

From monitored safety to calibrated caregiving: a qualitative descriptive study of parents' transition from neonatal intensive care unit to home with preterm infants

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Abstract

Background

When a preterm infant leaves neonatal intensive care, parents take over feeding, observation, infection prevention and help-seeking without the monitors and staff that previously framed infant safety. Discharge education often tells parents what to do, but gives less attention to how they interpret uncertain infant cues once they are at home.

Methods

A qualitative descriptive study was conducted in one tertiary children's hospital with a level III neonatal intensive care unit in China. Parents of preterm infants discharged from neonatal intensive care within the previous one to twelve weeks were recruited purposively. Thirty parents enrolled; six withdrew before interview completion, leaving 24 parents for analysis: 16 mothers and eight fathers representing 22 infants. Semi-structured interviews explored discharge preparation, early home care, feeding, symptom interpretation, family management and nursing support needs. Interviews were audio-recorded, transcribed verbatim and analysed inductively using reflexive thematic analysis. Meleis' Transitions Theory, Mishel's Uncertainty in Illness Theory and the Family Management Style Framework were then used as sensitising theories after inductive coding. Semi-structured interviews examined discharge preparation, early home care, feeding, symptom interpretation, family management and nursing support needs. Interviews were audio-recorded, transcribed and analysed inductively. We then used Meleis' Transitions Theory, Mishel's Uncertainty in Illness Theory and the Family Management Style Framework as sensitising lenses. A visual transition matrix, informed by journey-mapping principles, brought together transition moments, family care tasks, nursing touchpoints and pain points. Reporting followed the Consolidated Criteria for Reporting Qualitative Research and the Standards for Reporting Qualitative Research.

Results

Four themes were developed: becoming the monitor after leaving monitored safety; learning care in fragments and needing embodied rehearsal; negotiating family management under fragile normality; and rebuilding confidence through accessible nursing connection. Across themes, parents were trying to calibrate care: to match what they saw in the infant with what they knew, what the family could manage and when professional help was needed. The visual transition matrix organised this work across monitored safety, threshold ambiguity, fragmented confidence and calibrated caregiving. Feeding adequacy, breathing, colour change, temperature, weight gain and thresholds for urgent care were the main areas of uncertainty.

Conclusions

Preterm infant discharge is a staged family transition, not a single handover of information. Nursing support is likely to be most useful when it is organised around transition touchpoints: early co-care in hospital, rehearsal before discharge, observable thresholds for home decisions and prompt post-discharge access to neonatal nurses.

1. Introduction

Preterm birth remains a major global child health problem. The World Health Organization estimated that 13.4 million babies were born preterm in 2020 [1], and earlier modelling placed preterm birth at more than one in ten live births worldwide [2]. Neonatal intensive care has improved survival, but discharge does not return families to ordinary parenting. It moves care from a monitored unit to the home, where parents must interpret feeding, breathing, colour, temperature, crying, growth and infection risk without continuous professional interpretation.

Guidance on high-risk neonatal discharge asks clinicians to consider infant maturity, ongoing clinical needs, parental education, caregiver capability, home resources and follow-up [3]. Discharge readiness includes skill, knowledge, emotional comfort and confidence, whereas discharge preparation is the work through which those capacities are built [4]. More recent guidance recommends starting preparation early, including anticipatory guidance, family and home assessment and coordination with community providers [5].

The transition remains difficult because neonatal intensive care disrupts parental role development and exposes parents to a stressful sensory, emotional and relational environment. The Parental Stressor Scale: Neonatal Intensive Care Unit identified parental role alteration, infant appearance and unit sights and sounds as key stressors [6]. A later meta-analysis found parental role alteration to be the greatest stress source for both mothers and fathers [7]. Literature reviews and qualitative studies describe the transition home as a process involving disrupted parent-infant relationships, psychological consequences, caregiving learning, information needs and social-professional support needs [8–11].

Neonatal nursing has moved gradually from family-centred care toward more active family-integrated care. Family-centred care recognises parents as central to the infant's care and emphasises education, partnership and psychosocial support [12]. Family Integrated Care goes further by positioning parents as primary caregivers within the neonatal intensive care team; a multicentre cluster-randomised trial reported benefits for infant weight gain, parental stress and breastfeeding-related outcomes [13], and later reviews describe it as an extension of family-centred care toward parental empowerment and shared decision-making [14]. Even so, discharge work often still relies on verbal instruction and written materials. Families may receive advice about feeding, temperature, infection prevention, safe sleep and appointments, yet remain unsure what counts as normal once they are alone with the baby.

For nursing, this distinction matters. Parental difficulty after discharge is not always a knowledge deficit. It may reflect abrupt role change, limited hands-on practice, inconsistent communication, social risk, distance from follow-up services or disagreement within the family about how fragile the infant is. Studies of neonatal and broader paediatric hospital-to-home transitions show that these problems are shaped by mental health strain, financial stress, communication barriers, gaps in community resources and care coordination [15–19]. Mobile health and design studies add that parents value credible information, path planning, contact with professionals and tools that reinforce their parenting role [19, 20].

