Teaching Clinical Nurse Leaders How to Diagnose the Clinical Microsystem

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There has been focused attention on patient safety issues and the state of health care delivery. The Institute of Medicine (IOM) in hallmark reports (1999, 2001, 2003) has highlighted human errors and financial burden caused by system failures in health care. The complexity and sophistication of today's healthcare environment led to a call for reform in both the education of healthcare professionals and health care delivery.

To bring about the necessary changes in healthcare, systematic transformation at all levels of the system will be required (Nelson et al., 2002). However, to achieve broader organizational results we must focus on optimizing the performance of each microsystem, for healthcare outcomes reflect the collective performance of interrelated microsystems. Subsequently, linkages between microsystems must be seamless, timely, efficient, and reliable (Nelson et al., 2002). Microsystems must be understood and optimized to transform front-line care. Clinical Nurse Leaders (CNLs) are expected to have the knowledge and skills to diagnose microsystems and deploy resources appropriately to improve patient outcomes. This article defines the clinical microsystem and describes the importance of understanding microsystems structures, processes, and patterns for accurate diagnosis of the microsystem's performance. Tools and activities that were used to teach this essential content and skills to registered nurse CNL students in a pilot CNL program are described.

Microsystems

Clinical microsystems are frontline units where the patient and the health care providers interact (Nelson et al., 2002). Microsystems consist of interprofessional team members who provide direct care within a designated unit (e.g., a medical-surgical floor) contained within a larger systems or organization referred to as a macrosystem. The quality of the macrosystem is therefore dependent on quality provided at the microsystem level. The nucleus of the microsystem is always patient-family centered care. Inclusion of the patients into the same system as providers along with the inclusion of information and information technology to guide decision making distinguishes the microsystem from traditional, fragmented clinical health care teams (Batalden, Nelson, Edwards, Godfrey, & Mohr, 2003). High performing microsystems have a service excellence aim and use data for process improvement. Characteristics of high performing microsystems are listed in Table 1.

Microsystems: Structure, Process, and Patterns

Microsystems are "where patients and providers meet" (Nelson et al., 2002, p. 473). It is at this juncture that the CNL provides, manages, and evaluates care in all types of healthcare settings and is accountable for the financial and clinical outcomes of patients, as well as for the processes for improvement of outcomes (American Association of Colleges of Nursing, 2007). The CNL assumes a horizontal leadership role within the healthcare team and oversees the care coordination of a group of patients within and across microsystems. The CNL's role is to collaborate with the interdisciplinary team, for instance through interdisciplinary patient rounds, to identify risk analysis strategies and resources needed to

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Table 1. Microsystem Portfolio Diagnostic Tools for CNLs

Microsystem Characteristic	Diagnostic Tool
Leadership	Nursing Microsystem Assessment
	Microsystem Leadership Activity Log
Culture	*Hospital Survey on Patient Safety Culture*
	Microsystem Safety Assessment
Macrosystem Support	Microsystem Financial Assessment
	Microsystem Project Initiative Worksheet
Patient Focus	*Microsystem Profile*
	Patient-and Family-Centered Care Assessment
Staff Focus	*Microsystem Assessment Survey*
Interdependence of Care Team	*GITT Team Observational Tool*
	GITT Team Fitness Test
	TeamSTEPPS SWOT Analysis tool
Information and Information Technology	*Care Transition Measure Instrument*
	Ask Me 3
	Microsystem Rounds
Process Performance and Performance Patterns	*Metrics that Matter*
	Microsystem Process Cycle Time
	Microsystem Core and Supporting Processes Inventory
	Microsystem Unplanned Activity Assessment

ensure the safe delivery of care (Begun, Tornabeni, & White, 2006).

At the point of care, it is important for the CNL to understand the microsystem in terms of structures, processes, and patterns that exist in order to function as a leader and an agent of change (Nelson et al., 2002). *Structure* involves how the microsystem is organized, operates, and relates to other microsystems, leadership roles, reporting mechanisms, macro-organizational support, resource allocation (human, financial, supplies/equipment), and information technology. *Process* involves the culture of the microsystem, how care is delivered and by whom, the interdependence of the interdisciplinary team, case mix of providers, hours worked by staff, populations of patients, health outcomes, and process improvement activities. *Pattern* involves communication within, among and across disciplines and microsystems, relationships among interdisciplinary teams, clinical outcomes, delays in provision of care, risk, and potential error (American Association of Colleges of Nursing, 2007).

