patients or focused on a limited number of domains (eg, appointment attendance, prescription filling).[14] Few studies have examined a full model of parent comprehension of and adherence to pediatric discharge instructions across multiple domains, including medications, appointments, return precautions (concerning symptoms to monitor), and restrictions (eg, diet, activity, bathing, school return) or the relationship between comprehension and adherence errors.

Studies have suggested that discharge instruction comprehension and adherence errors are more likely when discharge plans are complex or when parents have low health literacy. Complex instructions, with multiple medications or appointments, are associated with comprehension errors, missed appointments, and failure to pick up prescriptions.[15–17] Low parent health literacy is associated with medication dosing and adherence errors.[18–22] In underserved populations with higher readmission risk,[2] low health literacy is common and may serve as a mediator of disparities in health outcomes.[23,24] No studies have examined how these factors contribute to adherence errors by parents of pediatric inpatients, including whether there is a direct association with adherence errors or an indirect association through impact on comprehension errors (ie, mediation). Additionally, no studies have examined whether the relationship between complex instructions and comprehension errors varies by health literacy (ie, moderation). Further investigation of these mechanisms can provide guidance for how to most effectively target interventions to improve parent discharge plan management.

Our objectives (Figure 1; available at www.jpeds.com) were to evaluate the degree to which discharge instruction comprehension errors contribute to adherence errors, the relationships between discharge plan complexity, comprehension, and adherence errors, and the mechanisms through which parent health literacy impacts comprehension and adherence errors, including its impact on the relationship between plan complexity and comprehension errors.

Methods

This was a prospective cohort study of parents of pediatric inpatients (acute and intensive care) at Bellevue Hospital Center, a public hospital part of New York City Health +

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Hospitals. As a part of standard care, parents receive discharge education from nurses and pediatric house staff, who receive no formal training in discharge communication. Nurses and house staff are allocated specified sections of a standardized template in the electronic health record (EHR) to prepare text-only (ie, no pictures or diagrams) written discharge instructions that include medication instructions imported from the discharge medication reconciliation. Nurses counsel parents before discharge using a printed copy of these instructions, which are given to parents to use at home. There is no standard process for verbal counseling from the medical team, although all parents in our study reported receiving verbal counseling from physicians. Professional interpreters are available for parents with limited English proficiency. The content of discharge education is not standardized. A lack of training in communication strategies[25,26] and limited discharge process standardization[27,28] noted at our institution have been commonly reported elsewhere. Approval for this study was obtained from the New York University School of Medicine Institutional Review Board and New York City Health + Hospitals.

Trained research assistants (RAs), when available, approached consecutive parents during their child's admission to assess eligibility. Inclusion criteria were an English- or Spanish-speaking parent/legal guardian (subsequently referred to as parent) of a child ≤12 years old discharged home on ≥1 daily medication; we included the 1 parent per child who self-identified as the primary caregiver. We only included parents whose children were ≤12 years old to limit possible confounding effects of adolescents' involvement in their own postdischarge care. Exclusion criteria were parents who were <18 years old, had hearing difficulty (self-reported) or vision problem (<20/50 on Rosenbaum screener), or were previously enrolled. Bilingual (English/Spanish) RAs obtained written informed consent from eligible parents who agreed to participate using the parent's preferred language.

Study Assessments

Three assessment types were used (Figure 2): surveys, an in-person medication dosing assessment, and a chart review. Parents were surveyed at enrollment (T1), within 12 hours of discharge (T2), and within 2 weeks of discharge (T3). RAs, blinded to discharge instructions, conducted surveys in the parent's preferred language. Survey questions were adapted from other studies,[18,29] piloted at the study site, and modified to ensure understandability and comprehensiveness. The in-person dosing assessment occurred at T3. During all assessments, parents were encouraged to refer to their child's written instructions. Parents received a $20 gift card at T3. After assessments were complete, 2 RAs performed a chart review to extract discharge instructions from the EHR (T4); 2 RAs performed this task to ensure reliability given the unstructured nature of the written instructions. The first author reviewed both extracted sets of instructions for accuracy and performed a third chart review in cases of disagreement.

Primary Outcomes: Errors in Comprehension of and Adherence to Discharge Instructions

Comprehension errors (Table I; available at www.jpeds.com) were assessed for the following domains (with subdomains in parentheses): medications (name, indication, dose, frequency, duration, side effects), appointments (name/specialty, timing, indication), return precautions (concerning symptoms to act on), and restrictions (diet, activity, bathing, school return);

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restriction instructions were assessed as 1 category in multivariable analyses given limited restrictions documented. Adherence errors assessed were medication dose and adherence, appointment attendance, return precautions, and restrictions.