We approached this transition from a nursing perspective. The question was not only whether parents felt "ready", but how readiness was made, lost and rebuilt during the first weeks at home. Three nursing theories were used after inductive analysis. Transitions Theory helped us examine role and responsibility change [21]. Uncertainty in Illness Theory directed attention to ambiguous infant cues and the work of appraisal [22]. The Family Management Style Framework helped locate infant care within household routines and family interpretations of the child's condition [23, 24].

These lenses led us to analyse discharge as caregiving calibration: parents learning to translate professional monitoring and advice into judgement that worked in their own household. Drawing cautiously on journey-mapping work in nursing services [25], we also read parents' accounts for changing touchpoints and pain points across the early transition.

The study aimed to explore how parents of preterm infants experience the transition from neonatal intensive care to home and to identify nursing support mechanisms that strengthen parental caregiving confidence.

2. Methods

2.1 Design

We used qualitative description with semi-structured interviews and reflexive thematic analysis. This design fitted the aim because we wanted a clinically useful account close to parents' experience, while still allowing interpretation across cases. Coding was treated as an interpretive process rather than a search for coding agreement, in keeping with reflexive thematic analysis [26, 27]. The three theories were not used as a pre-existing coding frame. They were brought in after initial coding to help interpret role transition, uncertainty and family management.

Reporting followed COREQ and SRQR guidance [28, 29].

Figure 1. **Theoretical sensitising framework for neonatal intensive care to home transition.** The figure shows how Transitions Theory, Uncertainty in Illness Theory and the Family Management Style Framework informed interpretation after inductive coding.

2.2 Setting

The study took place in a tertiary children's hospital with a level III neonatal intensive care unit. The unit admits preterm and medically complex neonates from the hospital and regional referral networks. Usual discharge preparation includes parent education, bedside demonstrations, written instructions, medication counselling, appointment scheduling and telephone follow-up when clinically indicated.

2.3 Participants and sampling

Parents were eligible if they were the mother or father of an infant born before 37 weeks of gestation, the infant had been admitted to neonatal intensive care, the infant had been discharged home one to twelve weeks before recruitment, and the parent was directly involved in home care. Parents were excluded if the infant was currently receiving emergency or inpatient care, if the parent was unable to participate in an interview, or if clinical staff judged that interview participation could cause disproportionate distress.

Purposive sampling aimed to include mothers and fathers, first-time and experienced parents, families living near and far from the hospital, and infants with varied gestational ages and lengths of hospital stay. Thirty eligible parents were enrolled; six withdrew before completing an interview and were not included in the analysis. Recruitment continued until the completed interview material provided sufficient information power for the study aim, sample specificity, quality of dialogue and analytic strategy [30]. Information power was judged iteratively during data collection and preliminary analysis by considering whether new interviews added substantially different accounts of discharge preparation, home care uncertainty, family management and help-seeking. The final analytic sample comprised 24 parents: 16 mothers and eight fathers representing 22 preterm infants. In two families, both the mother and father were interviewed, which is why the number of parent participants exceeded the number of infants represented.

2.4 Data collection

Participants were approached through the neonatal follow-up clinic and telephone follow-up service. Interviews were conducted in Mandarin Chinese, either in a private counselling room or by secure video call. Interviews lasted 38 to 82 minutes, and no repeat interviews were conducted. With consent, they were audio-recorded and transcribed verbatim. Transcripts were returned to participants for review before analysis. After each interview, the interviewer wrote field notes on context, non-verbal cues, emotional shifts and early analytic thoughts.

The semi-structured interview guide was developed specifically for this study by two neonatal nurses, one paediatric nursing researcher and one qualitative methodologist. It was not adapted from or reproduced from a previously published interview guide. Questions explored preparation for discharge, parent participation in neonatal care, first days at home, feeding, observation of breathing and colour, temperature and infection concerns, family decision-making, follow-up experiences and desired nursing support. Example prompts included: "When did you first feel that you were, or were not, ready to take your baby home?", "What signs in your baby were hardest to interpret?", "How did your family decide whether to call the hospital or seek care?", and "What kind of nursing support would have made the first

week at home safer or less stressful?" The English-language version of the guide is provided as Supplementary File 1.

2.5 Research team and reflexivity

The interviewer was a registered nurse with postgraduate training in child health nursing and qualitative interviewing. Two analysts had neonatal nursing backgrounds, and one had expertise in qualitative health research. We recognised that our nursing experience could make discharge education and service improvement too prominent in the analysis. Early coding meetings therefore included deliberate discussion of other readings, including family expectations, social support, uncertainty, material resources and emotional recovery after premature birth.

2.6 Analysis

Analysis followed the recursive phases of reflexive thematic analysis [26]. NVivo was used to organise transcripts, codes and analytic memos; all coding decisions were made manually by the researchers rather than by automated text-mining functions. Researchers read transcripts repeatedly, generated inductive codes across the dataset, wrote analytic memos and then clustered codes into candidate themes. Two researchers independently coded early interviews to compare interpretations and refine the developing coding structure. Coding focused on preparedness, home care, ambiguity, family routines, help-seeking and nursing support. Candidate themes were reviewed against the full dataset, refined in team discussions, named and then written as an explanatory account of transition. Because the design was qualitative and interpretive, we did not calculate inter-coder reliability coefficients or use theme counts as outcome measures.