Diagnosing the Microsystem

CNLs are taught how to diagnosis the microsystem in the 4-credit course Target Population Diagnosis. This course is taught in the final semester over the first 10-weeks of the 20-week term. Course prerequisites include the 3 P's (Patient Assessment, Pharmacology, and Pathophysiology), Informatics, and CNL Leadership Role. Courses in health systems and quality improvement are taught concurrently during this period.

Target Population Diagnosis provides the philosophy and framework for population health and the care of aggregates. Analysis and application of theory and skills needed to assess, diagnose, plan, and evaluate the care of populations in a complex health system is emphasized. An important course outcome is the ability to analyze microsystem structure, processes, and patterns. The course has a 3-credit didactic component and 1-credit clinical practicum. The clinical component focuses solely on microsystem diagnostic activities. A 300-hour clinical immersion that includes direct patient care follows this course. Target Population Diagnosis course outcomes are listed in Box 1.

Students complete 60 clinical hours in a clinical microsystem to conduct a comprehensive microsystem assessment. Microsystem selection is made collaboratively with the practice partner's education coordinator. Criteria require that the microsystem preceptor has: a) a BSN or higher degree, b) the ability to access data, and c) interest in student mentoring. In the pilot CNL program, all but one student completed the assessment on the unit where they were employed. Characteristics of high

Box 1
Target Population Diagnosis Course Outcomes

- Provides nursing interventions at the point of care to individuals across the lifespan with particular emphasis on health promotion and risk reduction services.
- Applies theories of chronic illness and epidemiology care to patients and families.
- Applies knowledge of pathophysiology, pharmacology, epidemiology, and genetics to assess patients, direct care, predict illness progression and response to therapy, and to guide/teach patients and families regarding care.
- Analyzes response to illness and therapies in consideration of individual's cultural, ethnic, socioeconomic, linguistic, religious, and lifestyle preferences.
- Integrates knowledge of reimbursement issues, community resources, social networks, and decision support mechanisms into care management.
- Customizes care based on individual/family ethnic/racial/cultural background, select needs, and preferences as well as to needs of an aggregate.
- Incorporates standards of end-of-life care for persons and families.
- Applies research based knowledge from nursing and the sciences as the foundation for evidence-based practice.
- Analyzes care environment including prevalence and incidence of disease states and treatment modalities, microsystem infrastructure, and interprofessional resources.

performing microsystems (Nelson et al., 2002) are used as a framework to guide students in diagnosing their clinical units. Activities related to understanding how the microsystem interacts with the mesosystem (department) and the macrosystem are conducted by groups of four to six students. Specific microsystem assessment activities are conducted individually. If students do not have access to data to complete an assessment, a case study is provided for analysis. Students create a Microsystem Portfolio that includes quantitative and qualitative data specific to the microsystem and larger organization. Specific tools and activities are listed in Table 1. The portfolio is presented to the nurse manager as a final course deliverable.

Leadership of Microsystem

Diagnostic tools to assess microsystem leadership include: Nursing Microsystem Assessment and Microsystem Leadership Activity Log.

Nursing Microsystem Assessment

The Nursing Microsystem Assessment (NMA) is a diagnostic tool used to assess the quality of nurse leadership, policies and procedures to promote autonomous practice, and collegial relationships between disciplines in the microsystem. The NMA, based on Magnet criteria (American Nurses Credentialing Center, 2005) and adapted from the Nurse Work Index-Revised instrument (NWI-R) (Aiken & Patrician, 2000), is a 35-item survey measuring the perceived level of nursing quality and job satisfaction in the practice environment.

The NMA is organized by the nine dimensions of successful microsystems. For example, under Leadership, students assess whether there is *opportunity for staff nurses to participate in practice decisions* and if nurse leaders provide *praise and recognition for a job well done*. Statements are rated using a 4-item ordinal measure: *strongly agree, agree, disagree,* or *strongly disagree*. CNLs complete the NMA based on their observations and available data, reflect on their assessment and synthesize the information into their improvement action plans.

Microsystem Leadership Activity Log

The Microsystem Leadership Activity Log is used to diagnose microsystem leadership opportunities within the scope of the CNL role. CNLs spend the day with their nurse managers or directors, observing instances when they are involved in activities affecting the microsystems such as care redesign, program development, and outcome evaluation.

