Original Article

Working Together in the Neonatal Intensive Care Unit: Provider Perspectives

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OBJECTIVES: To elicit healthcare provider perceptions of working together in a neonatal intensive care unit (NICU).

STUDY DESIGN: We conducted focus groups to elicit descriptions of how providers work together. The groups included one each of transport nurses, staff nurses, residents, fellows, attending physicians and two multiple provider groups. To identify themes and their descriptive elements we performed qualitative data analysis.

RESULTS: There were three to seven participants per group for a total sample of 36. Provider responses to questions about working together centered around three major themes: (1) Provider Characteristics; (2) Workplace Factors and; (3) Group Influences. Provider Characteristics were defined by personal attributes, reputation, and expertise. Workplace Factors included staffing, work organization, and work environment. Group Influences were described by communication and relationships.

CONCLUSIONS: Providers in this NICU described three broad organizational and interpersonal factors that influence how they work together, yet no consistent descriptions of teams or teamwork were found. The organizational factors, often far removed from bedside, should be considered when evaluating how providers work together.
Journal of Perinatology (2004) **24,** 552–559. doi:10.1038/sj.jp.7211136
Published online 13 May 2004

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The study was supported by a grant from the Agency for Healthcare Research and Quality (#U18HS11164-01) and Dr. Thomas is a Robert Wood Johnson Foundation Generalist Physician Faculty Scholar.

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INTRODUCTION

Medical errors are common,[1] particularly in fast-paced, multi-provider settings such as adult[2] and neonatal intensive care units (NICUs).[3,4] Based upon the experience of safety-critical industries and research in cognitive and social psychology, most medical errors and adverse events are due to failures in systems of care rather than just one provider committing an error.[1] In healthcare, systems failures may include sound-alike drugs, poorly designed devices and equipment, understaffing, fatigued providers, and poor teamwork and communication.

Breakdowns in communication and failure to work together effectively are common occurrences in healthcare and improving these processes may reduce errors, adverse events, and length of stay. For example, aviation has reported success in measuring teamwork and developed Crew Resource Management (CRM), a program designed in part to improve teamwork and prevent and manage error.[5] Investigators have begun to train NICU providers to use CRM skills,[6] but there are significant differences between healthcare and aviation that make it difficult to directly apply CRM to healthcare.[7] Before designing and implementing team training programs in healthcare it is important to understand provider perceptions of working together. These perceptions can identify fundamental contextual factors that should be accounted for in healthcare team training programs, for example, characteristics of individuals, teams, work units, departments, specialties, organizations, and professions.

The objective of this study was to elicit provider perceptions about working together in a NICU. Here, we report these perceptions and discuss their implications for team training in the NICU environment.

METHODS

Overview

Focus groups were used because of the paucity of previous research on working together in NICUs and our desire to understand provider perspectives. To our knowledge there have not been previous studies that ask NICU providers their impressions of working together, nor were there surveys we could use. Focus groups are an accepted method of initial research in areas where little or no research has been conducted. Furthermore, the simultaneous and systematic questioning of several individuals is also an effective means of eliciting the perceptions and experiences of a group. The group dynamic is a synergistic factor in bringing

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0743-8346/04 $30

out information which is not available through individual interviews or surveys.[8] We then used qualitative research methods to analyze the focus group transcripts. Qualitative methods help develop themes that can be used to build a theoretical foundation for the phenomenon being studied as well as provide the details for developing instruments for future study. The method began with a thorough reading of the transcripts; we then identified quotations and concepts that fit together into broader themes. These quotations and concepts became the ''descriptive elements'' that comprised broader themes (Table 2). Themes were added as needed to account for conflicting or contrasting provider opinions.

Setting and Participants

The setting was the NICU of a 500-bed, urban teaching hospital in the south-central United States. The unit contained 80 intensive-care beds and was staffed by approximately 50 RNs (of which 11 had additional training in neonatal resuscitation and transport), 13 faculty members who served as attending physicians, and other providers including respiratory therapists, Licensed Vocational Nurses, clinical pharmacists and nutritionists. Fellows and residents also rotated through the unit each month. A small proportion of the daily work in this unit is guided by protocols or clinical guidelines. The unit is usually conducting a project to improve safety and quality, and certain quality measures are routinely monitored by unit and hospital management. Volunteers were recruited by flyers placed in mailboxes and announcements at staff meetings.