Theoretical interpretation occurred after the first theme map had been developed. Transitions Theory helped explain role change over time; Uncertainty in Illness Theory helped explain the cognitive and emotional burden of interpreting ambiguous infant cues; and the Family Management Style Framework helped explain how care became embedded in household routines and family negotiations. This process led to the central analytic construct of caregiving calibration.

After theme development, we built a visual transition matrix informed by journey-mapping principles. The matrix brought together transition moments, caregiving tasks, nursing touchpoints and pain points found across the themes. It was not a formal patient journey map, a statistical model or a coding template. It was an analytic display showing how responsibility, uncertainty and support needs were interpreted to shift as care moved from the neonatal unit into the household.

Quantitative information was used only to describe the study context. No inferential statistical tests, subgroup comparisons or power calculations were undertaken, because the study sought analytic depth and variation in experience rather than estimation of population parameters. Numerical descriptors in the Results section should therefore be read as contextual information for judging transferability.

2.7 Translation and cross-language reporting

Primary analysis was conducted in Chinese. Quotations selected for the English manuscript were translated by a bilingual nursing researcher and checked against the Chinese transcript by a second team member. Differences were discussed with attention to meaning, tone and clinical context rather than literal equivalence. The team also discussed key analytic terms, including caregiving calibration, threshold ambiguity and fragile normality, before using them in English.

2.8 Rigour

We addressed credibility, dependability, transferability and confirmability using Lincoln and Guba's criteria [31]. Credibility was supported by repeated reading of transcripts, independent coding of early interviews by two researchers, analytic memos and regular team meetings. An audit trail included interview guides, coding decisions, theme maps and reflexive memos. We described the setting, sample and discharge context to support transferability. Disconfirming cases were discussed, including fathers who reported early confidence and mothers who felt less anxious after discharge than expected. A small group of participating parents reviewed a brief summary of preliminary findings; their feedback supported the relevance of the themes and helped us separate feeding uncertainty from respiratory uncertainty more clearly.

2.9 Ethical considerations

Ethical approval

was obtained from the Ethics Committee of Deyang People's Hospital. The study was conducted in accordance with the Declaration of Helsinki and relevant institutional ethical guidelines for research involving human participants. All participants provided written or electronic informed consent. Participants were informed that participation was voluntary and that they could stop the interview at any time. Identifying details were removed from transcripts, and quotations were labelled with participant role, broad infant gestational-age category, and time since discharge. When parents became distressed, interviews were paused, and the interviewer offered time, reassurance, and referral to the neonatal follow-up team where appropriate.

3. Results

Recruitment flow, participant characteristics and infant characteristics are summarised descriptively in Table 1. Counts are provided to describe enrolment, withdrawal, the interviewed sample and represented infants; they were not used to infer prevalence or compare subgroups.

Table 1
Recruitment flow, participant characteristics and infant characteristics

Sample characteristic	Value
Parents enrolled, n	30
Parents withdrew before completing an interview, n	6
Parents included in analysis, n	24
Mothers included in analysis, n	16
Fathers included in analysis, n	8
Families in which both parents were interviewed, n	2
First-time parents, n	14
Families with grandparent co-care, n	11
Families living more than 100 km from the hospital, n	7
Infants represented, n	22
Gestational age at birth, range	28 + 4 to 36 + 3 weeks
Birthweight, range	980 to 2460 g
Neonatal intensive care stay, range	12 to 74 days
Time from discharge to interview, range	1 to 12 weeks

Four themes described parents' movement from reliance on professional monitoring toward home-based judgement. We use caregiving calibration to name the work of aligning infant cues, parental interpretations, family routines and available professional reassurance. Figure 2 presents a visual transition matrix of transition moments, caregiving tasks, nursing touchpoints and pain points. The specific themes are listed in Table 2.

Table 2
Themes, interpretive meaning and nursing implications

Theme	Interpretive meaning	Nursing implication
Becoming the monitor after leaving monitored safety	Parents attempted to replace neonatal surveillance with continuous watching	Translate clinical indicators into observable home signs
Learning care in fragments and needing embodied rehearsal	Information alone did not create readiness; confidence grew through doing care under supervision	Use return demonstration and home-like simulation
Negotiating family management under fragile normality	Feeding, growth and protection became household projects shaped by family roles and advice	Include fathers and co-caregivers in discharge education
Rebuilding confidence through accessible nursing connection	Parents needed professional confirmation to calibrate judgement and help-seeking thresholds	Provide proactive follow-up and clear escalation pathways

3.1 Becoming the monitor after leaving monitored safety

Parents described the neonatal intensive care unit as a place where safety was made visible. Monitors, alarms, observation charts and nurses' repeated checks created a sense that deterioration would be noticed quickly. This safety was reassuring but also shaped what parents believed good care looked like. After discharge, parents no longer had access to numerical indicators or immediate professional interpretation. Several described responding by watching their infant intensely, especially at night.

