TRANSITIONING FROM OPEN BAY TO PRIVATE ROOM: THE IMPACT ON NEONATAL

PARENT-STAFF COMMUNICATION

By

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ABSTRACT
TRANSITIONING FROM OPEN BAY TO PRIVATE ROOM: THE IMPACT ON
NEONATAL PARENT-STAFF COMMUNICATION


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**Background:** Effective parent-staff communication improves parents' emotional well-being,

leads to better parent-infant bonding, and increases parental involvement in their child's care.

Several studies address the impact of workflow and analyze the effectiveness of parent

communication in a neonatal intensive care unit (NICU).  However, few studies address parent-

staff communication impact when moving from an open bay NICU to private rooms.

**Objective:** To determine the impact on neonatal parent-staff communication in moving from an

open bay to a private room neonatal intensive care design.

**Methods:**  Based on stakeholder interviews, spaghetti diagrams, and a communication process

map, we developed and administered a mixed format parent and provider questionnaire to

measure communication perception differences in the open bay and private room environment.

**Results:** There was no statistical difference (p-value > 0.05) between perceptions of

communication in the open bay (2.33) versus the private room (2.34).  However, there was a

statistical difference (p-values < 0.05) between the providers' communication perception (2.16,

2.26) versus the parents' communication perception (2.88, 2.75).  In addition, moving from an

open bay to a private room environment widened the difference between the types of information

parents desired versus what they actually received.  Additional communication opportunities

identified, in both the open bay and private room environment, include minimizing conflicting information, increasing parental engagement, and using diversified communication methods.

**Conclusions:**  Moving from an open bay to a private room NICU did not have a significant impact on parent-staff communication, but opportunity areas to improve parent-staff communication were identified. This data is being used to design interventions to improve parent-staff communication in our NICU.

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**CHAPTER ONE: AN INTRODUCTION**

The NICU experience is usually new, intense, and frightening for most parents. In addition, in a teaching hospital with rotating staff and physician trainees, establishing a consistent relationship between providers and parents can be challenging. Effective parent-staff communication is a key component to improving parents' emotional well-being so that they can better support their children. (1-3) Communication is one of the top three factors that parents use to determine the competency of staff and is one of the top three impact areas for parents' perception of the NICU experience. Parents want consistent, clear, detailed information with limited jargon, and individualized communication specific to the care of their neonate. (2, 3) They prefer face-to-face meetings, but their understanding can be enhanced with written and audio-visual materials and access to their babies' charts. Communication that engages parents can help them become active learners and motivate them to ask questions, conduct internet research on their own, and become involved in their babies' care. (2, 3) Poor communication increases parental stress and insecurity and causes parents to feel confused, isolated, and abandoned leading, to mistrust of medical decisions and decreased support for the physicians' plan of care. (1-3)

Several studies have measured various aspect of parent-staff communication (1-3) or NICU design impact on outcomes of patients, parents, and staff (4, 5). But no study addresses the impact of moving from an open bay design to a private room format on parent-staff communication. The aim of this project was to measure the impact on neonatal parent-staff communication in moving from an open bay environment to private rooms.

**CHAPTER TWO: METHODS**

**Setting**

The Dallas County Parkland hospital is a teaching hospital with a level III safety net neonatal intensive care unit that has over 250 employees who serve 65 newborns daily with an average length of stay of 18 days totaling 1,300 newborns annually. In 2015, Parkland redesigned its NICU from an open ward (17,625 square feet) to 96 private rooms (93,184 square feet)

The open ward design had six bays that contained six to twelve beds each across two floors, divided by three levels of acuity: critical care bays (level III), intensive care bays (level II), continuous care (level I). In addition, the open bay format had three private rooms for the most critically ill patients that needed one-to-one care. Each patient was assigned to one of three teams who managed and coordinated care during the day from 6 am – 6 pm. Two of these were teaching teams which consisted of a faculty physician, a physician fellow, between one and three resident physicians, and one to two nurse practitioners, while the third team was comprised of a faculty physician and nurse practitioners. Each team had patients that were scattered across multiple bays, and the physicians on the team changed every two to four weeks. The nurse practitioners on all three team varied daily. At night, all patients were managed by one night team, consisting of a faculty physician, a fellow, a resident physician, and nurse practitioners. In addition to their team, each patient had a daytime nurse and a night-time nurse. While many patients had "primary" nurses who cared for them regularly, nurses could change daily throughout their stay.

The redesigned NICU converted the entire open bay to private rooms that were organized into corridor-type pods containing 16 rooms each that included pull-out beds for parents to sleep

in overnight.  Each team had two assigned pods with all patients for each team contained in those pods.  Physicians still rotated onto the teams every two to four weeks.  Also similar to the open bay format, all patients were also managed overnight by one team and a night nurse.

**Study Design**

A neonatal interdisciplinary team consisting of a medical student, faculty physician, physician fellow, nurse practitioner, and unit nurse manager chartered the project and administered the following quality improvement tools: stakeholder interviews, spaghetti diagram, process map, and quantitative surveys.  The results were analyzed and formulated into critical to quality drivers with intervention prioritizations that were shared and aligned with key stakeholders.

**Stakeholder Interviews**

First, open bay providers were interviewed and parent-staff interactions observed.  During a two-week period, we identified the teaching teams who oversaw patient care and were the primary communication providers for parents.  One project team member conducted all the interviews and observations across the two weeks to ensure consistency.  We interviewed 20 physicians (faculty, fellows, and residents) and nurse practitioners regarding their communication process with parents.  The interviewees were blinded in regards to the purpose of the project.  Open-ended questions asked about when and how they interacted with parents and included follow-up questions for clarity.  The interviewees were then observed throughout their shifts to see how they communicated and interacted with parents.  The observed communication process was compared to the proposed communication process developed in the stakeholder interviews.

**Spaghetti Diagram**

Next, the NICU flow patterns in the open bay format were recorded. We observed nursing and physician staff movement throughout a shift and documented when and where parent communication happened within the open bay. One team member completed all the spaghetti diagrams across one week day and one weekend day. The flow patterns were recorded on spaghetti diagrams. Again, staff members were blinded in regards to the purpose of the project and only told that we were observing activities in the bays.

**Process Map**

A current state communication process map was developed based on stakeholder interviews and observations. The multidisciplinary team created a gold standard communication process map based on effective communication standards. (1-3) The team compared the current state to the gold standard to identify variability in the communication process.

**Quantitative Surveys**

A quantitative data survey was developed and conducted with parents and providers both in the open bay and private room format.

