Daily Intensive Care Unit Rounds: A Multidisciplinary Perspective

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Abstract
The distinctive nature of the workflow in the Intensive Care Unit (ICU), combined with the time sensitive nature and cognitive burden to the various providers make it an error prone environment. With the current proliferation of health information technology, it's crucial to recognize and define the current practice needs to enable a successful integration of these technologies into the workflow. Our study aimed to define the objectives and tasks of ICU Multidisciplinary Rounds (MDR) activities and gain insight from different ICU providers regarding their perceived versus observed practice. We conducted a survey of healthcare providers in the Medical and Surgical ICU at Mayo Clinic, Rochester, MN.A total of 105 surveys were distributed and 75 were collected, yielding a response rate of 71.5%.72% of providers identified designing or developing a plan of care, 23% mentioned data gathering, 16% team consensus, 12% patient and family interaction and 11% education
Members of multidisciplinary ICU teams most often identified the development of a care plan as the purpose of morning MDRs. Interruptions and resource utilization were identified as the main interferences to task completion, where limiting interruptions, workflow changes and technology were the suggested solutions

Keywords: Multidisciplinary Rounds (MDR), Interruptions, Intensive Care Unit (ICU), Rounding process, Surveykey

Introduction

Millions of Americans are admitted to intensive care units (ICU) each year [1], which is considered as a very dynamic health care setting. ICU has a distinctive workflow [2]. Factors like intense cognitive networking, multiple communication channels, interruptions and multitasking approach to patient care symbolize the nature of this environment [3, 4]. The time sensitive nature of critical illness adds to the complexity of the ICU environment and this unique workflow becomes more prone to medical errors [5].

Communication failure has been cited as a preventable cause of patient harm [6-8]. Multidisciplinary rounds (MDRs) provide a common platform for all individuals involved in patient care to communicate, offer their expertise and contribute to patient management and well-being [9]. MDR have been defined as regularly scheduled meetings (usually daily) of health care providers from different disciplines who are involved in the care of the same patients or management of the same unit [10]. In addition to enhanced provider satisfaction, the adoption of MDR in the intensive care unit (ICU) has been associated with improved processes of care (such as increased compliance with ventilator bundle protocols), improved family satisfaction, and better patient outcomes,

including reduced mortality(9-15) [16, 17]. A variety of rounding styles and processes exist, suggesting that the optimal method has not been identified, or that it varies with the circumstances.

Among the recommendations of the landmark report from institute of medicine (IOM) "To err is human" is the advocacy that, "Healthcare should be safe" which further states its belief in health information technology (HIT). "All health professionals should be educated to deliver patient centered care as members of an interdisciplinary team, emphasizing evidence-based practice, quality improvement approaches and informatics" in the needed change for healthcare reform [18]. With the increase in adoption of HIT, evaluations of the impact of HIT on quality and safety show mixed results [19, 20]. However, improper integration of HIT into clinical workflow was cited as one of the main factors for unsuccessful implementation [21].

To date, most studies of the rounding process have evaluated factors such as interpersonal and bedside examination skills, and clinical decision making skills that may affect efficiency [10]. Creamer et al measured the time spent on different activities in ward rounds, and Vats and colleagues assessed the impact of the introduction of a "lean" rounding process [12, 22]. Others have focused on the interaction between the electronic medical record and the rounding process [23, 24].

Our study aimed to define the objectives and tasks of ICU MDR activities and to provide insight to the providers regarding their perceived versus observed practice. The investigation was undertaken as part of a process to design an observational tool that would aid in understanding the current practice and structure of rounds in the ICU. Ultimately, our aim is to redesign processes of care to optimize "value added time" and increase bedside presence, while improving provider, patient and family satisfaction and adhering to trainee work-hour restrictions. This is based on Rapid Modelling Corporation's(RMC estd. 1994, 8044 Kimbee Drive, Cincinnati OH 45244) definition of value added and non -value added tasks for Registered Nurses(RN)- Value-added activities were defined as patient-centered actions that directly benefit the patient; necessary tasks were those that are essential in delivering patient care and do not directly benefit the patient; and non-value added activities were defined as actions performed by the RN that do not benefit the patient and are not necessary to delivering patient care.