Comprehension Errors.

Parent recollection of discharge instructions (Table I) was assessed via survey (in person or over the phone) within 12 hours of discharge (T2). For example, for medication frequency, we asked the open-ended question: "How many times a day will you give [MEDICINE NAME] to [CHILD'S NAME]?" Similar questions were asked for all subdomains (Table II; available at www.jpeds.com). To evaluate errors in comprehension for all subdomains except medication side effects, 2 clinicians independently assessed concordance between parents' report of instructions and instructions in the EHR (T4); parents were given credit for a correct answer if instructions were not present in the EHR. Because side effects were rarely documented, parents were categorized as correct if they named ≥1 known side effect. The inter-rater reliability was high ($k > 0.9$) for comprehension questions. Disagreements were resolved by a consensus discussion.

Adherence Errors

Dosing Error.: An established protocol[18] was used to assess medication dosing errors in person at T3. All parents measured liquid medications using a standard medication bottle as they would at home, using their own dosing tool or a similar tool from standard tools provided. Errors were defined as a >20% deviation from the prescribed dose as determined by visual inspection.[18] To ensure reliability, the dosing error assessment was performed by 2 clinicians for a subset of 100 parents ($\kappa = 1$). A similar method was used to assess dosing errors for pills. For nonoral medicines, parents reported the dose they gave (eg, number of sprays).

Medication Nonadherence.: Parents were surveyed to assess medication non-adherence (>20% deviation from prescribed number of doses [previously established protocol, parent reports first and last dose given, frequency, missed doses][18]). The survey was performed after the medication course was complete, either at T3 or via an additional phone survey after T3 if medications were being given after T3. Two clinicians independently assessed concordance between all parent's responses (regardless of when adherence was assessed) and extracted instructions at T4 ($\kappa = 1$).

Other Errors.: For appointments scheduled within 30 days of discharge, attendance errors were confirmed by EHR review at T4 for appointments at the study site (>95% of discharges) or by parent report after the appointment (at T3 or an additional phone survey after T3 for later appointments) for off-site appointments. Return precaution and restriction adherence were assessed at T3. Two clinicians assessed concordance at T4 as described elsewhere in this article ($\kappa > 0.9$).

Primary Predictor Variables

Discharge Plan Complexity.—Plan complexity was assessed individually for each domain, defined as complex or not based on the total number of items per domain. For

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medications, ≥2 medications was considered complex; ≥2 appointments was considered complex (having ≥2 medications or appointments is associated with more errors[15]). Having ≥3 return precautions or ≥1 restriction (in any subdomain, eg, diet, activity, bathing, school return) was considered complex (median split).

Health Literacy.—Parent health literacy was assessed with the Newest Vital Sign, a validated measure in English/Spanish.[30] Scores were dichotomized as low (0–3 of 6) or adequate (4–6 of 6).[30]

Additional Variables

RAs collected the following at T1: parent age, sex, race/ethnicity, country of birth, preferred language, education, income, insurance type; and child age, sex, and chronic disease status.[31] We also asked parents if they would have preferred if providers and nurses used professional interpreters more than they did for discharge counseling. We extracted the following from the EHR: evening vs daytime discharge, weekend vs weekday discharge, time in the intensive care unit, length of stay, and if discharge medications (without a change in dose) had been administered by parents before admission (ie, home medications).

Statistical Analyses

Descriptive statistics were used to characterize all variables. Generalized estimating equations (exchangeable correlation structure, binomial distribution, logit link) were used to account for the assessment of multiple types of errors for each subject. This process allowed us to create single models assessing overall errors across subdomains (see Primary Outcomes) and avoid multiple comparisons. In all cases, we performed unadjusted and adjusted analyses. Adjusted analyses included the following covariates (chosen a priori based on previous literature[12,14,19,22,32–36]) in addition to plan complexity and health literacy: parent race/ethnicity and preferred language; and child age, chronic disease status,[31] and length of stay. Additional variables noted elsewhere in this article, including a lack of interpreter use and prior use of medications, were not associated with errors in unadjusted analyses and were not included in adjusted analyses.