*Parent Survey*

Parents who were at least thirty days post discharge from delivery were selected if they had a neonate with a stay in the NICU of more than 4 weeks. A 16-item mixed format parent questionnaire was drafted based on components of optimal neonatal parent-staff communication identified in other studies. Specifically, communication perception was measured by asking respondents to indicate their agreement (yes, sometimes, no) to five statements based on components of effective communication between parents and staff: minimizing conflicting information, providing support to parents, answering parents' questions, ensuring

communication is understood, and inspiring parental engagement (measured by assessing parents' use of books and internet resources). (1-3) The questionnaire was orally piloted with four parents (two Spanish-speaking, two English-speaking) to determine clarity of questions. The final parent questionnaire was developed (see Figure 1) and administered to parents either orally or by telephone in the parent's native language. The survey took 15 minutes to complete on average. The parents' responses were entered into an electronic survey system.

### Provider Survey

A similar 15-item mixed format questionnaire was administered electronically to all neonatal providers including nurses, nurse practitioners, attending physicians, physician fellows, and resident physicians who had worked in the NICU within the preceding six months. The questionnaire was piloted with four providers to determine clarity of questions. The final questionnaire was developed (see Figure 2) and administered to providers. Two additional questions were added to the private bay provider survey: 1) How do you feel the single bed layout of New Parkland has impacted parent-staff communication? (five point Likert scale from significantly better to significantly worst) 2) If you feel there has been a change, why do you think the new layout has had this effect on parent-staff communication? (open-ended question)

### Statistical Methods

The characteristics of survey participants were compared using the chi-square test for independence or Fisher exact test with a null hypothesis that there was no significant difference in the survey population between open bay and private room with an alpha $< 0.05$. Using a non-paired means comparison t-test assuming unequal variance with a 95% confidence level, parents' perception of staff communication was averaged and compared to the provider's average response. In addition, open bay responses were compared to private bay responses for both

providers and parents.  Open-ended responses were reviewed, categorized, and analyzed for themes.

### Critical to Quality Drivers

All of the data was analyzed, complied, and shared with the project team.  The team identified "critical to quality" drivers that most impacted parent-staff communication.

### Prioritization Matrix

Based on the critical to quality drivers, the team placed improvement areas in a prioritization matrix.  Each team member rank ordered the improvement areas according to implementation difficulty (1 being the most difficult, 6 being the least) and level of return (1 being the lowest return, 6 being the highest) based on perceived improvement in parent-staff communication. Team members' scores were averaged together for each improvement area for implementation difficulty and level of return and placed on the prioritization matrix according to the average scores.

# CHAPTER THREE: RESULTS

## Stakeholder Interviews and Parent-Staff Observational Studies

Based on the 20 stakeholder interviews, a 23-step process map was developed that listed the steps providers completed when communicating with parents (See Figure 3). Observational studies and spaghetti diagrams identified 11 points of variability in parent-staff communication when compared to the process map and effective communication standards. 50% of the inconsistencies noted occurred during the updating of parents. Other points of variability occurred throughout the process. Certified medical translators were not always used due to lack of availability. Providers used medical jargon and didn't check for a parent's understanding of the communication. Sometimes the communication was hurried and the providers did not introduce themselves, explain their role on the team, or build a rapport. Providers didn't always ask open-ended questions or allow parents to ask questions. Providers sometimes stood over parents while talking often due to the physical constraints of the open bay. Lastly, the patient's medical record was sometimes inconsistent with the observed conversation between parents.

Most parent communication took place in the afternoon after rounds were complete. If a parent was present in the NICU, the providers would communicate directly with the parent. If a parent was not present, providers would call the parents to update them. Translators were used when needed and available. Observed communication often included medical terms and acronyms like TPN and CPAP. During observations, providers did not explain the medical terms used unless the parent asked for an explanation. When questioned, providers observed that while providing updates, they felt that many parents didn't understand the medical information given. Providers tended to provide updates about the daily changes (weight gain, clinical status) rather than the infant's overall medical condition. Checking for understanding was generally

assessed by asking a closed ended question like "Do you understand?" rather than open-ended questions like "Tell me what you understand about (blank)?" Providers documented their conversation in social note using the standard template which sometimes led them to checkmark items that were not actually discussed. For example, a few providers documented that they communicated with both parents even though the father did not speak English and did not understand the conversation. Some providers documented that the conversation took place in Spanish even though the documenting provider was not present for the conversation nor did they actually communicate with the person that talked to the parent.

During two observed parent meetings, parents indicated that they communicated with many different people and often did not understand what roles each person had on the team. They stated that they preferred to talk to a physician on a regular basis. If they didn't talk to a physician, parents felt that their child's needs were not a priority (one parent reported that a physician had only updated them twice during a four-month NICU stay). Parents expressed frustration with the amount of time they have to wait for a translator to arrive. Parents indicated that they did not understand their child's medical condition or plan and they often left the NICU with many unanswered questions.

In general, the communication inconsistencies were observed more with junior providers than senior providers. Better communication techniques were observed with attending physicians. These attending physicians used open-ended questions to check for understanding, provided simple explanations, and asked for the parent's opinion regarding their child's medical care.

**Communication Flow Patterns**

The team noted parent-staff communication differences based on the day of the week. On the weekday, provider flow in and out of the room was less frequent and therefore less

communication interactions occurred with parents.  Parent-staff communication occurred only if

the parent requested information.  Provider flow in and out of the room increased on weekends,

resulting in parent interactions (see Figure 4).  Parent-staff interactions were often provider

initiated.

**Quantitative Surveys: Open Bay vs. Private Room Comparison**

### Demographics

In the open bay format, of the 30 parents eligible to participate, 28 consented to the

survey (including 11 mother-father dyads).  The team was unable to contact two parents and

therefore they were excluded from the project. In the private room format, of the 40 parents

eligible to participate, 20 consented to the survey (including 14 mother-father dyads).  The 20

parents the team was unable to contact were similarly excluded from the project.  P-values

showed no statistically significant difference in the demographics of the open and private bay

parents except in terms of native language.  54% of open bay parents were native Spanish

speakers compared to 85% of private bay parents (p-value = 0.031) (see Table 1).  However,

stratification of survey responses by demographics did not show statistically significant

differences between open bay and private room parent (p-value > 0.05).