Material and Method

Selection and Description of Participants

After receiving a waiver of informed consent from our institutional review board, in December 2010 we conducted a multidisciplinary survey study of ICU providers in two ICUs at a single institution, Mayo Clinic, Rochester, MN. Mayo Clinic is a tertiary referral institution with 201 adult ICU beds. The ICUs involved were a 24-bed medical ICU (MICU) to which patients with cardiovascular, gastrointestinal, metabolic, respiratory, renal and multisystem failure were admitted and a 20-bed surgical (SICU) that primarily serves patients after thoracic, vascular, plastic, orthopedic, urologic and otolaryngologic procedures. Daily rounds in both the units have been of a multidisciplinary nature since 1998, and routinely involve physicians (of multiple specialties and levels of training), pharmacists, registered nurses, and respiratory therapists, as well as patients and family members. Rounds are led by attending intensivists (trained and board certified in pulmonary critical care in the MICU, and anesthesiology critical care in the SICU) and occur daily, including weekends. In addition to the attending ("consultant") intensivist, physician members of the ICU team include critical care fellows (internal medicine, pulmonary, anesthesia) and residents (internal medicine, anesthesia, surgery, emergency medicine). All levels of physician are present on-site 24 hours per day.

Methods

A series of focus group sessions, each comprising 1 attending intensivist, 1 critical care fellow and 3 research fellows lead to establishing the specific survey objectives for this study. These objectives included gathering providers' perceived goals of morning MDR, obtaining information

regarding the tasks required, and identifying obstacles to completion of tasks, and their potential solutions. Since different providers have different tasks and workloads at different times, the survey was designed to capture data pertaining to three phases: pre-rounds, rounds and, post-rounds, defined as follows:

Pre-rounds: An individual or group event that starts with handover from the night physician to the day physician (resident/fellow), followed by data gathering, reviewing overnight events, physical exam of patient etc. and ends before the MDR can commence. Pre-rounds are typically of 1-2 hours' duration.

Rounds: The process of engaging as a team to present and discuss patient issues and interaction with patients and families at the bedside. Rounds take between 1 and 3 hours, approximately.

Post-rounds: An individual or group event that constitutes follow-up and implementation of the daily care plan that has been recommended during the rounds; as well as taking care of emergencies and unforeseen situations that may arise. This lasts for about 2-4 hours after rounds.

All ICU healthcare providers were eligible to participate in the study. Patients and families were not surveyed. The survey instrument (Figure 1 Below) captured basic demographic information (e.g., provider role, ICU type) and asked a series of open-ended questions relating to goals and processes of rounding - specifically relating to morning MDR. An e-mail with details of the survey was sent to the providers prior to data collection to encourage participation. Research fellows' hand-delivered paper surveys to providers in the ICU and were available to collect completed forms. A box for survey collection was also placed prominently in each ICU. Non-responders were followed up in person and through a reminder e-mail with a request to complete the survey. Completed forms were scanned and saved to a protected database. Respondent identifiers included only role and work location.

Statistics

Responses from each provider group, were compiled in a spreadsheet (Microsoft® Excel 2007, Microsoft, Redmond, WA), then grouped thematically into those referring to pre-rounds, rounds and post-rounds. Data relating to rounds were further analyzed by grouping all the responses into common sub-themes and subsequently deriving broad themes that describe the tasks involved in MDRs.