We first assessed the relationship between comprehension errors (predictor) and adherence errors (outcome; Figure 1). We then examined the association between discharge plan complexity (predictor) and (1) comprehension and (2) adherence errors. Using similar analyses, we applied Baron and Kenny's criteria[37] to determine whether comprehension errors mediated the relationship between complexity and adherence errors. Criteria for complete mediation are (1) the predictor variable is associated with the outcome variable, (2) the predictor is associated with the potential mediator, (3) the potential mediator is associated with the outcome, and (4) the predictor is no longer associated with the outcome after adjusting for the potential mediator.[37] We also examined associations between health literacy and comprehension and adherence errors. Given the poor documentation of side effects, we also performed a sensitivity analysis examining associations between health literacy/plan complexity and comprehension errors, including all subdomains other than side effects in the analysis. We assessed whether comprehension errors mediated the relationship between health literacy and adherence errors. We examined whether health

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literacy moderated the relationship between plan complexity and comprehension errors by including the product of the dichotomous health literacy and complexity variables as an additional predictor. We also assessed the association between plan complexity and comprehension errors for parents with low compared with adequate health literacy. Analyses were performed using Stata SE 12.1 (StataCorp, College Station, Texas). A P value of <.05 was considered statistically significant.

Based on preliminary work in which 75% of parents had low health literacy, and dosing error rates were approximately 25% and 50% in the adequate and low health literacy groups, respectively, we estimated a sample size of approximately 215 subjects, assuming 25% attrition, to achieve 80% power (2-sided $\alpha = 0.05$) to detect a 25% difference in the error rate between the low and adequate health literacy groups.

Results

Sample Characteristics

From June 15, 2015, to April 5, 2017, 267 unique parents met eligibility criteria (Figure 3; available at www.jpeds.com); of these parents, 225 (84%) agreed to participate. Of those enrolled, 85% had comprehension assessments within 12 hours of discharge; 73% (n = 165) had in-person dosing assessments within 2 weeks of discharge. Parents were mostly female (93%) and Hispanic (74%); 87% of children had public insurance (Table III). The most common diagnoses of the children were epilepsy, hyperbilirubinemia, cellulitis/abscess, urinary tract infection, asthma, appendicitis, and pneumonia, comprising 67% of discharges. Most parents (76%) had low health literacy. Most discharge plans (79%) had ≥1 complex domain. Written instructions were prepared by 27 nurses and 55 pediatric residents.

Comprehension and Adherence Errors

Comprehension errors (Table IV) were common for return precautions (58%), medication side effects (50%), and dose (24%). Many parents made adherence errors for medication dose (34%) and return precaution (78%) instructions. Errors were common for comprehension of activity (63%) and adherence to diet (89%) instructions in cases when restrictions were documented. Most parents made ≥1 comprehension error (85%) and ≥1 adherence error (86%).

Association between Comprehension and Adherence Errors

Comprehension errors were associated with subsequent adherence errors (OR, 13.0; 95% CI, 9.0–18.9; $P < .001$). This association remained after adjusting for potential confounders (aOR, 8.7; 95% CI, 5.9–12.9; $P < .001$).

Impact of Discharge Plan Complexity

Complex discharge plans were associated with errors in comprehension in adjusted analyses (aOR, 7.0; 95% CI, 5.4–9.1; $P < .001$; Table V; available at www.jpeds.com); adjusted results were similar when medication side effects were excluded from the analysis (aOR, 8.0; 95% CI, 6.0–10.7; $P < .001$). Complex plans were also associated with adherence errors after adjusting for potential confounders (aOR, 5.5; 95% CI, 4.0–7.6; $P < .001$).

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Comprehension errors partially mediated the relationship between plan complexity and adherence errors (Figure 4, A),[37] because the association between complexity and adherence errors weakened while remaining statistically significant after adjusting for comprehension errors (aOR, 3.3; 95% CI, 2.3–4.7; $P < .001$).

Impact of Parent Health Literacy

Low (compared with adequate) health literacy was associated with comprehension errors (aOR, 1.8; 95% CI, 1.2–2.5; $P = .002$; Table V); results were similar when excluding side effects (aOR, 1.9; 95% CI, 1.3–2.8; $P = .002$). Low health literacy was also associated with adherence errors (aOR, 1.5; 95% CI, 1.1–2.2; $P = .03$). Low health literacy was no longer associated with adherence errors after adjusting for comprehension errors (aOR, 1.2; 95% CI, 0.8–1.9; $P = .4$), meeting the criteria for complete mediation[37] (Figure 4, B).

The association between plan complexity and comprehension errors was greater in parents with low (aOR, 8.3; 95% CI, 6.2–11.2; $P < .001$) compared with adequate (aOR, 3.8; 95% CI, 2.2–6.5; $P < .001$) health literacy. The test for moderation, or interaction between health literacy and complexity variables, was significant ($P = .004$).