### Parent and Provider Communication Perception

The combined weighted average parent-provider communication score was 2.33 (open

bay) and 2.34 (private room design) out of 3.00.  Providers in both open bay and private room

formats reported statistically significant lower score of communication quality than parents

across all communication perception statements except for receiving conflicting information. The

private room providers' score for conflicting information (2.11) was not statistically different

from the private room parents' score (2.40). (See Table 2)

The weighted average parental communication perception score between the private room (2.75) and open bay (2.88) was not statistically different (p-value 0.375). However, private room parents reported a statistically significant lower score (p-value 0.028) for receiving conflicting information (2.40) versus open bay parents (2.82). In addition, both private room (2.60) and open bay parents (2.57) reported lower scores on using resources to learn about their baby's health. (See Figure 5)

Although the private room providers had higher communication perception scores than open bay providers, the difference was not statistically significant (weighted average p-value 0.436). Both private room and open bay providers gave lower scores for parents receiving conflicting information (2.11, 1,99) and parents using the internet to the learn about their baby's health (2.01, 1.91). (See Figure 6)

Although there was no statistical difference between the perceptions of open bay provider communication as compared to private room communication, 68% of providers felt that the private room layout improved communication. Reasons noted included increased privacy, which facilitated more parent-staff conversations, increased parent time at bedside, which increased likelihood of interacting with physicians, and increased confidentiality, which encouraged parents to openly communicate with providers. On the other hand, 18% of providers indicated worsened parent-staff communication with the private room layout. Providers listed impaired visibility of parents, increased parental isolation, and the spreading out of sibling groups, which decreased the likelihood of interacting with parents. (See Table 6)

**Parent Communication Preferences**

Only 39% of open bay parents and 35% of private room parents reported receiving communication updates from providers, despite 50% of both groups preferring to receive

communication updates from physicians. 89% of open bay parents and 80% of private room parents reported being updated at least once day or more, while 100% of both groups preferred to be updated at least once a day or more. The majority of open bay and private room parents received communication updates either face to face (93%, 100%) or via the telephone (86%, 90%) but both groups preferred the use of other communication methods such as handouts (61%, 75%), electronic images (57%, 75%), pictures (50%, 45%), or written documents (61%, 80%) in addition to face to face and telephone updates. (See Table 3)

Open text analysis of the main things parents wanted to know about their babies' health revealed a disconnect between what providers reported discussing with parents and what parents actually wanted to know. Parents and provider responses were categorized into six main topic areas: specific health issues (medical conditions, medication, labs), general status (health trend), significant changes (medical condition, treatment plan), eating progress (oral intake), health progress (baby's health performance versus goal, prognosis), and health statistics (weight, growth, height). Compared to the type of information provided, both open bay and private room parents desired less objective information (health stats and eating progress) and more subjective details (health issues, general status, changes, and health progress). Across all categories, changing from an open bay to a private room widened the difference between the types of information that parents desired compared to the type of information given by providers. (See Table 4)

**Provider Identified Barriers to Communication**

In both the open bay and private room format, the majority of providers indicated language differences and lack of interpreters (84%, 88%) as a main barrier to communicating with parents. (See Table 5)

**Critical to Quality Drivers**

In both the open bay and the private room format, parents and providers reported increasing parent engagement and minimizing conflicting information as opportunity areas. In addition, parents desired increased communication with the medical team. The project team identified six ways to improve parent-staff communication: 1) Providing a list of tools and resources to parents; 2) Encouraging parents to participate in morning rounds; 3) Incorporating virtual communications tools like orientation videos or online portals to increase the medical team's visibility; 4) Organizing regular family meetings between the parents and attending physician, especially for chronically or critically ill patients; 5) Changing the standardized communication template in the medical records system to ensure that specific areas desired by parents are addressed during parent-staff communication interactions; and 6) Increasing access to translators. (See Figure 7)

**Prioritization Matrix**

The project team rated these six improvement areas based on difficulty to implement as compared with the perceived benefit to communication (Figure 8). Developing virtual communication tools scored the most difficult to implement due to budget constraints with the lowest return due to perceived cost exceeding perceived benefit. Although improving translation service was the second most difficult to implement because changing the translation service was outside the direct control of team members, it had the highest return due to the negative effect of language barriers on parent-staff communication and understanding. Providing parents with a list of tools and resources had moderate implementation difficulty due to additional work needed to develop an appropriate resource list covering the majority of neonatal topics. Also, this improvement area had a low return due to concerns about low parent usage of the resource list.

Designing a new communication update template had moderate implementation difficulty to due additional work needed to change the current template, incorporate it into the medical record system, and train the staff. This improvement area had a moderate return, as it would remind providers to communicate with parents about particular topic areas. Organizing regular family meetings was the second easiest to implement with the second highest level of return, given that the NICU already had a family liaison staff position that could help organize family meetings. Lastly, family centered rounds scored easiest to implement with the highest return due to no additional effort or cost needed by staff to encourage parents to attend morning rounds as the teams already rounded outside the patient's room.

**CHAPTER FOUR: DISCUSSION AND CONCLUSION**

The aim of this project was to analyze the impact on parent-staff communication in moving from an open bed to a private room NICU design. This project was one of the first to look at NICU design on parent-staff communication. There was no statistical difference in the combined parent-provider weighted average communication score when moving from an open bay to a private room. On average, a private room NICU did not enhance or worsen parent-staff communication when compared to the open bay design. However, individual components of parent-staff communication revealed areas for improvement opportunities.

**Key Point 1**: There was a statistical difference between the providers' perception of parent-staff communication versus parents' perception. Providers thought we were worse at parent-staff communication than what parents reported. It is possible that our surveyed parents had a positive bias toward our communication.(5) Given that their infants were still under the care of the NICU team, parents may have been less willing to give lower ratings. Despite the assurance of confidentiality and anonymity, parents may have feared that the results might negatively impact patient care.

It is also possible that providers may have had a negative bias toward our communication. Given that communication with parents of different language has been an on-going issue with few interventions, providers have been frequently frustrated. Notwithstanding the potential biases, other studies have shown that providers' perceptions differ from parents due to differences in education background, medical knowledge, culture, and other factors. (6-9)

**Key Point 2:** Both providers and parents identified the same opportunities to improve parent-staff communication: minimizing conflicting information and increasing parent's use of the Internet and book resources. Particularly in the NICU environment where the baby's health

status and plan can change minute by minute (10), it is often difficult to keep parents up to date on every medical change thereby increasing the risk that conflicting information would be provided. Also, due to the technically complicated and unique conditions that NICU infants can have, it is a challenge for parents to find reliable information in print or online that is presented in a manner that they can understand but studies show that parent's become more engaged if they are exposed to parent education programs. (11, 12) Lastly due to high patient loads and finite time, the family needs are often divided among the team members. A social worker takes care of social needs while a provider takes care of medical needs. Therefore, a single team member may not have a full understanding of the family's perception regarding their overall care.

**Key Point 3:** The difference between the information parents desired versus the information they received during provider updates increased when moving from an open bay to a private room. Parents desired more subjective information and less objective details in the private room format. The private room design decreases parents' visibility to the providers when they are in the unit causing providers to potentially spend less time with the parents and thus limit communication to quick updates of readily available objective details.(5)

**Key Point 4:** The manner in which providers communicated was not aligned with how parent's preferred to interact. Parents desired more frequent updates from doctors instead of nurses. However, many of the patients are updated primarily by a nurse practitioner instead of a physician. Since the survey instrument did not distinguish between doctors versus nurse practitioner, it is difficult to understand if parents meant more communication from their primary provider or specifically a physician.