Figure 1. Data collection sheet

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Results

A total of 105 surveys were distributed and 75 were returned, yielding a response rate of 71.5%. Two of the surveys had no response on them making the total survey responder number 73. Physicians returned 37 surveys (23 from the MICU, 14 from the SICU), nurses 26 surveys (5 and 21 from the MICU and SICU, respectively), and others (pharmacists and respiratory therapists) returned 10 surveys (6 from MICU and 4 from SICU).

There were five major themes identified: develop plan of care, data gathering, team consensus, patient, family interaction, and education. Among these developing a plan of care was the one with most frequent sub themes, Table 1 below lists the themes, subthemes and some of the representative responses.

Table 1. Thematic and sub-thematic grouping of survey responses with representative responses

Theme	Sub theme	Representative Responses
Develop a plan of care	Data interpretation	"To check the progress of our patients and make improvements to their care"
		"Look at all the labs and tests and adjust plan of care based on result"
		"Reviewing care and results to date to help in guiding that plan"
	Discuss last 24 hours	"To summarize patient's data in the last 24 hours. To adjust plan of care accordingly"
	Task allocation for next 24 hours	"To develop a plan for the day which should include patients, room nurse, consultant and residents of the team"
		"Coordinate patient care"
		"Manage ventilators"
	Develop a shared mental model	"To get everyone on the same page regarding the plan for the patient."
		"Agreeing on plan of care for patient"
		"Each member of the team has something important to contribute"
		"Convey plan to family/nursing/residents"
		"Get everyone's opinion"
	Role specific task allocation	"Divide up the work to improve efficiency"
		"communication within the group (MD, RN, RT) as to what is the game plan for each particular patient in the unit"
Data gathering	Patient assessment and physical examination	"Review new test result"
Team Consensus	Team work	"Get as much done as group so a single person doesn't have problems during the day"
Patient and family interaction	Update family Update patient	"To address the questions and concerns of family members"
Education	Resident education	"'Educating residents and fellows"

The responses to the question "From your perspective, what is the purpose of morning rounds?", develop plan of care was the most frequent emerging theme with 72% of the responses containing this theme followed by data gathering which incorporated in 23% of the responses, other themes are summarized in Figure 2 .
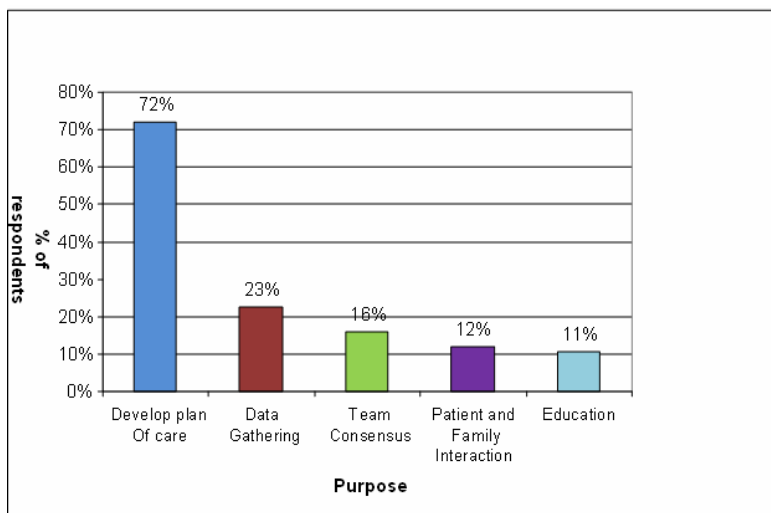
Figure 2. Purpose of morning rounds by percentage of respondents (* Some respondents (40/73) provided more than one purpose.)