Students choose three examples from their observations and identify their role in collaborating with the manager for the best possible outcome. For example, the student may observe the manager at an interprofessional meeting discussing problems with patient throughput. Potential CNL actions could include obtaining data on patient discharge time and working with front-line staff to create a discharge process flowchart.

Culture of Microsystem

Diagnostic tools to assess microsystem culture include: Hospital Survey on Patient Safety Culture and Microsystem Safety Assessment.

Hospital Survey on Patient Safety Culture

The Hospital Survey on Patient Safety Culture is used to diagnose patient safety culture in the microsystem, with emphasis on patient safety issues and error and event reporting (Sorra & Nieva, 2004). The survey, sponsored by the Agency for Healthcare Research and Quality (AHRQ) measures seven unit-level aspects of safety culture; students complete sections related to outcome measures, unit level safety culture, and hospital-wide safety culture. Students rate each item using a 5-point Likert scale of agreement or frequency and synthesize data with findings from Microsystem Safety Assessment to develop an action plan for achieving a culture of safety within their microsystems.

Microsystem Safety Assessment

The Microsystem Safety Assessment is used to diagnose patient and environmental safety in the microsystem. CNLs perform environmental and patient safety rounds using the specific check-lists of the institution. All safety problems are immediately reported to the nurse manager or director. CNLs also conduct individual group interviews with the Safety Officer, Infection Control Nurse, and Pharmacist to understand specific microsystem issues that impact patient and organizational outcomes. Based on the interviews, safety culture survey, and safety rounds, students develop an action plan for the top three patient safety priorities for their microsystem, including barriers and facilitators for achieving a culture of safety.

Macro-organizational Support of Microsystem

Diagnostic tools used to assess microsystem organizational support include Microsystem Financial Assessment and Microsystem Project Initiative Worksheet.

Microsystem Financial Assessment

The Microsystem Financial Assessment is used to diagnose fiscal performance of the microsystem. Students examine expenses and revenues specific to unit operations and meet as a group with the Finance Officer to discuss ways to maximize resources in their microsystem. The *IHI Glossary of Frequently Used Financial Terms* is reviewed prior to the interview to facilitate conversation. Students use the data to identify three opportunities to decrease costs in their microsystem.

Microsystem Project Initiative Worksheet

The Microsystem Project Initiative Worksheet is used as a diagnostic tool to help prioritize clinical improvement projects. The 3-section worksheet, modified from a tool developed by IHI and RWJF (Robert Wood Johnson Foundation, 2004), facilitates planning for resource needs, understanding the business impact, and investing

in sustainable improvements. CNLs collaborate with the nurse manager to complete the worksheet; a case study is available for students who do not have access to microsystem financial data.

Patient Focus

Diagnostic tools used to assess microsystem patient-focus include *Microsystem Profile* and *Patient/family-centered Care Assessment*.

Microsystem Profile

The Microsystem Profile (Godfrey, Nelson & Batalden, 2005) is used to diagnose the microsystem's purpose, patients, people, processes, and patterns. The profile provides an organized method to assist CNLs in gathering explicit information about the clinical microsystem. For example, the section *Know Your Patients*, includes dimensions such as age distribution, living situation, most prevalent diagnoses, procedures, and medications, points of entry to the microsystem, discharge disposition, length of stay, average daily census, 30-day readmit rate, and patient satisfaction. Aggregate data are collected throughout the course; they are used as a baseline and to monitor progress toward improved patient care and staff outcomes.

Patient/family-centered Care Assessment

The *Patient-and Family-Centered Care: A Hospital Self-assessment Inventory* is used to diagnose how effectively clinical practice supports patient centered care and to develop action plans to advance the practice of patient- and family- centered care in the microsystem (Institute for Patient and Family Centered Care, 2004). The 10-section inventory is one of many tools developed by the Institute for Family Centered Care to assess clinical settings. CNLs analyze the microsystem's ability to promote patient and family participation in care and decision-making throughout care planning, delivery of care, and evaluation of patient outcomes. Specifically, analysis includes microsystem structures and processes that support dignity and respect, information sharing, participation, and collaboration. Data are used to determine priorities for change and improvement.

Staff Focus

The Microsystem Assessment Survey was used to assess microsystem staff focus.

Microsystem Assessment Survey

The Clinical Microsystem Assessment Tool, developed by Mohr (2004), diagnoses the clinician's perception of the microsystem's performance to the nine characteristics of successful microsystems. CNLs use these data to better understand how the clinical microsystem compares to high performing clinical microsystems. This tool provides a definition of each success characteristic and three descriptions with a range of low functioning to high performing behaviors.