Discussion

This study of parents of hospitalized children found that errors in comprehension of and adherence to discharge instructions were common, especially when discharge plans were complex and for parents with low health literacy. Our study suggests that a key driver of poor adherence is poor comprehension, rather than other potential barriers.[38] The impact of plan complexity on comprehension errors was greatest for parents with low health literacy.

More than 80% of parents in our study made comprehension or adherence errors, even when using written discharge instructions, confirming findings of prior studies.[14] Medication side effects, medication dose, and return precaution instructions were particularly challenging for families, consistent with findings from other studies.[18–20,22,29,39–43] Although side effect comprehension was likely poor in part because parents did not receive education in this area, associations between plan complexity/health literacy and comprehension errors remained when side effects were excluded from our analyses; errors were common in other domains of care, even though written instructions were provided. Future interventions should ensure that discharge instructions are standardized and include content relevant to all domains of care.

Parents who made comprehension errors had approximately 9 times the odds of making adherence errors, a relationship previously established for appointment instructions.[15] Providers should ensure that parents comprehend instructions before discharge, using communication strategies such as teachback (ie, having patients summarize instructions in their own words). Teachback is considered a top safety practice by the Agency for Healthcare Research and Quality.[44] Parent comprehension of and adherence to instructions is improved through the use of health literacy-informed strategies such as teachback, pictographic instructions, and dose demonstration.[18,19,45–47] Such strategies should be incorporated into care transition processes.

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Complex instructions were associated with comprehension and adherence errors in our study, consistent with prior work[15–17] and cognitive load theory, which states that the cognitive demand of complex information taxes an individual's processing ability.[48] Providers can decrease cognitive demand by presenting key information on a limited number of topics, using explicit and action-oriented instructions, and checking for comprehension before discussing subsequent topics (ie, "chunk and check").[49–51] The relationship between plan complexity and adherence errors was only partially explained by comprehension errors. Additional barriers not measured in this study (eg, inability to leave work, lack of transportation)[38] to fulfill instructions when children have multiple appointments may account for the remaining effects of complexity on adherence errors and should be explored further.

We found that parents with lower health literacy were less likely to comprehend instructions, supporting an association found in prior emergency department studies.[18–22] Low health literacy was also associated with adherence errors; comprehension errors were a key mediator in this relationship, because health literacy was no longer associated with adherence after adjusting for comprehension. Other potential mechanisms are possible (eg, low literacy populations having fewer resources to purchase prescriptions) and should be studied further. In addition, the impact of complex instructions on comprehension errors was greater for those with lower health literacy, suggesting a potential mechanism for disparities related to adverse outcomes after discharge.

Our study has limitations. It was not powered to assess the association between comprehension/adherence errors and readmission rates (approximately 5% readmitted at our hospital); future larger studies should address this important outcome. Adherence to several instructions was assessed by self-report, which is subject to social desirability bias and may have led to an underestimation of errors. The overall rates of missed appointments may be higher than the reported rate of 16% (closer to 20% per EHR review), because the data included in our analysis was restricted to parents who attended an in-person assessment, which was usually timed with a scheduled appointment. The assessment of errors related to restrictions was limited, because few discharge plans documented restriction instructions, even when expected (eg, activity restrictions after surgery). Because we did not observe discharge counseling, it is possible that the discussion of restrictions and other types of instructions occurred, but was not documented; we may be underestimating true error rates; errors were defined based on deviation from documented instructions. Our method of measuring the complexity of the discharge plan is limited in that it does not take into account that increasing complexity of 1 domain may contribute to errors in other domains by increasing overall cognitive load; the way in which plan complexity is measured should be explored further. Generalizability may be limited because the study was performed at a single site, with English- and Spanish-speaking families, and in a population that was primarily Hispanic with low health literacy. Finally, although we only included parents whose children were discharged home on medications, errors in other domains of care were common, so our results are likely generalizable to children not discharged home on medications.