The purposes of morning MDRs are summarized according to respondent type in Figure 3, once more plan of care was evident among the three respondent groups, data gathering was more prominent among nurse (7/25) and physicians responses included more education (7/37), Also a data cloud tag generated from the responses of four groups; attending physicians, in training physicians (interns, resident, fellows), nurses and others (pharmacist, respiratory therapists) showed the words patients, plan and care were Echoed among all responses, the word family had more occurrences among nurses responses and the word discuss was more frequent among physicians and in-training physicians (Figure 4).
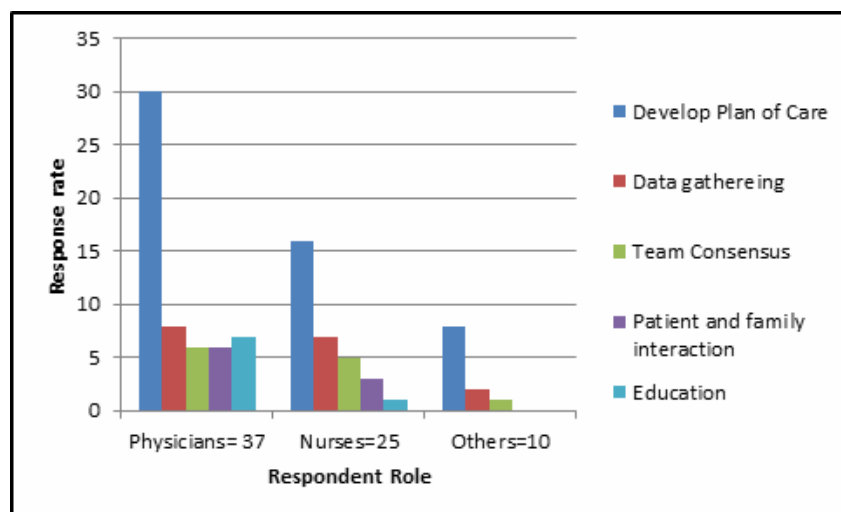

Figure 3. Purpose of Morning Rounds per Respondent Role

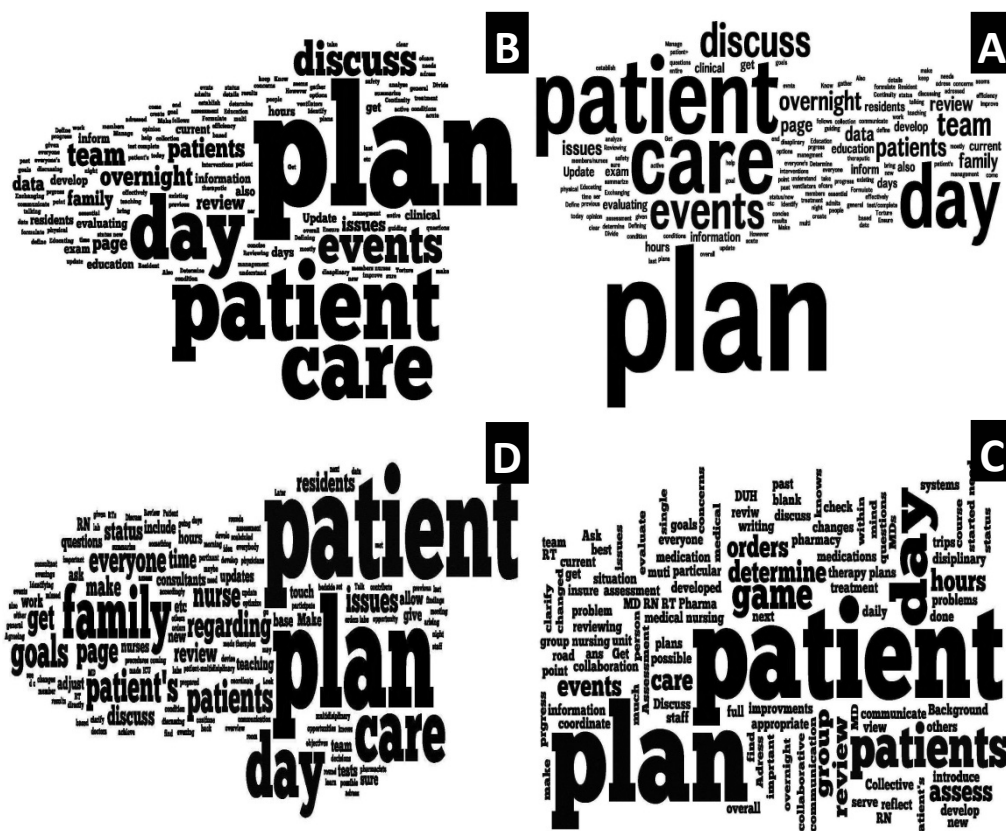*Jyothsna GIRI, Adil AHMED, Yue DONG, Mark T. KEEGAN, Vitaly HERASEVICH, Ognen GAJIC, Brian PICKERING*