Prior to beginning the study, we decided to conduct one focus group for each of the major provider types in the unit plus two groups of mixed provider types. Therefore, we conducted seven groups that represented the primary provider types in this NICU: one group each of transport nurses ($n=3$), residents ($n=6$), attending physicians ($n=3$), staff nurses ($n=7$), fellows ($n=6$), and two mixed provider focus groups ($n=4$, and 7) for a total of 36 participants. Each of the primary provider types in the unit participated in the focus groups, but we did not attempt to make the sample size of each provider type quantitatively proportional to the number of that provider type working in the unit. Respiratory therapists, clinical nutritionists, and pharmacists are important team members in this unit, but their participation is focused on specific types of patients, primarily the sickest. We did not include them in order to derive more generalizable information.

Each of the seven groups met once in a quiet conference room in the hospital. After obtaining informed consent, participants recorded their age, gender, education, certification, and work experience on a Demographic Form. To reduce investigator bias, all questions were open ended and the experienced focus group facilitator (GS) had little knowledge of and no direct experience with the aviation teamwork model or the providers themselves. Two researchers developed a Guided Interview format for the study using a series of open-ended questions (see Appendix 1) to elicit descriptions of how providers work together. The phrase ''work together'' is a less specific phrase than teamwork, therefore allowing a broader range of responses by the participants. Interviews, lasting 60 to 90 minutes, were recorded and transcribed verbatim. A research assistant checked the accuracy of all transcripts. Field notes were also recorded. The study was approved by the Human Subjects Committee. Participants received $40.00 for their participation.

Data Analysis

Qualitative data analysis methods were used.[9] Two investigators (G.S., J.M.) read and re-read the transcripts to comprehend the whole and highlight relevant data bits. Synthesis revealed three common themes emerging from the data. Further analysis identified descriptive elements for each theme. Themes and their descriptive elements were revised as analysis proceeded to accurately present the participants' perspectives. Investigators searched for and considered data to compare and contrast with the established themes to verify inclusion. Given that some groups were comprised of just one provider type, and other groups several provider types, themes that arose from the different groups could be compared and contrasted in order to derive more valid and generalizable themes regarding perceptions of how providers worked together. The validity of the analysis was enhanced by other investigators' (E.J.T., J.B.S., R.J.H.) independent reviews of the transcripts, that resulted in revision of the themes.

RESULTS

The average age of the participants was 34. 4 years with a range of 25 to 57 years. There were nine male participants and 27 female. Participants included seven African Americans, 16 Caucasians, four Hispanics, six Asians, and three from other ethnic groups. Years of experience ranged from 3 months to 26 years with an average of 8 years. In all, 23 held medical degrees (residents, fellows, attending physicians), nine were registered nurses, two were LVNs, and two were unlicensed patient care assistants (PCAs). The nurses and PCAs were full-time employees of the hospital (Table 1).

Provider responses to questions about working together centered around three major themes: (1) Provider Characteristics; (2) Workplace Factors and; (3) Group Influences. To elaborate the themes, each was defined by several descriptive elements and participant quotes (Table 2).

Theme I. Provider Characteristics

Provider Characteristics included the descriptive elements of personal attributes, reputation, and expertise.

Personal attributes: The personal attributes that providers mentioned included power, competitiveness, collegiality, values,

Table 1 Demographic Characteristics of the Participants

	Registered nurses $N=9$	Licensed vocational nurses n = 2	Unlicensed personnel $N=2$	Physicians $N=23$	Totals $N=36$
Male	0	0	0	10	10
Female	9	2	2	13	26
Mean years experience	9.3	18.5	4	6.8	9.7
Mean age in years	34.4	45	26.5	33.6	34.9
Ethnicity:					
African American	3	0	2	2	7
Caucasian	6	1	0	9	16
Hispanic	0	1	0	2	3
Asian	0	0	0	7	7
Other/none listed	0	0	0	3	3

beliefs, gender, confidence, vulnerability, flexibility, and attitudes about their work and other providers. One nurse summarized the importance of personal attributes, ''If the nurse doesn't like the physician for whatever reason, even if it's on a personal level, well that can affect the nursing.'' However, some providers overcame differences in personal attributes. A nurse reported, ''in spite of personality differences, people adopt roles, know where they fit in to help best, and come together to get the work done''.