Parents also desired the use of diversified communication methods rather than receiving communication only via phone or face-to-face. Unfortunately, parents most frequently visit at

night while their primary team is present in the unit during the day. Therefore, parents often receive most of their daily face-to-face communication from their nurse during the night shift. The most frequent update to parents during the day was over the phone, which limited the type of communication methods that could be employed. (13)

**Limitations**

This project was limited by a sample size. A large sample is recommended to validate results. In addition, the survey participants were different between the open bay and the private room due to the time lag of conducting the survey, which may cause some bias in the results. The parental participants excluded parents whose infant had been discharged from the NICU at the time the survey was conducted. Also, the survey instrument used was created specifically for this project and is not a validated survey instruments so inherent bias in the question may exist. Lastly, only the quantitative survey was re-administered in the private room layout. The stakeholder interviews, spaghetti diagrams, and process map was based on the open bay design.

**Conclusion**

Although moving from an open-bay to a private room NICU had no overall statistical impact on parent-staff communication, opportunities to improve parent-staff communication exist regardless of the NICU design. Increasing parent engagement, increasing communication with medical team, and minimizing conflicting information were the three critical to quality (CTQ) drivers of parent-staff communication identified by our multidisciplinary team. We assembled an inter-professional team consisting of a nurse, resident, attending, and medical student to implement parent-staff communication interventions. Intervention sub-teams will focus on the following: providing parent orientation sessions, improving access to translation

services, increasing provider use of visual handouts, and designing a communication template to assist providers in communicating the right information.

**LIST OF TABLES**

Table 1: Demographics of parents and providers who completed the quantitative surveys

| | Open Bay n (%) | Private Room n (%) | p-value* |
|---|---|---|---|
| **Eligible Parents** | 30 | 40 | |
| Completed Survey | 28 (93%) | 20 (50%) | |
| Age Range | | | 0.281 |
| 18-29 | 11 (39%) | 11 (55%) | |
| 30-49 | 17 (61%) | 9 (45%) | |
| Native Language | | | 0.023 |
| English | 13 (46%) | 3 (15%) | |
| Spanish | 15 (54%) | 17 (85%) | |
| Gender | | | 0.762 |
| Female | 17 (61%) | 13 (65%) | |
| Male | 11 (39%) | 7 (35%) | |
| Level of Acuity | | | 0.108 |
| Level II: Intensive Care | 11 (39%) | 3 (15%) | |
| Level III: Critical Care | 17 (61%) | 17 (85%) | |
| | | | |
| **Eligible Providers** | 350 | 350 | |
| Completed Survey | 98 (28%) | 101 (29%) | |
| Role | | | 0.523 |
| Nurse | 52 (53%) | 57 (56%) | |
| Nurse Practitioner | 17 (17%) | 15 (15%) | |
| Physician Attending | 6 (6%) | 12 (12%) | |
| Physcian Fellow | 7 (7%) | 5 (5%) | |
| Physician Resident | 16 (16%) | 12 (12%) | |
| Gender | | | 0.536 |
| Female | 89 (91%) | 89 (88%) | |
| Male | 9 (9%) | 12 (12%) | |

\* p-values calculatd using pearson chi square test except for native language and
 level of acuity which were calcuated using the two tailed fisher exact test

*Table 1*:  p-values showed no statistical significant differences in the demographics of the open and private bay participants except in terms of native language.  54% of open bay parents were native Spanish speakers compared to 85% of private bay parents (p-value = 0.031 using a two tailed fisher exact test with alpha = 0.05).  However, stratification of data by demographics did not show statistically significant differences in open bay parent survey responses when using a non-paired means comparison t-test assuming unequal variance with a 95% confidence level for applicable questions.

Table 2: Comparison of parents and provider communication perception

| Statements (1=no; 2=sometimes; 3=yes) | Open Bay | | | Private Room | | |
|---|---|---|---|---|---|---|
| | Parents | Providers | p-value | Parents | Providers | p-value |
| Parents receive information that does not conflict | 2.82 | 1.99 | 0.00 | 2.40 | 2.11 | 0.08 |
| Parents feel supported | 3.00 | 2.39 | 0.00 | 2.90 | 2.43 | 0.00 |
| Parents feel comfortable asking questions | 3.00 | 2.31 | 0.00 | 2.90 | 2.44 | 0.00 |
| Parents are talked to in a way that they understand | 3.00 | 2.19 | 0.00 | 2.95 | 2.32 | 0.00 |
| Parents use books or the Internet to learn more about their baby's health | 2.57 | 1.91 | 0.00 | 2.60 | 2.01 | 0.00 |
| **WEIGHTED AVG** | **2.88** | **2.16** | **0.00** | **2.75** | **2.26** | **0.01** |
| **WEIGHTED AVG (combined parent-provider)** | **2.33** | | | **2.34** | | |
| **N** | **28** | **88** | | **20** | **101** | |

*Table 2*:  The combined weighted average parent-provider communication score was 2.33 (open bay) and 2.34 (private room design).  Providers indicated statistically significant lower scores than parents across all statements (except for receiving conflicting information) with p-values of 0.00 using compare means unpaired t-tests assuming unequal variances at 95% confidence level. The private room providers' score for receiving conflicting information was not statistically different from the private room parents' score.  Parents and providers both had lower scores for receiving conflicting information and using books/internet for self-learning in the open bay and private room design.

Table 3: Comparison of parental communication preferences

| | Open Bay | | Private Room | |
|---|---|---|---|---|
| | Current n (%) | Preferred n (%) | Current n (%) | Preferred n (%) |
| Total | 28 | 28 | 20 | 20 |
| **Q5,9: Who is your current vs preferred primary communicator?** | | | | |
| Nurse | 16 (57%) | 6 (21%) | 8 (40%) | 6 (30%) |
| Doctor | 11 (39%) | 14 (50%) | 7 (35%) | 10 (50%) |
| **Q6,10: How often do you (current) vs. would you like to (preferred) receive updates?** | | | | |
| >1X per day | 7 (26%) | 16 (57%) | 5 (25%) | 9 (45%) |
| Once per day | 18 (63%) | 12 (43%) | 11 (55%) | 11 (55%) |
| Weekly | 2 (7%) | 0 (0%) | 4 (20%) | 0 (0%) |
| Monthly | 1 (4%) | 0 (0%) | 0 (0%) | 0 (0%) |
| **Q7,12: How do you (current) vs. would like to (preferred) receive updates?** | | | | |
| Use handouts | 8 (29%) | 17 (61%) | 8 (40%) | 15 (75%) |
| Show electronic images | 7 (25%) | 16 (57%) | 2 (10%) | 15 (75%) |
| Draw pictures | 7 (25%) | 14 (50%) | 5 (25%) | 9 (45%) |
| Provide written documents | 7 (25%) | 17 (61%) | 7 (35%) | 16 (80%) |
| Speak face to face | 26 (93%) | 27 (96%) | 20 (100%) | 20 (100%) |
| Speak via telephone | 24 (86%) | 28 (100%) | 18 (90%) | 20 (100%) |