Figure 4. A data cloud tag generated from the responses of four groups; (A)attending physicians. (B) in training physicians includes;interns , resident and fellows. (C) pharmacist and respiratory therapists (D)nurses

Responses to the questions "What interferes with your ability to perform the tasks?" and "What might improve your ability to perform these tasks?" generated multiple themes with interruption as the major barrier and most of the suggested solutions were aimed towards this barrier, more themes are summarized in Table 2.

Discussion

The results of our study show that 72 % of respondents identified the development of a plan of care as the purpose of rounds. Our study aligns with prior survey data of residents and medical students suggesting that patient management concepts - rather than education - are the primary focus of morning rounds [25]. The primacy of patient management is not limited to physicians, however, but exists across the entire multidisciplinary team, suggesting that rounds are perceived by the majority to be a patient- centered activity.

Given the acuity and complexity of many patients in the ICU it is crucial to seek multidisciplinary input to allow informed consideration of issues and increase the likelihood of making appropriate clinical decisions [26]. Sixteen percent of respondents listed the development of team consensus as a purpose of MDRs.

It is interesting that only a minority of physicians perceived education to be the purpose of MDRs. Eleven providers (2 interns, 3 critical care fellows, 4 consultants and 2 nurses) in our study reported education as an important element of rounds. The attitude towards morning rounds as an educational activity varies largely within the physician subgroups- interns, residents and attending.

[27, 28]. The University of Alabama, Birmingham study of interns and residents perception reported that attending approachability and enthusiasm along with high quality education are most crucial for successful attending rounds in the medical ICU [29]. Others would suggest that time spent on rounds - especially rounds that have a large teaching component – may actually take providers away from the delivery of patient care.

Our study captured the providers' perceived barriers to task completion during the MDR (Table 2 below). These barriers may be categorized into two major components: interruptions and resource deficits. Daily rounds are highly dependent on effective verbal communication, which can be impaired by interruptions and time constraints [10]. In fact, it has been argued that information transfer during rounds is neither adequate nor efficient [10]. Causes of interruptions include pages, discussions with consulting services, and urgent requests for patient management, among others. Consistent with the results of our study, in a systematic review of the literature, Gurses and Xiao identified noise and interruptions as two major barriers to communication during MDRs [10]. Friesdorf found that the leading causes of interruptions during rounds were non-related requests for non-urgent therapy and diagnostic decisions, questions and comments from consultants, phone calls, and issues related to unit management [30]. Pages and phone calls have been implicated by a number of investigators in interrupting patient care activities [31, 32]. In one study, 24% of pages received by residents in a university affiliated teaching hospital occurred during rounds or teaching conferences [31].