Reputation: Reputation, comprised of previous experiences together, perception of the other, trust, and respect, was the second descriptive element of the Provider Characteristics theme. Reputation often preceded a new provider's arrival and was purportedly difficult to change. A nurse said, ''...[if] you make a decision based on something that you knew from a previous experience that is not what is usually done in this institution, fifty people will know within 30 minutes.'' When asked how that influences working together the nurse responded ''it's very influential because some people really care about what everybody is saying. And for other people, they don't really care.'' Regarding respect and trust, another said, ''The degree of confidence in co-workers is based on prior interactions and often a quick assessment of the provider's assertiveness that would be needed in a particular circumstance.'' A provider's reputation was derived from prior second-hand information as well as judgments in particular situations.

Expertise: Expertise was the third descriptive element in Provider Characteristics and included a colleague's knowledge, skills, certifications, and education. Expertise went beyond seniority (e.g., ''the best expert may not be the most senior''), but seniority plays a critical role (e.g., a fellow said: ''...a back up plan if someone can't perform a skill, you call the next person in the hierarchy.''). A transport nurse described how the interaction of reputation, expertise, and trust affected working together after an attending physician observed her successfully working with a fragile infant during a transfer, ''...whereas before I was kind of shaky on our relationship [needing to prove myself], now it's gone.'' Positive clinical experiences among providers from different disciplines could demonstrate expertise and build respect.

Theme II. Workplace Factors

Workplace Factors, the second theme, had three descriptive elements: staffing, work organization, and work environment.

Staffing: Staffing levels and provider mix were reported as being highly variable. This affected staff workload and their ability to complete work in a timely manner. The dynamic mix of permanent and transient providers caused by rotation of physicians and use of agency personnel created an often complicated and unpredictable work environment. A resident stated, ''There's a different set of residents every month, ... others, like staff nurses, RTs [respiratory therapists], and the ancillary staff, are there all the time, so I think there's a lot of trust that's built up between the different people that you're working with. It's so fast and it goes by so fast, by the end of the month when you finally learn the patient and you're learning how things work, you leave.'' Staffing impacted both the fluidity of group membership from day to day, as well as continuity of care (e.g., a physician said, ''it is best when the same nurse cares for the patient''). The number of healthcare providers present also affected the workplace and how work was done; too many was potentially as complex and detrimental as having too few. With too many, ''there may be no prioritization, too many orders being shouted,'' but they also reported ''it is hard to say no to extra help.'' Consensus views were that appropriate levels of staffing involved a delicate balance. Seniority, whether granted from position title or from experience, played a role. Junior staff members (particularly residents) felt challenged confronting new situations without a more senior provider to assist and guide. In summary, descriptions of staffing pertained to the number of providers, their qualifications, their familiarity with one another, and the ability to efficiently and effectively complete tasks.

Table 2 Themes and Descriptive Elements about how Providers Work Together

Themes	Descriptive elements
Provider Characteristics	Personal attributes: ''depends on the people involved''
	Personal attributes
	Attitudes toward others, work
	Values
	Gender
	Reputation: ''Perception difficult to change''
	Previous experiences
	Respect and trust
	Knowing the other
	Expertise: ''builds with experience''
	Knowledge and skills
	Education and certification
	Experience
Work Place Factors	Staffing: ''anyone who impacts the way work is done''
	Defined by discipline
	Continually changing
	Familiarity with one another
	Number of workers
	Work organization: ''goes according to roles and responsibilities, it is complex with many variables''
	Complexity and type of work
	Processes and protocols versus own way of doing things
	Accountability and responsibility offers checks and balances
	Title, seniority, unit protocol determine what one does
	Work environment: ''how they all come together to get the work done''
	Sense of community versus conflict
	Way problems are solved
	Trust
Group Influences	Communication among providers: ''it is the skill and style of how you share information''
	Skill and style of questions, documentation and sharing information
	Integrity and accountability
	Communicating across hierarchy
	Relationships: ''get to know one another working together over time''
	Hierarchy: flat or structured
	Seniority and chain of command
	Alliances and trust
	Shared experiences
	Teams: ''work for the same goal, to give the best care for the patient''
	Definition varied by discipline or purpose
	Coordinate care
	Shared responsibility and accountability
	Need someone in charge
	Influenced by the people involved