One mother explained:

"In the unit, there were numbers for oxygen and heart rate. At home, there were no numbers. I kept looking at his chest to see whether it was moving. I knew I was his mother, but I felt I had become the monitor."
(P06, mother, infant born before 32 weeks, two weeks after discharge)

Another parent described the first nights at home as a shared surveillance task:

"My wife and I took turns sleeping. If the baby made a small sound, one of us sat up. We were not sure whether it was normal breathing, milk coming up, or something dangerous." (P13, father, infant born at 34 weeks, three weeks after discharge)

The issue was not anxiety alone. Parents were also dealing with a change in the kind of evidence available to them. In hospital, risk had been translated into monitor values and professional responses. At home, risk appeared in colour, breathing rhythm, feeding stamina, temperature, crying and sleep. Parents had been told to observe these signs, but several did not know how to connect observation to action.

Parents did not all take up this surveillance role in the same way. Those whose infants had shorter hospital stays sometimes described discharge as a relief and were less fearful at first than parents

whose infants had respiratory instability or feeding problems. Even so, confidence could weaken when an unfamiliar sign appeared at night or when follow-up advice was not immediately available. Readiness was therefore unstable, shaped by the fit between infant cues, family experience and professional reassurance.

3.2 Learning care in fragments and needing embodied rehearsal

Parents commonly recalled receiving discharge information, yet several described it as fragmented, rushed or difficult to retain. They distinguished between "being told" and "knowing how to do it when alone". Feeding, burping, bathing, temperature measurement, safe positioning and recognising abnormal signs became meaningful only when parents practised them with the infant and received feedback.

One mother said:

"The nurse explained feeding many times, but my hands were still shaking when I did it myself. When she watched me feed and said, 'This angle is better, wait for him to rest, now continue,' I finally understood what the words meant." (P03, mother, infant born at 33 weeks, one week after discharge)

Fathers often felt that hospital teaching was directed primarily towards mothers. Some fathers became involved only after discharge, when the workload at home made shared care necessary:

"In the hospital I thought the mother should learn most things. At home I realised she could not be awake all night. I had to learn how to hold him after feeds and what to do if he coughed." (P10, father, infant born at 35 weeks, four weeks after discharge)

Parents valued repeated practice, return demonstration and gentle correction. Confidence grew when they performed care in front of a nurse before doing it alone at home. Readiness was embodied and relational, not only cognitive.

Fragmented learning was partly produced by the organisation of neonatal care. Some parents were taught feeding, bathing or temperature monitoring by different nurses at different times, and small differences in wording or technique were sometimes heard as contradictory instructions. Fathers often learned later because of work schedules, visiting arrangements or assumptions that mothers would be the primary learner. Discharge education therefore needs consistency across staff and deliberate inclusion of the caregivers expected to share care at home.

3.3 Negotiating family management under fragile normality

The home period required families to build a fragile new normal around feeding, growth monitoring, infection prevention and follow-up. Feeding was the most frequently described source of uncertainty.

Parents worried that insufficient intake would compromise growth, but also feared choking, vomiting, fatigue or respiratory compromise.

One mother described feeding as a repeated test:

"Every feed felt like an examination. If she stopped sucking, I wondered whether she was tired or full. If I pushed more, I worried she would choke. If I stopped, I worried she would not gain weight." (P01, mother, infant born before 32 weeks, two weeks after discharge)

Family management was shaped by more than parental knowledge. Grandparents, partners and other relatives often offered advice based on experience with term infants. Such advice could be supportive but sometimes conflicted with neonatal guidance. Parents then had to negotiate between professional recommendations and family expectations.

"My mother said the baby was too small and should be fed more. The nurse said to watch tolerance and not force feeds. I was caught between them. I needed someone professional to explain it to the whole family, not only to me." (P09, mother, infant born at 34 weeks, six weeks after discharge)

Distance from the hospital also affected family management. Parents living far from the neonatal follow-up clinic described weighing the risks of travel against the risks of waiting. For these families, uncertainty was intensified by cost, transport, time away from work and concern about exposing the infant to infection during hospital visits.

Family management did not begin after professional care ended. It was where professional advice was tested, reinterpreted and sometimes contested. Parents who could explain neonatal advice to grandparents or partners described smoother routines. Parents who could not do so often had to mediate conflict while caring for the infant. Mother-only instruction left some parents carrying too much of this interpretive work.

3.4 Rebuilding confidence through accessible nursing connection

Parents did not expect nurses to remove all uncertainty. They wanted help determining which uncertainties were safe to observe and which required action. A phone call, message response or scheduled follow-up could transform a vague worry into a manageable plan.

"Sometimes I did not need to go to hospital. I needed to ask, 'Is this normal?' If the nurse said what to watch for and when to come, I could breathe again." (P07, mother, infant born at 35 weeks, three weeks after discharge)

Parents repeatedly requested threshold-based guidance: what can be watched at home, what requires contacting a nurse, and what requires urgent care. They preferred clear, observable signs over broad instructions such as "come back if the baby is unwell".

"If the instruction is just 'observe the baby's condition', I do not know what that means. I need a list: if breathing is like this, call; if colour is like this, go immediately; if milk is less than this, contact someone."
(P18, mother, infant born before 32 weeks, one week after discharge)

Accessible nursing connection helped because it offered technical interpretation and emotional containment at the same time. Parents developed judgement when nurses confirmed, adjusted or corrected their interpretation of infant cues. Confidence was not a trait parents either had or lacked. It was built through repeated calibration between home observations and professional responses.