Table 2. Perceived interferences and suggestions for improvement, divided into themes and sub themes with representative response

Perceived Interferences	Details of Perceived Obstacles	Representative Responses
Limiting Interruptions	"Pages and phone calls" "Calls from [and] discussion with other services"	"Limit interruptions" "Protected time" "No pages or dedicated provider to answer pages"
Technology	Technological tools	"faster computers" "checking labs before coming to ICU" "Rounding with computers" "more organized interface for looking at important (and filtering useless less important) information" "Faster, better and more computers and workrooms" "Slow, malfunctioning or unavailable computers"
Workflow	"Administrative work"	"Structured forms/formats for data gathering and documenting patient note"
	"Early admissions" "Rapid response team calls" "Codes" "Acute occurrences" "Ongoing clinical care issues" "ICU overflow"	Dedicated rapid response team" "New team members responsible for admissions and pages"
Limited Resources	"Staffing issues, lunch hour, etc"	"Hire more people"

We identified a number of instances where the providers felt that resources were inadequate. Our institution has invested heavily in information technology and we have a complex electronic environment. Access to data is heavily dependent on mobile computers and a wireless network. Although the network is of high quality, a number of respondents identified malfunctioning or unavailable computers as a barrier to MDR task completion. Inadequacy of personnel was also

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highlighted in relation to unanticipated admissions and acute patient occurrences requiring immediate intervention. We and others have shown that "rounds-time" admissions have high acuity and increased mortality compared with patients admitted at other times of the day, prompting a re-evaluation of the personnel available to manage such patients(33). Some investigators have reported provider concerns regarding confidentiality and compliance with HIPAA during MDRs [34, 35]. Interestingly, this was not reported to be a barrier to MDR task completion in our study. Repetition of content during MDRs was identified as a factor influencing care provider satisfaction in a survey [36].

Among the solution suggested by the responders beside limiting the interruptions , a need for structured form or format for data manipulation was one of the suggestions, Undoubtedly , checklists improve multidisciplinary providers' ability to share the same understanding of goals, problems and tasks [37]. Also the need for more resources particularly electronic support emerged as one of the solutions. Indeed, a variety of information tools have been employed to enhance patient care and to improve efficiency of MDRs. (10) Process oriented tools, decision support tools and information tools.

This study helped to understand the provider perspective towards morning rounds thereby helping us to design an observational tool [38]. This tool was then used for further studies in assessing various provider roles' during morning rounds [39]. Moreover , with introduction of any new technology in the work place, both positive and negative impacts should be expected [40], EHR is no exception. Studies about implementation of HIT in the workflow identified many unintended consequences including increase providers workload [41, 42], time consuming due to mismatch between EHR and workflow [43], and hindrance to team communications [44]. On other hand systems that are well integrated in the work flow improves both provider and patient satisfaction [20].

One of the strengths of our study is that we acquired data from multiple disciplines as well as physicians of varying grades. Earlier studies focused simply on comparisons of residents and interns or residents and attendings, but did not investigate the perceptions of non-physician staff. Our data were collected in two different ICU environments - albeit at a single institution – which had different cases-mixes and supervising physicians of different specialties. The qualitative nature of the survey and the open-ended questions enabled us to explore the attitudes and feelings of respondents. The relatively small sample size and the use of self-reporting surveys rather than a direct interview technique might limit the validity of the findings.

Conclusions

Members of multidisciplinary ICU teams most often identified the development of a plan of care as the purpose of morning MDRs. Education was less often cited as the purpose of rounds. Healthcare workers identified interruptions relating to urgent and non-urgent patient matters and a deficit of resources (both personnel and infrastructural) as the main impediments to task completion in the pre-round, round and post-round phases of MDRs. This study helped to design an observational tool that was used for further studies involved in assessing various provider roles' during morning rounds.

It also reiterates that among the various tasks that were sought to be essential in morning rounds, patient outcome and care was listed as most important task by various providers of the MDR team. The study can help suggest proposals for changing structure of the MDR. It can help in designing a structure of morning rounds with emphasis on enhancing provider education at various levels.

List of abbreviations

MDR- Multidisciplinary Rounds

ICU-Intensive Care Unit

HIT-Health Information Technology

MICU- Medical Intensive Care Unit

SICU- Surgical Intensive Care Unit

RN- Registered Nurse
EHR- Electronic Health Record

Conflict of Interest

The authors declare that they have no conflict of interest.

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