*Table 3*: Only 39% of open bay parents and 35% of private room parents reported receiving communication updates from medical team. 50% of both groups preferred to receive communication updates from doctors. 89% of open parents and 80% of private room parents were update at least once day or more. However, 100% of both groups preferred to be updated at least once a day or more. The majority of open bay and private room parents received communication updates either face to face (93%, 100%) or via the telephone (86%, 90%) but both groups preferred the use of additional communication methods such as handouts (61%, 75%), electronic images (57%, 75%), pictures (50%, 45%), or written documents (61%, 80%) in conjunction with face to face and telephone updates.

Table 4: Comparison of parental responses regarding what they want to know about their baby's health versus the information provided to parents

| Type of Information | Open Bay | | | Private Room | | |
| --- | --- | --- | --- | --- | --- | --- |
| | Parents (%) | Providers (%) | Diff | Parents (%) | Providers (%) | Diff |
| Specific Health Issues | 13 (46%) | 41 (47%) | 1% | 11 (55%) | 29 (30%) | -25% |
| General Status | 12 (43%) | 30 (34%) | -8% | 9 (45%) | 18 (18%) | -27% |
| Significant Changes | 11 (39%) | 29 (33%) | -6% | 7 (35%) | 5 (5%) | -30% |
| Eating Progress | 10 (36%) | 38 (44%) | 8% | 3 (15%) | 56 (57%) | 42% |
| Health Progress | 9 (32%) | 9 (10%) | -22% | 10 (50%) | 10 (10%) | -40% |
| Health Stats | 8 (29%) | 33 (38%) | 9% | 2 (10%) | 48 (49%) | 39% |
| N | 28 | 87 | | 20 | 98 | |

| Key | Description |
| --- | --- |
| Specific Health Issues | Breathing, medical conditions, medications, labs |
| General Status | Health is trending up, down, no change |
| Significant Changes | Changes to general health status, issues, or treatment plan |
| Eating Progress | Eating and food intake |
| Health Progress | Baby's health performance vs goal; prognosis |
| Health Stats | Physical attributes such as weight, growth, height |

*Table 4*: Open text analysis of parent responses regarding the main things they wanted to know about their baby's health compared to provider responses regarding the main things they discussed with parents. Parents and provider responses were categorized into six main topic areas regarding a baby's health: specific health issues, general status, significant changes, eating progress, health progress, and health stats. Compared to the type of information provided, both open bay and private room parents desired less objective information (health statistics and eating progress) and more subjective details (health issues, general status, changes, and health progress). Across all categories, changing from an open bay to a provide room, widen the delta between the type of information that parents desired vs. the type of information given by providers.

Table 5: Comparison of providers' response regarding barriers to communication

| Barriers to Communicating with Parents | Open Bay n (%) | Private Room n (%) | % Diff |
|---|---|---|---|
| Parent's Language Difference/Lack of Interpreters | 74 (84%) | 88 (88%) | 4% |
| Parent's Education Level | 28 (32%) | 27 (27%) | -5% |
| Parent's Availability | 21 (24%) | 23 (23%) | -1% |
| Lack of provider time to communicate | 15 (17%) | 12 (12%) | -5% |
| Lack of Privacy | 7 (8%) | 1 (1%) | -7% |
| N | 88 | 100 | |

*Table 5*: Open text analysis of providers listing the top two barriers to communication. In both the open bay and private room format, the majority of providers indicated language differences and lack of interpreters (84%, 88%) as a main barrier to communicating with parents.

Table 6: Providers Response regarding the impact of private room layout on parent communication

|  | n (%) |
| --- | --- |
| Significantly Worse | 8 (9%) |
| Slightly Worse | 8 (9%) |
| No Change | 11 (13%) |
| Slightly Better | 29 (34%) |
| Significantly Better | 29 (34%) |

N= 85

| Reason why worse | n (%) |
| --- | --- |
| Decreased provider visibility to when parents are on the unit | 13 (22%) |
| Increased isolation of parents causes a negative impact to parent's psychosocial well-being and decreases bonding with other families | 4 (7%) |
| Decreased ability to room siblings together | 2 (3%) |

| Reason why better | n (%) |
| --- | --- |
| Increased privacy leads to better engagement between providers and parents and allows parents to ask more personal questions | 26 (44%) |
| Private rooms encourages parents to stay more often and longer and have better bonding with infant | 7 (12%) |
| Increased confidentiality | 11 (19%) |

N= 85

*Table 6*:  68% of providers indicated that the private room layout improved communication because the increased privacy facilitated more parent-staff conversations, increased parent dwell time increased the likelihood of interacting with parents, and increased confidentiality encouraged parents to communicate with providers.  While 18% of providers indicated worsening communication with the private room layout because the impaired visibility, increased parental isolation, and the spreading out of sibling groups decreased the likelihood of interacting with parents.

**LIST OF FIGURES**

Figure 1: Parent Survey



*Figure 1*. Parent survey administered orally to parents either in person or via telephone in their native language.

Figure 2: Provider Survey



*Figure 2*. Provider survey administered electronically.

Figure 3: Open Bay Process Map



**NICU Parent Staff Communication Process**
Scope: Daily communication (excludes admission & discharge) between parents and
residents/fellows/NP/Nurses (excludes ancillary services, attending physician, and specialist)

**Process Variability**
1. English proficiency not checked or overestimated
2. Uses medical jargon with limited explanation
3. Doesn't check for what parents already understands about their baby's complex medical problems and issues
4. Doesn't introduce themselves or explain their role on the team
5. Doesn't establish a rapport
6. Doesn't ask if this is a convenient time to talk
7. For face to face, provider stands while parent is sitting
8. Doesn't ask open ended questions
9. Doesn't ask if there are any concerns
10. Open environment is not conducive for asking sensitive questions
11. Documentation is inconsistent with actual conversation