Work organization: A second descriptive element for Work Place Factors was work organization, defined by the nature and complexity of the work and also the roles, responsibilities, and accountabilities of staff. The NICU environment was described as ''stressful'' and ''complex with many influences''. Patient care protocols specified roles and responsibilities for some situations, such as resuscitations. In other situations, practices among physicians differed, sometimes, substantially. One physician stated, ''I mean, everyone has their own way of practicing medicine.'' Emergencies were reported as challenging, ''…attracting too many people, which creates a chaotic environment. The senior person there takes command, which means some assess the

situation, assign staff and make sure that things are being done, not just one more person yelling one more set of orders.'' Although care protocols assigned ''predefined responsibility, recognition of the role you are playing and its seniority,'' behavior varied among providers based on ''assertiveness, competence and reputation.'' Position titles defined the chain of command so that ''the senior person takes charge.'' Checks and balances among the providers was reportedly ''a two edged sword, serving to ensure accuracy'' and produced conflict when perceived as others ''checking up [on me]''.

Workplace environment: A third theme for Workplace Factors was workplace environment, defined as the unit atmosphere, and provider responses to the work place. Staff nurses described the unit as functioning best when there was a climate of collaboration, ''togetherness, like a sense of community, though we are all different, pride in our job is a common denominator. When we don't have community, we get polarization, we don't get to bring things to the table.'' As trust builds in a healthy unit, providers ''lean on each other for different observations that others may notice.'' The importance is signified by the desire for ''...a good environment to think in a better way. NICU is a little overwhelming at first with all the monitors, and a lot of things going on with the patient...and the workload and the hours...until you establish rapport with the people working there.''

Theme III. Group Influences

Three descriptive elements defined Group Influences: communication, relationships, and teams.

Communication: Communication was defined by both verbal and written information sharing. Further descriptors included communication skill and style, accountability to others to share accurate information, verification of information and observations, questioning, and hierarchy. A physician illustrated the intricately critical nature of communication, ''Balancing questions at all levels and sharing information is critical to what physicians do,'' especially given that ''you must make decisions based on observations and assessments made by others'' and that miscommunication is noted as a serious problem. Accountability for information sharing ''...gets to be a vital issue in patient care. There are people on the team who withhold information from the person who is supposed to be in charge of care, but they are waiting for the person who they feel like really knows what is going on, because they don't think the person in charge is adding to the patient's care.'' Still, physicians explained ''information helps save lives.''

Hierarchy also influenced communication and was ''embedded in title, not expertise.'' A physician said, ''Even attendings are careful questioning another physician. I counsel junior levels how to address another physician appropriately, especially if they are from outside the facility.'' A nurse said, ''questions can only go down the chain of command, and you are very careful about questions going up the chain of command.'' However, another nurse stated, ''Questions done in a timely and respectful manner can be beneficial,'' and there was a physician who ''usually welcomes questions because I feel like it could be something that I'm missing.'' Participants agreed that the way questions were asked and information was shared was critical to effective communication.

Communication within a hierarchy may skip the order in the chain of command, sometimes leading to conflict, ''We are in a system with few senior people with the majority of the care delivered by an army of junior people at all levels...with a duality that you have a nurse here, a physician that should be above the nurse, yet the physician is so inexperienced that the nurse knows more of what to do and that causes a lot of friction...as opposed to my asking is there any value in what you are saying.'' A transport nurse said, ''I don't think because you have the authority means you have the answer.''