CNLs work collaboratively to survey their microsystems for the purpose of developing and refining project management skills. They also acquire experience in conducting staff surveys using an on-line survey tool, such as Survey Monkey. As a group CNLs identify key project outcomes, select process owners, and assign deadlines. Students meet in person during class and electronically in-between class. Project documents are posted to an electronic course management system, such as Blackboard. Processes included managing the project, developing communication for staff subjects, loading the survey on Survey Monkey, preparing data for analysis, and creating a poster for dissemination. Faculty assist the team throughout the project, facilitating Institutional Review Board approval to conduct the Microsystem Assessment Survey (required by the University) and survey author approval.

CNLs present microsystem specific data to the clinical staff to identify the microsystem's areas of strength and developmental opportunities. Findings guide selection of microsystem dimensions for recognition and those in critical need for improvement. Finally, CNLs aggregate data and submit a poster abstract for review at a local nursing conference.

Interdependence of Care Team

Diagnostic tools to assess microsystem team interdependence include: GITT *Team Observation Tool, GITT Team Fitness Test, and TeamSTEPPS SWOT Analysis*.

Team Observation & Team Fitness

The Team Observation Tool and the Team Fitness Test, part of the Geriatric Interdisciplinary Team Training Core Curriculum (John A. Hartford Foundation, 2001), are used to diagnose the quality of teamwork within the microsystem. CNLs collect data through team meeting observations and use findings to conduct a strengths, weaknesses, opportunities, and threats analysis (SWOT) for their team. CNLs use the Team STEPPS SWOT Analysis tool (AHRQ, 2006) to determine readiness to implement a teamwork initiative in their microsystem.

Information and Information Technology

Diagnostic tools used to assess microsystem information exchange and technology include *Care Transition Measure, AskMe3*, and Microsystem Rounds.

Care Transition Measure Instrument

The Care Transitions Measure © (C™) (Coleman, 2006) is used to diagnose the quality of patient care transitions in the microsystem. Patient care transitions are defined as the movement that patients make between healthcare practitioners and settings as their condition and care needs change during the course of a chronic or acute illness (Coleman & Boult, 2002). C™ is a 15-item patient survey developed by a team at the University of Colorado at Denver and Health Sciences Center that is endorsed by the National Quality Forum. Items are rated using a 4-item ordinal measure of agreement. CNLs

administered the instrument to 10 patients after hospital discharge to assess patients' understanding of their care requirements and preparedness for self-care. Data are used to identify improvement opportunities in the patient discharge process.

Ask Me 3

Ask Me 3 is used to diagnose the microsystem's ability in meeting the health literacy of its target population. It is a brief, effective tool designed by the Partnership for Clear Health Communication to increase clear communication between health care providers and patients, and to address the issue of low health literacy and its impact on health (Partnership for Clear Health Communication, 2002).

Ask Me 3 is used to assess the capability of the microsystem in encouraging patients to understand the answers to 3 questions: (1) What is my main problem? (2) What do I need to do?, and (3) Why is it important for me to do this? CNLs observe communication between the microsystem clinical team members and the patient and family members to assess whether clinicians address health literacy needs.

Microsystem Rounds

Microsystem Rounds are used to diagnose antecedent factors impacting the microsystem's ability to achieve quality outcomes. Rounds are conducted on-line to provide a safe, non-threatening environment for CNLs to explore microsystem system failures through instructor feedback and questioning and input from fellow students.

A case study involving a newly admitted patient transferred from the Emergency Department (ED) is used to enhance CNLs' understanding of the impact of connecting microsystems on performance. CNLs track the number of times information is exchanged from the patient's initial presentation to the ED until admission to the in-patient unit. Principles of complexity theory, human factors, and patient safety are synthesized to identify the effect of healthcare working conditions on patient, performance, and organizational outcomes.

CNLs classify real and potential problems into categories, such as communication, quality care, safety, knowledge, and time and then rank them in descending order of frequency. A Pareto chart is constructed to identify the most common sources causing the majority of the problem. CNLs develop evidence-based solutions for the highest ranking problems affecting 80% of the problem.