A few parents became more selective in their use of professional support over time. They first contacted nurses for reassurance about minor changes, then began to use earlier advice to decide whether to observe, call or seek care. This mattered analytically because accessible nursing connection did not simply create dependence. Used well, it helped parents internalise thresholds and make more proportionate help-seeking decisions.

4. Discussion

4.1 Key findings and interpretation

Parents in this study did not simply move from hospital to home. They moved from a setting where safety was visible and professionally interpreted to one where they had to judge uncertain signs themselves. Caregiving calibration captures this work: parents gradually converted clinical surveillance, discharge instructions and family routines into home-based judgement. The four themes showed why that conversion was uneven. Parents became substitute monitors, needed practice rather than information alone, managed fragile routines within family systems and rebuilt confidence through accessible nursing connection.

These findings shift attention away from readiness as a discharge-day state and toward readiness as something made across time, setting and family routines. Uncertainty was not only an emotional response. It was a practical problem of matching ambiguous infant cues to actions. This matters for neonatal nursing because support needs clustered around transition touchpoints, not only around the discharge conversation. The argument is not that parents need indefinite professional surveillance after discharge. Early, accessible nursing responses may help parents internalise safe thresholds and use support more selectively over time.

4.2 Relationship to existing literature and theory

Prior qualitative work has linked preparedness with parent presence, adequate information and a gradual transition home [9, 10]. Our findings add a more specific point: gradual transition needs to include practice in judgement, not only practice in tasks. Parents had to interpret feeding fatigue, breathing, colour and weight change in context. This fits with literature describing role disruption, caregiving learning and support needs after preterm birth [8], as well as studies reporting communication

difficulties, limited knowledge and mental health strain during neonatal intensive care and transition home [11, 17].

Caregiving calibration also refines discharge readiness literature. Smith et al. [4] defined readiness partly through skills, knowledge, comfort and confidence. In our analysis, mastery was not a fixed state reached on discharge day. It was tested again at home by ambiguous infant cues, family opinions and practical constraints. Family-centred and family-integrated neonatal care rightly support parent involvement before discharge [12–14], but involvement needs to include threshold-based decision-making if parents are to move from performing tasks to making safe situated judgements.

Transitions Theory helps explain why discharge was experienced as a change in identity and responsibility rather than a single event [21]. Parents moved from being visitors or supervised learners to primary interpreters of infant safety. Confidence, family support, distance from hospital, consistency of information, economic pressure and access to nurses shaped that transition. Nursing work was most useful when it crossed the hospital-home boundary instead of ending at discharge, consistent with guidance on early discharge planning, family and home assessment and coordinated follow-up [5].

Uncertainty in Illness Theory explains why parents struggled with threshold decisions [22]. The problem was not just lack of information; it was ambiguity in the meaning of infant signs, unpredictability in preterm infant behaviour, and difficulty appraising whether a change was benign or dangerous. Threshold-based tools may reduce uncertainty by translating professional knowledge into observable cues and action categories. This reading is consistent with research showing that families and providers value path planning, credible information, engagement with services and digital or mobile support during neonatal transition [19, 20].

The Family Management Style Framework helps locate discharge work within household life [23, 24]. Parents had to define the infant's condition, organise daily management, and weigh perceived consequences for the infant and family. Feeding routines, grandparent advice, night-time surveillance, travel to hospital and parental work demands all shaped how care was enacted. Studies of medically complex and socially disadvantaged families similarly show that transition experiences are shaped by mental health, social support, finances, care coordination and access to services [15–18]. These findings suggest that neonatal discharge education should include the family system, not only the parent present on discharge day.

4.3 Nursing touchpoints and pain points

The visual transition matrix identifies points where nursing support may be most relevant. During monitored safety, bedside participation, nurse explanation and observation of routine care were the main touchpoints. The pain point was role restriction: parents could be present without practising the judgement they would soon need. During threshold ambiguity, discharge teaching and anticipatory guidance became central, but clinical language did not always translate into observable home signs. During fragmented confidence, home routines, family advice and follow-up access shaped whether

parents could calibrate their responses. Later, as caregiving became more settled, nursing support worked best as a backstop that refined parental judgement rather than replacing it.

4.4 Implications for nursing practice

The findings suggest a staged nursing pathway for safer transition (Fig. 3). Parents need early opportunities for co-care during the neonatal stay, including feeding, comfort, skin care, temperature measurement and observation when clinically appropriate. Discharge preparation should include home-like rehearsal and return demonstration, especially for slow feeding, vomiting, coughing, temperature variation and uncertainty about breathing. Nurses should also provide threshold tools that distinguish what can be watched, what requires contacting the neonatal team and what requires urgent care. Post-discharge contact should be proactive and timed to the first days at home, when uncertainty is often highest.

The pathway is not a discharge checklist in another form. Checklists can standardise preparation, but parents in this study needed a relational learning system: practice, feedback, repetition, family alignment and an accessible professional backstop. This fits with recommendations for anticipatory guidance, family needs assessment, consistent messages and timely discharge teaching [5]. It also fits digital transition studies showing that parents want path planning, information and support rather than unfiltered online content [19, 20].