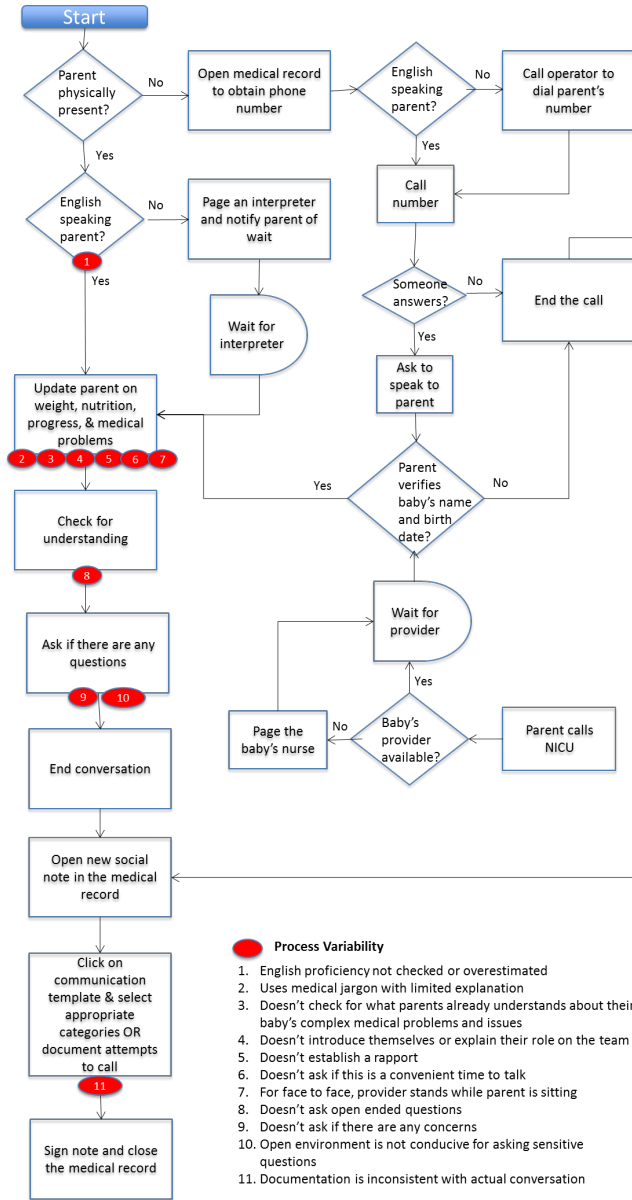*Figure 3*. The communication process map, based on stakeholder interviews, detailed what should occur with parent-staff communication. This was compared to observations of parent-staff interaction as well as an effective communication standard to identify 11 points of variability in parent-staff communication with 50% of the variability occurring during the updating of parents on weight, nutrition, and other medical problems.

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Figure 4: Open Bay Spaghetti Diagram



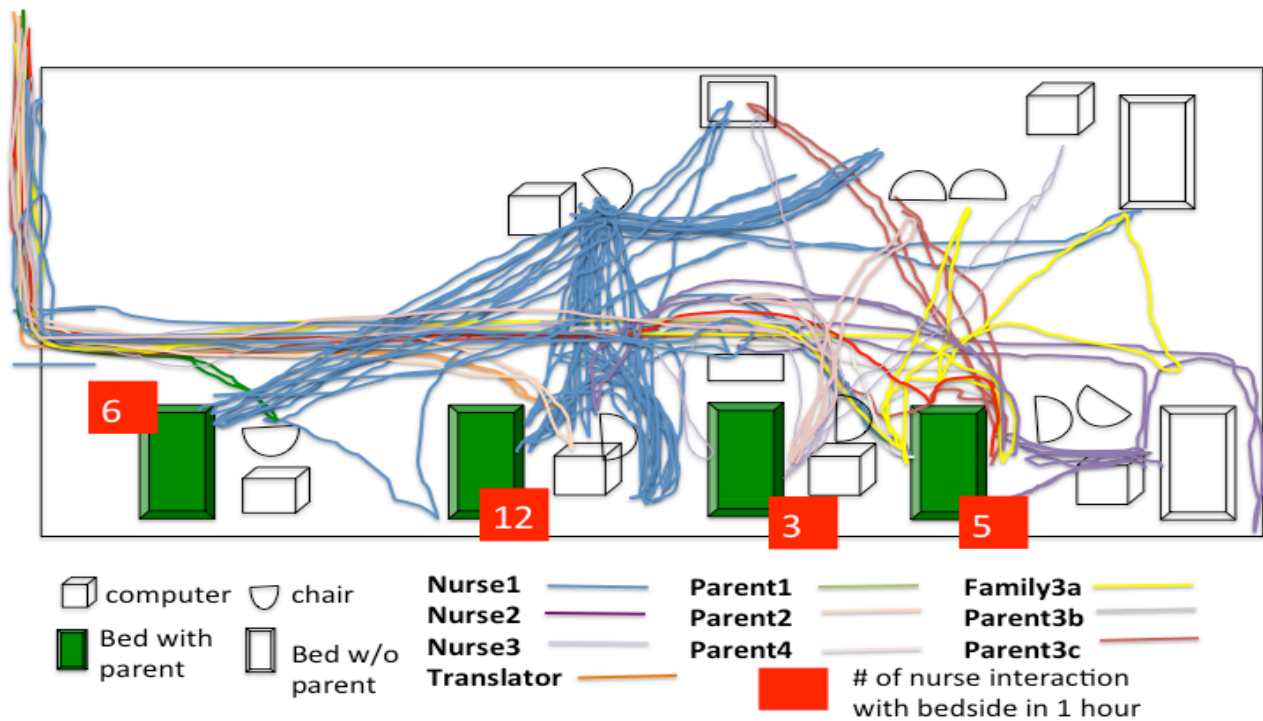*Figure 4.* This is a typical open bay layout of an acute care room that had patients in 4 out 6 available beds. Each bed had on office chair for either parents or staff and a staff computer station. This diagram shows a weekend day shift with 3 nurses overseeing the care of 4 infants. Throughout the shift, 5 parents, 1 family member, and 1 translator came in and out of the room.