Process Improvement and Performance Pattern

Diagnostic tools used to assess microsystem process improvement and performance pattern include *Metrics that Matter, Microsystem Process Cycle Time, Microsystem Core and Supporting Processes Inventory, and Microsystem Unplanned Activity Assessment.*

Microsystem Metric

Metrics that Matter (Godfrey et al., 2005) is a tool that includes all the measures essential for the microsystem to make and sustain improvements and attain high reliability performance. CNLs record vital microsystem performance characteristics, creating a systematic approach to identify when improvements are needed, if improvements are successful and sustained, and the amount of variation in results over time. For each metric, CNLs document an operational definition, data owner, target value, and action plan. CNLs regularly review the Microsystem Metrics to monitor progress, and make improvements as needed.

Microsystem Patient Cycle Time

The *Microsystem Patient Cycle Time* (Godfrey et al., 2005) is used to diagnose the process for admitting patients to the microsystem. CNLs track admissions for a week, collecting data on the length of time from new patient notification to completion of the admission process. CNLs use the findings to identify problems with the admission process and opportunities for improvement.

Microsystem Core and Supporting Processes Inventory

The *Microsystem Core and Supporting Process Inventory* (Godfrey et al., 2005) is used to diagnose the current state of microsystem processes. CNLs rate each process using a 7-item scale: *works well, small problem, real problem, totally broken, cannot rate, we're working on it,* and *source of complaint*. Data are used to identify where to begin problem improvement efforts from the staff perspective.

Thirty processes that encompass the full range of care delivery are included in the evaluation. CNLs choose a care process that is a *real problem* or *source of complaint*, create a process flow chart, and identify three strategies for improvement.

Microsystem Unplanned Activity Assessment

The *Microsystem Unplanned Activity Assessment* (Godfrey et al., 2005) is used to diagnose patterns of interruptions, waits and delays in the process of providing smooth and uninterrupted patient care. CNLs use this tool during one shift, documenting each time an interruption occurs when direct patient care is delayed or interrupted. The number of interruptions, waits, and delays occurred while admitting and caring for patients are tallied with the offending department and reason for the delay documented. CNLs analyze how the interruptions affected patient, staff, and organizational outcomes, in addition to their personal stress level, and identify three strategies to reduce interruptions.

Course Evaluation

Evaluation of Target Population Diagnosis by faculty, students, and preceptors identified several strengths and weakness, as well as opportunities for improvement. Course strengths identified by faculty were that the course: a) is founded on microsystem success

characteristics, b) supports competency achievement in quality and safety, specifically patient-centered care, safety, quality improvement, evidence-based practice, informatics, and teamwork (Cronenwett et al., 2007), and c) uses customizable tools with utility beyond the academic exercise. Course weaknesses were: a) lack of timely access to microsystem data and b) inability to electronically populate tools in pdf format.

Students reported as a result of the course that they understood more about their clinical unit and learned to systematically evaluate a clinical microsystem. In addition, though they found the workload manageable, they unanimously agreed that the assessment should be conducted on the same microsystem where their clinical immersion is planned to avoid duplication (macrosystem activities) and save time. The preceptors' clinical evaluation was favorable, with the portfolio being highly valued as a course deliverable.

As a result of the course evaluation, two changes were implemented. First, access to available microsystem data is established prior to start of clinical. Second, all tools are available in Word or Excel format. In addition to the two improvement strategies, the feasibility of using the same site for both Target Population Diagnosis and the clinical immersion is being explored. Lastly, course evaluations will also include a mechanism to update microsystem diagnostic tools. For example, after conducting this course, a new book titled *Quality By Design: A Clinical Microsystems Approach* was published by the authors of *Clinical Microsystem Action Guide*.

Conclusion

Nurses in the CNL role assume accountability for client care outcomes. As unit-based integrators of care, CNLs are expected to keep patients and families from being overlooked by our fragmented healthcare system. Although CNL courses and curricula will vary across programs there must be a consistent commitment on the part of nurse educators to help students acquire a microsystems "view." The knowledge and skills necessary to conduct comprehensive assessments of microsystems must be taught. It is essential that graduates participate in microsystems review and analysis of past trends to project risks to client safety and quality of care outcomes. Learning strategies that include interviews with key healthcare providers, directors, and administrators will provide CNL students with a broad understanding of the factors that influence microsystems. Characteristics of high performing microsystems that include the nine dimensions: leadership, culture, macro-organizational support, patient focus, staff focus, interdependence of care team, information and information technology, process improvement, and performance pattern can be a useful framework to guide students through the process of diagnosing clinical units.

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