The pathway also has equity implications. Families living far from hospital, families with limited caregiving support and parents whose infants have greater clinical complexity may need more intensive follow-up. A standard booklet is unlikely to meet these different needs. Neonatal services could use risk-stratified follow-up, combining routine telephone contact, video consultation, nurse-led clinics and rapid escalation pathways. Fathers and grandparent co-caregivers should be included where they are part of daily care, because household advice and role negotiation shaped how professional recommendations were enacted.

4.5 Implications for research

Future studies could test whether threshold-based discharge tools and structured post-discharge nurse contact improve parental confidence, timely help-seeking, feeding outcomes, follow-up attendance and avoidable emergency presentations. Intervention development should identify which components are essential, how fathers and grandparents can be included, and how digital follow-up can be implemented without widening inequalities. Longitudinal qualitative work would be useful because caregiving calibration may change as infants grow, feeding patterns shift and developmental follow-up becomes more prominent. Mixed-methods studies could also examine whether calibrated caregiving explains part of the relationship between family-integrated care exposure and post-discharge outcomes.

4.6 Strengths and limitations

Strengths include the inclusion of mothers and fathers, attention to family management, cross-language reporting procedures and integration of nursing theory with inductive qualitative analysis. The visual

transition matrix made the findings more usable clinically by locating themes within transition moments and nursing touchpoints. COREQ and SRQR guidance supported transparent reporting. Limitations include single-site sampling, which may limit transferability to neonatal units with different discharge policies, staffing models and community follow-up systems. Interviews after discharge may be shaped by recall, by parents' current emotional state and by the infant's health at the time of interview. Because the design was cross-sectional rather than longitudinal, the visual transition matrix should be read as an analytic synthesis of post-discharge accounts, not as direct evidence of observed change over time. Counts in the sample table are descriptive and should not be interpreted as estimates of prevalence. The nursing background of the research team may also have foregrounded service improvement, although reflexive discussion was used to consider other interpretations.

5. Conclusion

Preterm infant discharge asks parents to turn monitored clinical safety into judgement that works at home. Confidence developed through caregiving calibration: repeated alignment of infant cues, family routines, professional thresholds and accessible nursing reassurance. Neonatal nursing should move beyond one-off information transfer toward staged co-care, embodied rehearsal, threshold-based decision support and proactive follow-up. This approach may support parental confidence, continuity of care and safer early home management for preterm infants.

Abbreviations

COREQ

Consolidated Criteria for Reporting Qualitative Research

NICU

neonatal intensive care unit

SRQR

Standards for Reporting Qualitative Research.

Declarations

Ethics approval and consent to participate

Ethical approval was obtained from the Ethics Committee of Deyang People's Hospital (approval number: [INSERT APPROVAL NUMBER BEFORE SUBMISSION]). All procedures involving human participants were performed in accordance with the Declaration of Helsinki and relevant guidelines and regulations for research involving human participants. All participants provided written or electronic informed consent before interview participation.

Consent for publication

Not applicable. The manuscript does not contain identifiable individual participant data. De-identified quotations are reported using participant role, broad infant gestational-age category and time since discharge.

Competing interests

The authors declare that they have no competing interests.

Authors' information

Not applicable.

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Author Contribution

KS and QD conceived the study. KS, QH, YX, YG and TZ contributed to recruitment and data collection. KS, QH, YX and HL contributed to qualitative analysis and interpretation. KS drafted the manuscript. QD, HL, QH, YX, YG and TZ critically revised the manuscript for important intellectual content. All authors read and approved the final manuscript.

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Availability of data and materials

The datasets generated and/or analysed during the current study are not publicly available because the interview transcripts contain sensitive family and infant health information. De-identified excerpts are available from the corresponding author on reasonable request, subject to ethics approval and participant confidentiality requirements.