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Parent health literacy and discharge plan complexity played key roles in discharge plan comprehension and adherence errors. Future work should focus on the design and testing of interventions that incorporate health literacy-informed strategies to improve parent comprehension of and adherence to discharge instructions. Additional efforts are needed to standardize the discharge process; discharge education should cover all domains of care in the patient's preferred language. Next steps should also include the observation of discharge counseling to account for how different counseling styles and capabilities contribute to discharge plan comprehension and adherence. Future work should also explore the relationship between discharge instruction comprehension and adherence errors and postdischarge adverse events.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Glossary

EHR	Electronic health record
RA	Research assistant

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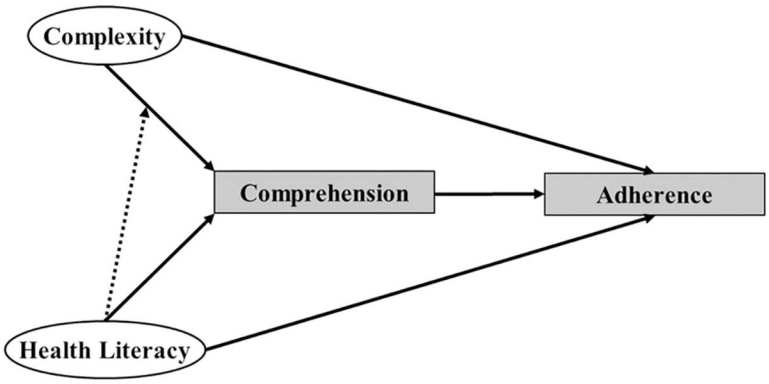

Figure 1.

Conceptual model depicting associations between discharge plan complexity, parent health literacy, and parent comprehension of and adherence to discharge instructions.

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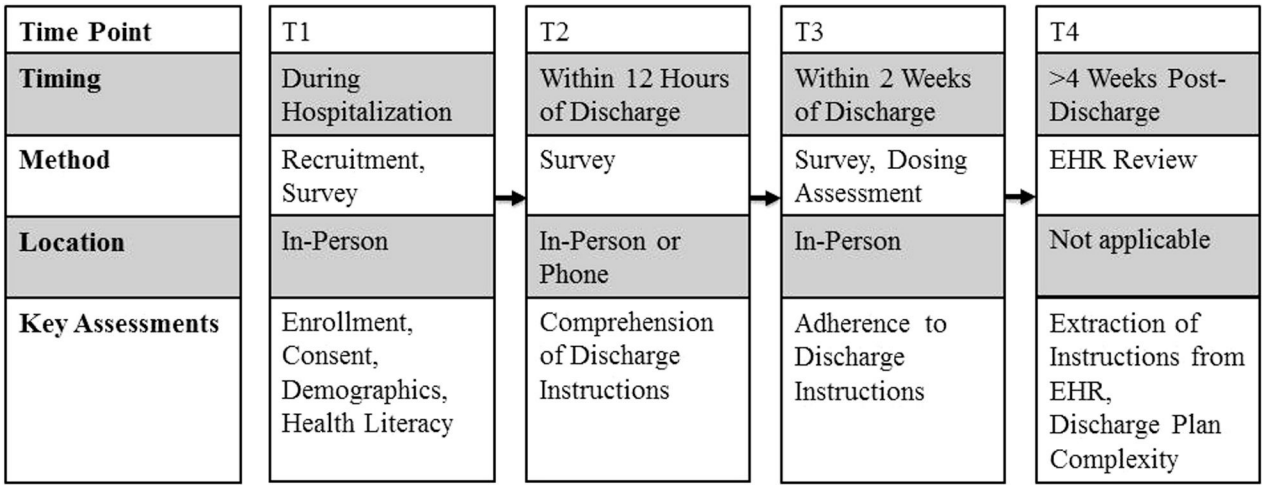

Figure 2.

Summary of types and timing of study assessments. Some participants required an additional phone call between T3 and T4 if their T3 assessment occurred before the completion of all instruction (eg, completion of medication course).

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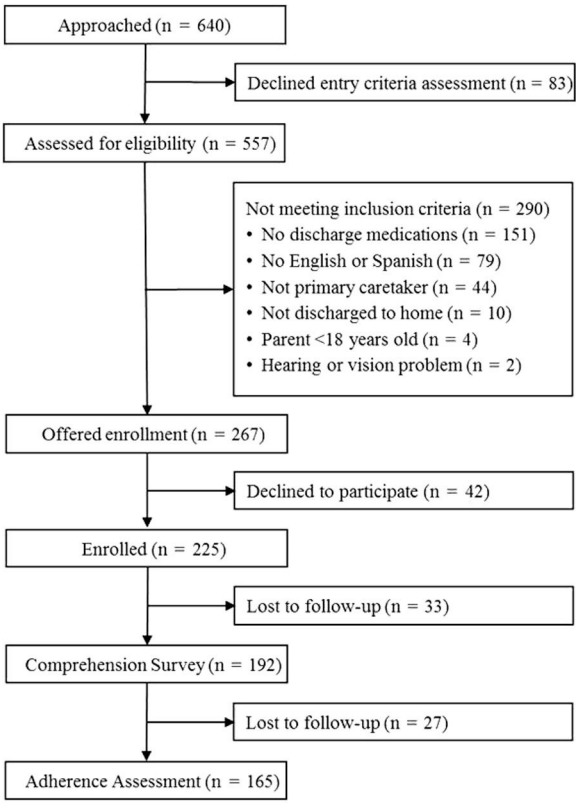

Figure 3.
Study flow diagram.