Relationships: Relationships, the second descriptive element for the Group Influences theme, were influenced by interactions among providers, types of providers and time working together. Interactions among providers depended upon the types of providers present and were influenced by behaviors such as being dominant, authoritative, or unilateral and uncompromising. These behaviors affected opportunities for others to engage in care activities and provider communication. One nurse described it as ''the ability to know depends on being there day after day to have good a communication system with other nurses and physicians.'' Sorting through relationships often left some providers feeling caught in the middle, ''the residents come down on [the nurses] and say this isn't right and has to be this way, then they get it from their attending and they are in the middle and nobody knows where to go.''

Teams: Teams comprised the third descriptive element for the Group Influences theme. One resident noted that, ''*Team* referred to a group of people who work together to care for patients in that environment.''. Most participants described teams according to disciplines and the work ascribed to each role. Teams were also described through processes of care such as resuscitation, admissions, and deliveries. Broader definitions of teams were also provided. An attending physician said teamwork is a ''complex set of interactions and activities with defined roles to accomplish a task, so that the total of the collective efforts surpasses the success achieved by an individual.'' Nurses described the role of team members as ''helping each other be the best we can be.'' Shared responsibility and accountability was another factor describing teams, stated by one attending, ''there may be some things about that patient's care that could be jeopardized because you are

making the decision to not involve everybody on the team. Even though you may feel like this person is a weaker link, we are all still part of the team.'' How teams worked together depended on the personalities, attitudes, knowledge, and skill of the people involved. Team role was built from working together and getting to know one another based on skill and expertise.

Teams were considered necessary for patient care coordination; ''Collective minds offer better care, when decisions are made together,'' (but one provider observed how rarely the entire team made patient care rounds together). Others used metaphor to capture the definition of team, including ''a well-oiled machine,'' a ''sports team needing a coach,'' ''a lot of good musicians but no director,'' or a ''family where members come and go.'' A physician summarized it as ''… once you have established a system within your team, and there is consistency every day, then it tends to run smoothly, and if there is a role that nobody plays and agrees on and assigns some responsibility and the respect for that person's opinion, then it tends to run. But when there is one member or one person in the system not working, then that teamwork does not happen.''

SIGNIFICANCE

Providers in a NICU reported three broad themes that affect the way they work together: the Provider Characteristics, Workplace Factors, and Group Influences. As expected in any work setting, our participants said the personal attributes of the providers involved have a major influence on how they work together. These relatively unchangeable characteristics such as personality, reputation, and expertise were noted as important. Workplace factors influencing the way providers worked together, included staffing, organization of work, and environment. Staffing and organization of work were both dynamic and often unpredictable factors influenced by numerous characteristics of providers, the organization, and the patients.

Group influences such as group communication and relationships were noted by participants (especially physicians) with emphases on how much they rely on others for information. Hierarchy within groups had a powerful but complicated influence on the way providers communicated with each other. As described in healthcare and other settings[10] front-line personnel often found it hard to question those with authority. In the current study, some participants described the process of skipping immediate superiors to go above their head to someone with more knowledge, experience, or rapport. Other participants reported being comfortable asking or receiving questions from anyone.

Within the broader concept of groups, we found that providers occasionally, and without prompting, talked about teams. Teams were often described according to a process of care (the transport team) or discipline (nursing team). Providers noted that rounds in the NICU did not consistently include all team members even though this inconsistency hampered communication and work coordination. These descriptions of team processes in this NICU were in contrast to other subjects' more inclusive descriptions of teamwork that included phrases like a ''collective mind'' or a ''well oiled machine''.

Limitations

Our conclusions should be interpreted in light of the usual limitations of qualitative research: primarily the reliability of our analyses and the generalizability of our findings. Generalizability is limited because the study was conducted in one NICU, the providers were relatively young and inexperienced, we did not include clinical pharmacists and respiratory therapists, and the work processes in this unit may differ from other units. In addition, participants may have been hesitant to express concerns about how they work together while sitting in a group with other colleagues. Validity was enhanced by confirming that themes were present across different groups and we had several investigators read transcripts to look for data that would support or refute our working themes.[11] Finally, our results reflect provider perceptions of working together, which may be different from actual behavior.