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Figures

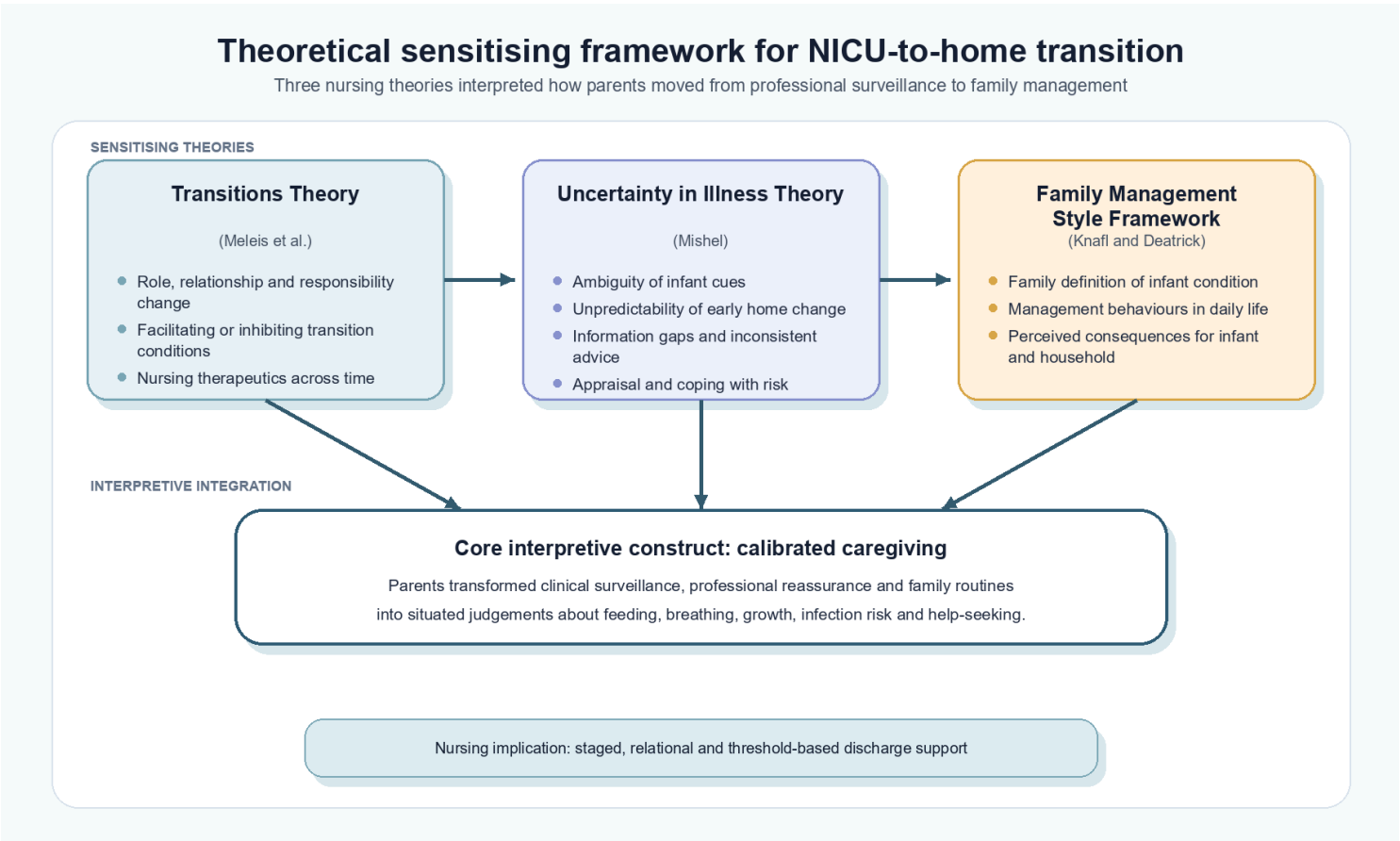


Figure 1

Theoretical sensitising framework for neonatal intensive care to home transition.The figure shows how Transitions Theory, Uncertainty in Illness Theory and the Family Management Style Framework informed interpretation after inductive coding.