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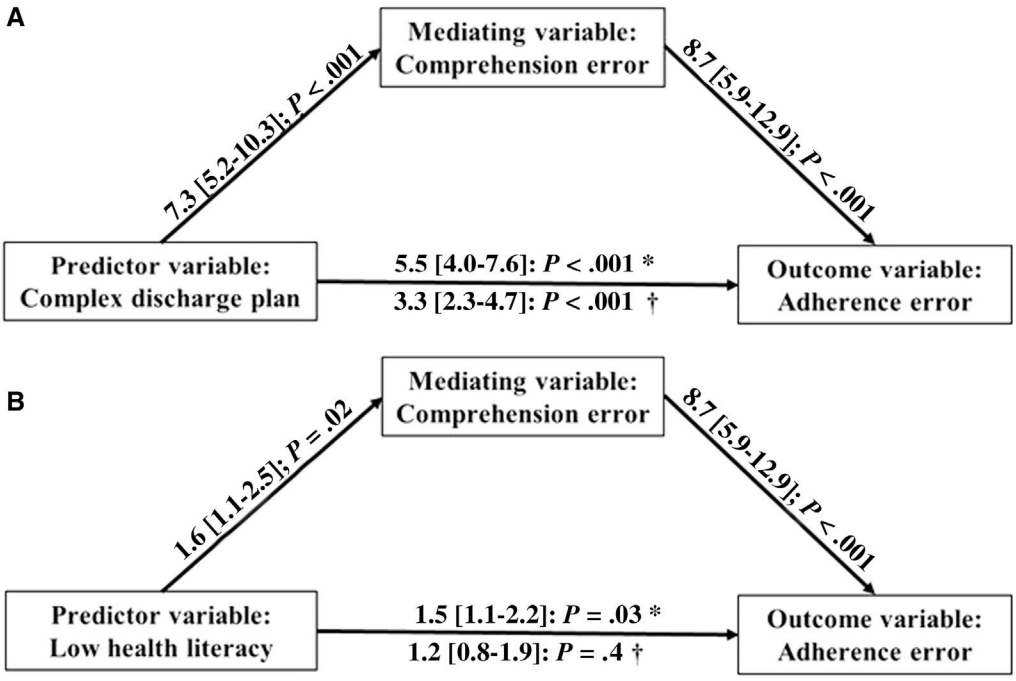

Figure 4.

Path analysis assessing comprehension errors as a possible mediator in the association between **A**, discharge plan complexity and **B**, parent health literacy (predictors) and adherence errors (outcomes) (n = 165). Values are OR [95% CI] and *P* values from logistic regressions using generalized estimation equations to account for multiple possible error types for each parent (adjusting for parent race/ethnicity, language, child age, length of stay, chronic disease status, health literacy [A only], and plan complexity [B only]). Note that, unlike separate analyses in which comprehension errors were the sole outcome, these analyses only include subdomains examined for both comprehension and adherence errors (medication dose and adherence, appointment attendance, return precautions, and restrictions). *Not adjusting for comprehension errors. †Adjusting for comprehension errors.

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Table I.