Implications

Our results have several implications for measuring and improving how providers work together in NICUs similar to this one. First, providers say there are numerous complicated workplace factors outside of teams that may influence how providers work together. These workplace factors are often referred to as system factors in patient safety literature.[12] These system factors may influence the behavior of individuals and teams and should be accounted for when trying to measure and improve teamwork.[13] For example, direct observation of a team (e.g. a resuscitation team) for a short amount of time may lead an observer to believe that the team is violating protocols or not communicating, and therefore may need to be retrained. But our findings suggest that other very complicated factors such as staffing, lack of acceptance of protocols by all staff, or need to communicate with experienced personnel outside the team may explain such behavior.

Second, NICU providers had differing ideas about teamwork (a term we never introduced during a focus group due to its ambiguity and out interest in obtaining unbiased perceptions of this concept). Some never used the term, others thought of teams only for specific care processes or for single provider types, while others had very broad notions of teams as ''families'' or groups working together so that the ''collective effort surpasses the effect achieved by an individual.'' That these providers had such different ideas about teamwork indicates the need for caution with how terms are used in efforts to understand and improve the way providers work together. This finding that teamwork is perceived differently by providers is consistent with previous research.[14]

Accordingly, interventions to improve how providers work together could refer to specific behaviors instead of using the term teamwork. Experience in aviation suggests it is possible to train people to be more comfortable asking questions of each other (a behavior called inquiry; or to appropriately assert specific information during critical times (assertion). These behaviors can be defined, taught, and observed. Furthermore, these behaviors can be taught to all types of people, regardless of their personal characteristics (another factor cited as important by the providers we interviewed) and these behaviors may be transportable across care settings.

However, such training programs should be based upon data that tell us which behaviors are important for preventing or managing errors and patient harm in particular settings. There has been some research on teamwork in healthcare. For example, the MedTeams group evaluated a broad team training intervention for emergency medicine;[15] providers are being trained to use team behaviors during simulated resuscitations and emergencies in anesthesia[16] and neonatology;[6] and a list of behavioral markers has been identified for pediatric cardiac surgery[17] and neonatal resuscitation.[18] All of these studies are based upon teamwork behaviors, or behavioral markers, that are important for preventing and managing error in aviation.[19,13] This study adds to this literature by offering support for the importance of certain behavioral markers in the NICU. Focus group participants did not discuss behavioral markers with sufficient clarity to meet our threshold for calling them themes *per se*; however, numerous participants mentioned several of the aviation markers. These included: information sharing, teamwork, assertion, inquiry, workload distribution, leadership, and evaluation of plans. These were discussed most often as part of the Group Influences theme.

Conclusion

Providers working in a large NICU noted that Provider Characteristics, Workplace Factors, and Group Influences affect the way they work together. Although Providers mentioned specific team related behaviors found to be important in aviation teams, they expressed different definitions and perceptions of teamwork. Future efforts to measure and improve how providers work together should note that behavior may be affected by multiple issues external to the immediate work environment. Regarding day-to-day practice in NICUs, medical directors, nurse managers, and administrators should be cautious about using the words team and teamwork, and they should consider a broad set of organizational factors when evaluating and trying to improve the way providers work together.

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Appendix 1 NICU Focus Group Interview Guide

(1) Tell me your observations about how providers work together in NICU?

a. To give focus to the topic working together, use the process of admitting an infant to the NICU. Tell me the process and who is involved. Or use another process that comes to mind.
b. What is your role in getting a baby into the unit?
c. What influences the way you are able to carry out your role?
d. What happens when things go well in the admissions process?
e. What happens when things do not go well during the admissions process?
f. How do you compare/differentiate when things go well and when things do not go well?
g. What is essential for an admission to go smoothly?

(2) What influences the way people work together?
a. What enhances the way people work together?
b. What limits the way people work together?
c. What behaviors help providers perform well?

(3) How do you define collaboration among providers?
a. Are there other words that you could use besides collaboration?
b. When comparing when things go well and do not go well, what are your observations about collaboration in NICU?
c. When have you observed collaboration in NICU?
d. What happens when collaboration breaks down?
e. How does this influence care?

(4) What other processes become important in describing how providers work together in NICU?

(5) What other observations do you have about the way providers work together in NICU?