Visual transition matrix: caregiving calibration

Transition moments, touchpoints and pain points in the NICU-to-home journey

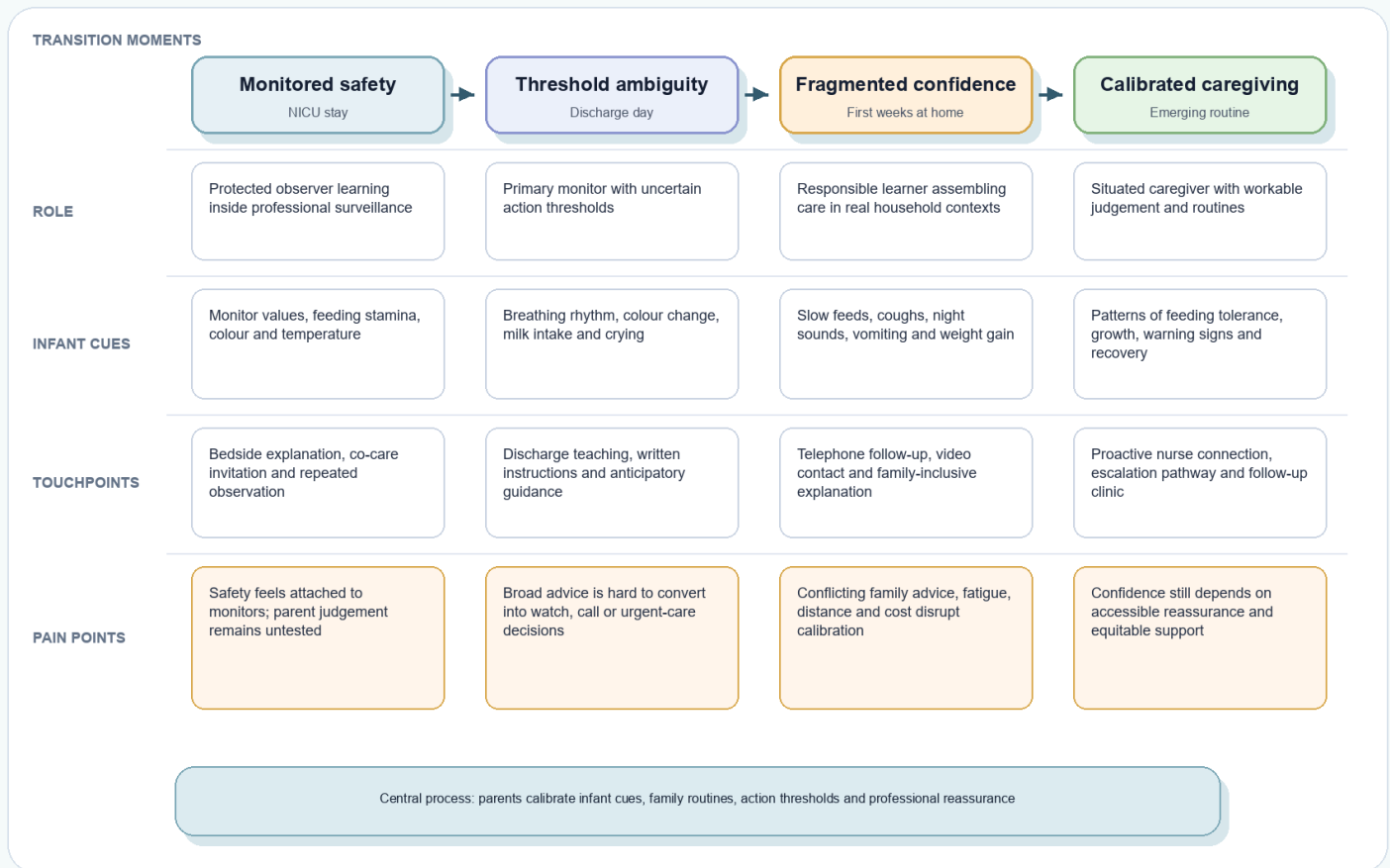


Figure 2

Visual transition matrix: from monitored safety to calibrated caregiving. The display synthesises parents' evolving role, dominant infant cues, nursing touchpoints and pain points across the neonatal intensive care-to-home transition.

Nursing support pathway for safer NICU-to-home transition

A theory-informed intervention logic derived from the qualitative findings

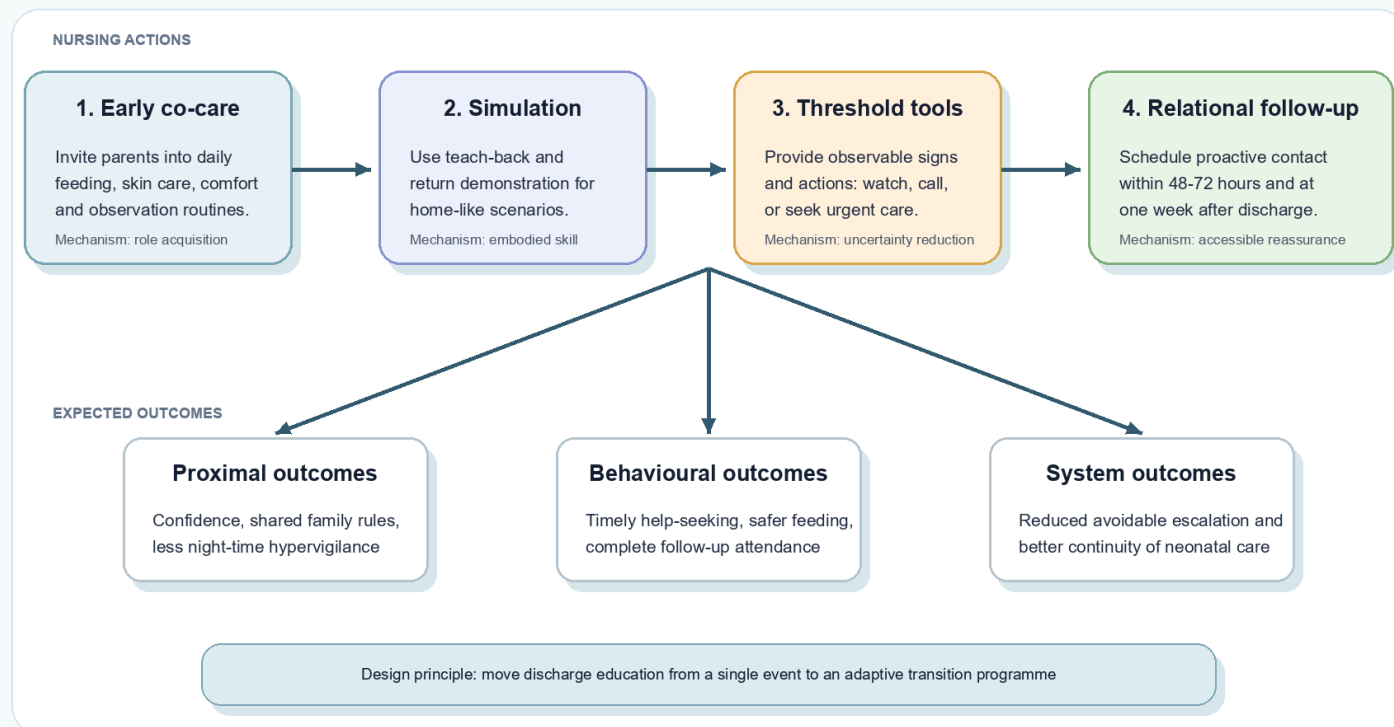


Figure 3

Nursing support pathway for safer neonatal intensive care to home transition. The pathway translates the findings into an intervention logic combining early co-care, home-like simulation, threshold tools and relational follow-up.