Definitions of comprehension and adherence errors by domain

Domains	Comprehension error definition*,†	Adherence error definition
Medications		
Name	Any error in reporting medication name (given credit for correct answer for similar sounding medication name [eg, amoxicillin and amoxicillin-clavulanate])	N/A
Indication	Any error in reporting indication for any medication	N/A
Dose	A >20% deviation from reported dose(s)[18] for any prescribed medication	A >20% deviation from prescribed dose(s) in (1) an observed dosing assessment for any prescribed oral medication (established protocol)[18] and (2) by parent report for any nonoral medication (eg, nasal sprays, inhalers)‡
Frequency	Any error in reporting frequency for any medication	Adherence: Calculated based on parent report of first and last dose of medication and if there were any missed doses. Parents did not need to specify specific dates and times and instead could report an answer relative to their discharge date (eg, "the evening we left the hospital" would be considered a correct first dose). Error defined as >20% deviation from prescribed number of doses[18] for any medication
Duration	Any error in reporting duration for any medication	
Side effects	Unable to report any known side effects of the medication (given credit for correctly identifying ≥1 known side effect or for reporting that there are no side effects for vitamins)	N/A
Appointments		
Physician name/ specialty	Incorrectly reports either the name or specialty for any appointment (given credit for correctly naming physician name or specialty for each appointment)	N/A
Appointment timing	Incorrectly reports either the date or timing (either morning or afternoon, exact time not necessary) for any appointment	Missed appointment within 30 days of discharge (chart review for appointments at study site, parent report for off-site appointments†)
Indication	Any error in reporting reason for any appointment made	N/A
Return precautions	Parent does not identify a specific sign or symptom from each body system documented in the EHR that they have been told to watch out for after discharge (eg, for patient with pneumonia with the following symptoms listed, parent would need to identify 1 symptom from each of the 3 body systems to get credit for a correct answer): 1) cough, difficulty breathing 2) fever 3) not drinking, poor urine output	Parent does not identify a specific sign or symptom from each body system documented in the EHR that they have been watching for (eg, for patient with pneumonia with the following symptoms listed, parent would need to identify 1 symptom from each of the 3 body systems to get credit for a correct answer): 1) cough, difficulty breathing 2) fever 3) not drinking, poor urine output†
Restrictions		
Diet	Any error in identifying specific diet restriction to be followed (ie, changes from the prehospitalization diet) when documented in the EHR	Any error in identifying specific diet restriction being followed (ie, changes from the prehospitalization diet) when documented in the EHR†
Activity	Any error in identifying specific activity restriction (vague instructions such as "as tolerated" excluded from analysis) to be followed when documented in the EHR	Any error in identifying specific activity restriction (vague instructions such as "as tolerated" excluded from analysis) being followed when documented in the EHR†

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Domains	Comprehension error definition*,†	Adherence error definition
Bathing	Any error in identifying bathing restriction to be followed when documented in the EHR	Any error in identifying bathing restriction being followed when documented in the EHR†
School return	Any error in identifying specific school return restriction to be followed when documented in the EHR	Any error in identifying specific school return restriction being followed when documented in the EHR†

EHR, electronic health record.

*Specific discharge instruction comprehension questions are listed in Table II.

†Two independent reviewers assessed concordance of parent response with instructions documented in the medical record ($\kappa > 0.9$ for all questions) and resolved disagreements by consensus discussion.

‡Observed dosing error assessment performed for all parents and performed by 2 independent reviewers for a subset of 100 parents to ensure reliability ($\kappa = 1$).

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Table II.

Questions used to assess comprehension of discharge instructions

Domains	Question
Medications	
Name	Please name the medicine (or medicines) [CHILD'S NAME] needs to take at home every day.
Indication	Why is [CHILD'S NAME] taking [MEDICINE NAME]?
Dose	How much of [MEDICINE NAME] will you give [CHILD'S NAME]?
Frequency	How many times a day will you give [MEDICINE NAME] to [CHILD'S NAME]?*
Duration	How many days will you give [MEDICINE NAME] to [CHILD'S NAME]?*
Side effects	What are some of the side effects or problems that might happen because of [MEDICINE NAME] you will give [CHILD'S NAME]?
Appointments	
Physician name/specialty	After you leave the hospital, who are the doctors [CHILD'S NAME] is supposed to see?
Appointment timing	When is your appointment with [DOCTOR'S NAME]?
Indication	Why does [CHILD'S NAME] need to see [DOCTOR'S NAME] after you leave the hospital?
Return precautions	What symptoms or changes should cause you to bring [CHILD'S NAME] to the emergency room or call your doctor?*
Restrictions	
Diet	Compared to when [CHILD'S NAME] was well, what, if anything, should be different about what he/she eats or drinks?*
Activity	Compared to when [CHILD'S NAME] was well, what, if anything, should be different about how active [CHILD'S NAME], should be, eg, the way he/she plays or exercises?*
Bathing	Compared to when [CHILD'S NAME] was well, what, if anything, should be different about the way he/she bathes or showers?*
School return	When should [CHILD'S NAME] go back to school, day care, or camp?*

*Similar questions asked as part of subsequent adherence assessment.

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Table III.