Figure 5: Open Bay vs. Private Room - Parent Communication Perception Average
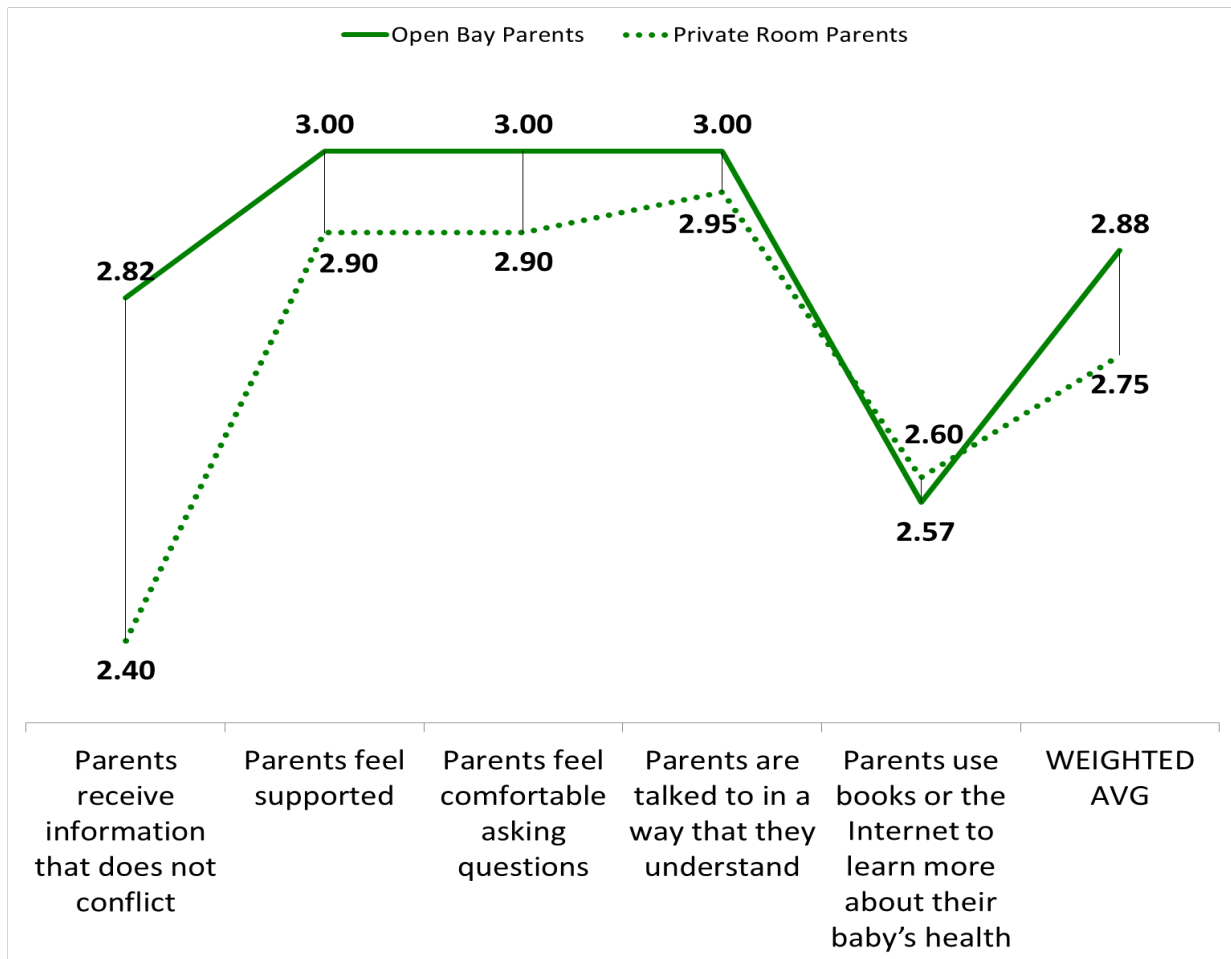


*Figure 5*. The weighted average communication score between the private room (2.75) and open bay (2.88) was not statistically different (p-value 0.375). However, private room parents had a statistically significant lower score (p-value 0.028) on receiving conflicting information (2.40) versus open bay parents (2.82). In addition, both private room (2.60) and open bay parents (2.57) indicated lower scores on using resources to learn about their baby's health. p-values calculated using non-paired means comparison t-test assuming unequal variance with a 95% confidence level.

Figure 6: Open Bay vs. Private Room – Provider Communication Perception Average
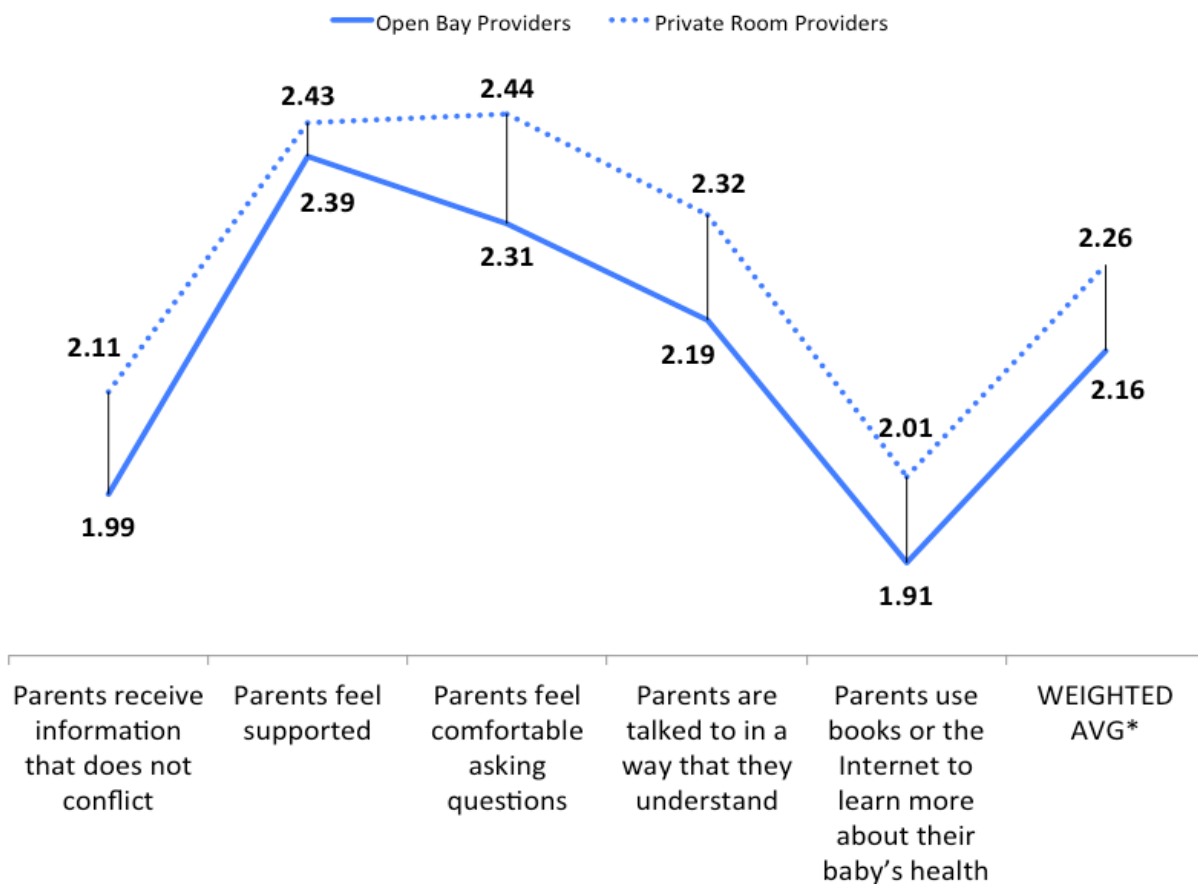


*Figure 6*. Although the private room providers indicated higher communication scores than open bay providers, the difference was not statistically significant (weighted average p-value 0.436). Both private room and open bay providers had lower scores for parents receiving conflicting information (2.11, 1,99) and parents using the internet the learn about their baby's health (2.01, 1.91).   p-values calculated using non-paired means comparison t-test assuming unequal variance with a 95% confidence level.