Participant and hospitalization/discharge characteristics (n = 165)

Variables	Value
Parent	
Age, years	32.0 [27.5–38.0]
Female sex	153(93)
Race/ethnicity	
Hispanic	122(74)
Black, non-Hispanic	20 (12)
Asian, non-Hispanic	12(7)
White, non-Hispanic	6(4)
Other	5 (3)
Preferred language to speak	
English	98 (59)
Spanish	67(41)
Born outside the United States	115(70)
Income	
<$25,000	65 (39)
≥$25,000	44 (27)
Parent refused or did not know	56 (34)
Education	
Less than high school	46 (28)
High school or equivalent	54 (33)
More than high school	65 (39)
Low health literacy (Newest Vital Sign Score 0–3)	126(76)
Child	
Age, months	24 [1–72]
Male sex	100(61)
Insurance	
Medicaid/Medicaid managed care	143(87)
Private	10(6)
No insurance	9 (6)
Other	3 (2)
Receiving discharge medication before admission	79 (48)
Hospitalization/discharge related	
Evening discharge	11 (7)
Weekend discharge	20 (12)
Length of stay, days	2 [1–3]
Spent part of admission in pediatric intensive care unit	13(8)
Parent preference for additional use of interpreter for discharge counseling	20 (12)
Complex discharge plan	
Medications (≥2 medications)	57 (35)

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Variables	Value
Appointments (≥2 appointments)	38 (23)
Return precautions (≥3 return precautions)	99 (60)
Restrictions (≥1 restriction)	24 (15)
≥1 complex domain	130(79)

Values are number (%) or median [IQR].

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Table IV.

Parents with comprehension and adherence errors (n = 165)*

Domains	Comprehension error†	Adherence error‡
Medications		
Name	18(11)	N/A
Indication	29 (18)	N/A
Dose	39 (24)	56 (34)
Frequency	17(10)	22 (13)§
Duration	22 (13)	
Side effects	82 (50)	N/A
Any medication error	111 (67)	63 (38)
Appointments		
Name/specialty	26 (16)	N/A
Timing	18(11)	26 (16)¶
Indication	30 (18)	N/A
Any appointment error	50 (30)	26(16)
Return precautions	96 (58)	129 (78)
Restrictions*		
Diet (n = 9)	3 (33)	8 (89)
Activity (n = 8)	5 (63)	4 (50)
Bathing (n = 12)	1 (8)	0 (0)
School return (n = 2)	0 (0)	0 (0)

N/A, not applicable.

Values are number (%).

*There were 165 participants unless otherwise specified (comprehension of restriction instructions only assessed when documented in the medical record).

†Comprehension errors defined as lack of concordance of parent report of instruction and instructions documented in the medical record for an individual domain of care.

‡Adherence errors defined as parent following instructions for an individual domain of care incorrectly (in-person dosing assessment for oral medications, chart review for appointment attendance, parent report for other domains).

§Medication adherence (defined based on duration and frequency).

¶Appointment attendance.

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Table V.

Predictors of comprehension and adherence errors[*] (n = 165)

Variables	Comprehension errors, OR (95% CI)	Comprehension errors, OR (95% CI)[†]	Adherence errors, OR (95% CI)	Adherence errors, OR (95% CI) [†]
Complex discharge plan[‡] (reference: noncomplex discharge plan)	6.6 (5.2–8.4)[§]	7.0 (5.4–9.1)[§]	5.4 (3.9–7.3)[§]	5.5 (4.0–7.6)[§]
Low health literacy[¶] (reference: Adequate health literacy)	1.6 (1.2–2.3) [**]	1.8 (1.2–2.5) [**]	1.5 (1.1–2.1) [††]	1.5 (1.1–2.2)[††]

[*]Generalized estimating questions (exchangeable correlation structure, binomial distribution, logit link) to account for multiple possible error types for each parent. Comprehension errors defined as lack of concordance of parent report of instruction and instructions documented in the medical record for an individual domain of care. Adherence errors defined as parent following instructions for an individual domain of care incorrectly (parent report, in-person dosing assessment, chart review).

[†]Model also adjusted for the following variables (a priori) not reaching significance in adjusted model: parent race/ethnicity and language; and child age, length of stay, and chronic disease status.[27]

[‡]Complexity by domain: ≥2 medications, ≥2 appointments, ≥3 return precautions, ≥1 restriction.

[§]$P < .001$.

[¶]Newest vital sign score dichotomized into low (0–3 of 6) and adequate (4–6 of 6) health literacy.

[**]$P < .01$.

[††]$P < .05$.