Figure 7: Critical to Quality Drivers
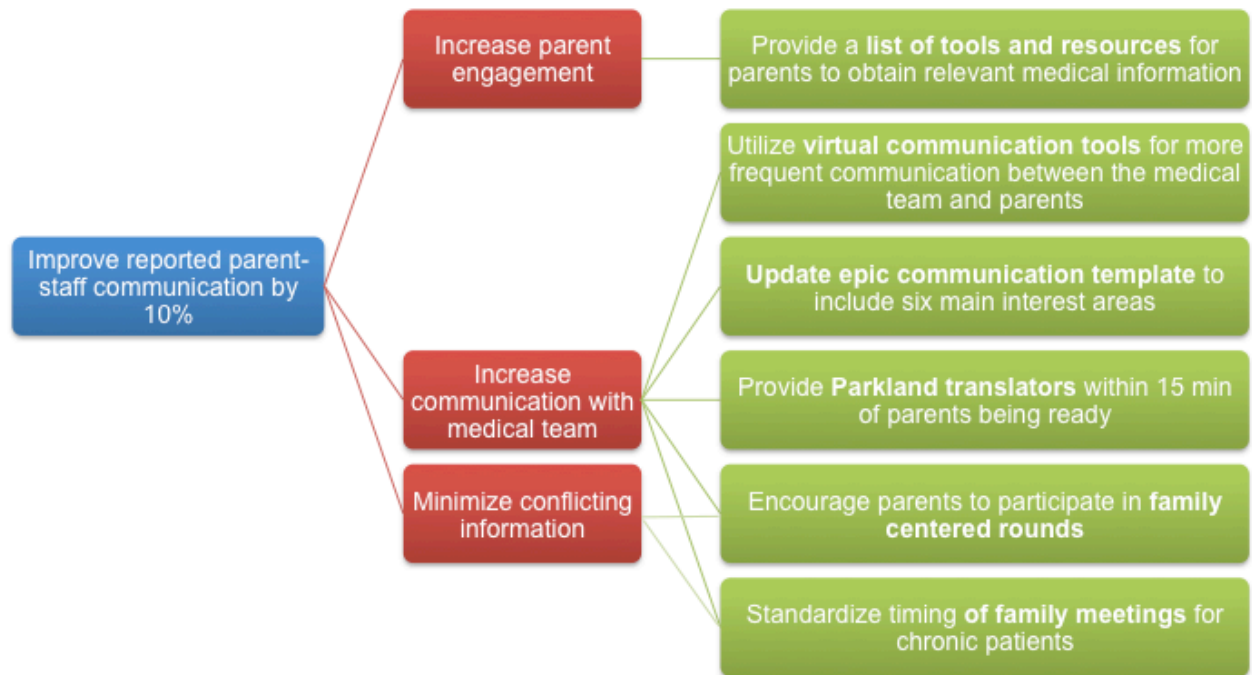


*Figure 7*. In both the open bay and the private room format, parents and providers indicated increasing parent engagement and minimizing conflicting information as opportunities areas. In addition, parents desired increased communication with the medical team. The project team brainstormed 6 project areas to improve parent-staff communication.

Figure 8: Prioritization Matrix



*Figure 8*. The project team prioritized the 6 improvement areas identified in the critical to quality drivers.

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1.     Wigert H, Dellenmark Blom M, Bry K. Parents' experiences of communication with neonatal intensive-care unit staff: an interview study. BMC Pediat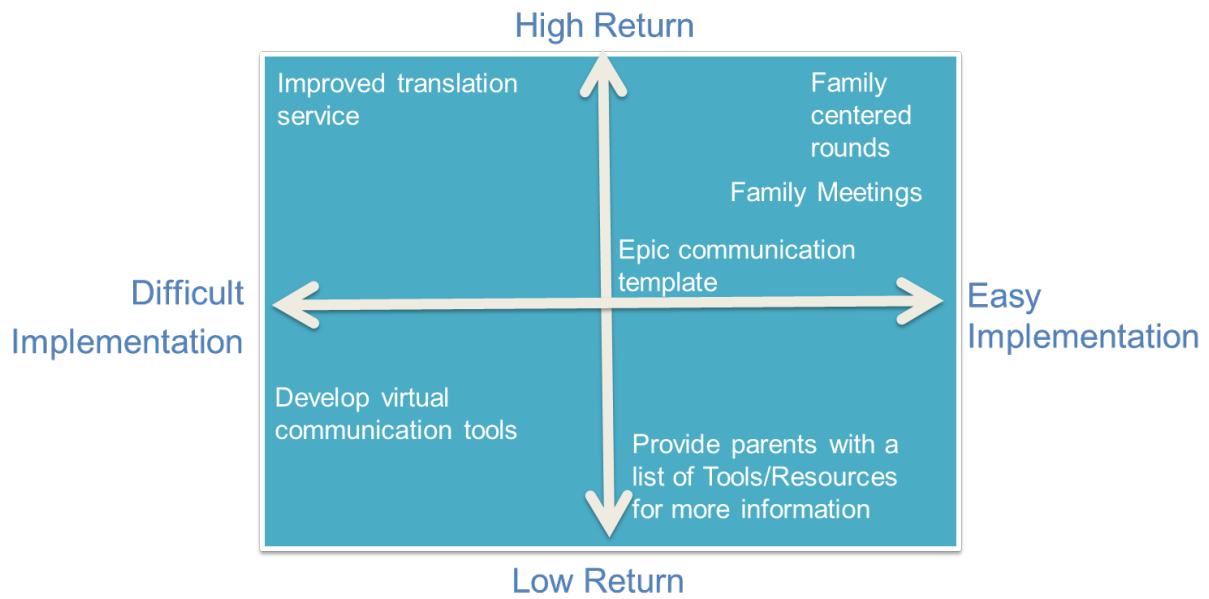r. 2014;14:304. Epub 2014/12/11. doi: 10.1186/s12887-014-0304-5. PubMed PMID: 25492549; PubMed Central PMCID: PMCPMC4276021.

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**VITAE**


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