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Quality Improvement Recommendations for

Nurse Sensitive Transplant Indicators

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QUALITY IMPROVEMENT RECCOMENDATIONS FOR NURSE SENSITIVE TRANSPLANT INDICATORS

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ABSTRACT

Recent research has highlighted the impact of nursing care on patient outcomes. To date, efforts to establish nurse sensitive measures have focused largely on adults in medical surgical settings. This scoping review examines if there any nurse sensitive solid organ transplant outcome indicators for internal and external benchmarking purposes. **Key words**: nurse sensitive indicator, quality indicator, solid organ transplant, quality care and safety care.

QUALITY IMPROVEMENT RECCOMENDATIONS FOR NURSE SENSITIVE TRANSPLANT INDICATORS

Safe, evidence based patient care is at the core of all healthcare providers' practice. Rising patient acuity, advances in healthcare technology and financial accountability are some of the drivers behind health care organizations' uptake of evidence based quality outcome indicators.[1] Certain indicators are known as nurse sensitive. Nurse sensitive indicators (NSI) are patient outcome measures influenced by nursing care.[2] Specifically, nurse staffing ratios, falls, hospital acquired infection, and pressure ulcers are a few NSIs that have been statistically and clinically proven to be associated with patient outcomes.[3–5] Recent research demonstrates that utilization of NSIs in hospitals improve patient safety and quality patient care by preventing errors or adverse events from occurring to patients while in the hospital.[4,6,7] Safe, quality patient care refers to the degree to which nursing services are based on current, context specific, evidence based practice that improves patient health outcomes.[7,8] NSIs are organized into process and outcome indicators that influence patient care.[9] While process and outcome indicators contribute to improving patient quality and safety, outcome indicators are more clearly understood than process indicators as they measure tangible patient outcomes influenced by nursing rather than a complex nursing process.[10,11] Furthermore, many of the measurement systems utilized in hospitals (Collaborative Alliance for Nursing Outcomes California and National Database of Nursing Quality Indicators) focus on outcome indicators, rather than process indicators, to monitor and demonstrate quality of nursing care.[11] By analyzing NSI patient outcomes, a standard can be set to compare and measure quality and safety over time within and between organizations.

Current NSI research highlights a gap in the literature suggesting that existing endorsed

NSIs utilized in hospitals do not adequately reflect the complexity of nursing care and range of nursing contributions to patient care. [6,12] For example, patient falls, an NSI, may not be a useful outcome to use as a quality, safety measure in ambulatory clinic patients.[3,11] In order to truly advance quality and safe patient care, NSI outcome indicators need to encompass the Institute of Medicine recommendations of being effective, safe and patient centered.[13] Limited NSI research has been conducted in the solid organ transplant (SOT) population. SOT refers to transplantation of kidney, heart, liver, lung, intestine, islet cell and pancreas.[14,15] SOT is on the rise and increasing numbers of international health care centers are performing SOTs.[16,17] SOT outcomes are a significant focus for quality and safety improvement purposes.[16] While SOT outcomes serve to monitor SOT performance within and across organizations, they are not nurse sensitive. In order to evaluate and sustain effective, safe and patient centered care healthcare needs to evaluate all healthcare disciplines contribution to quality and safety. Assessment of the quality of nursing care provided in SOT context is pertinent because of the role nurses play in assessing, intervening and supporting SOT patients in their post-operative course.[18–20]

In order to articulate nursing professions' contribution to SOT patient outcomes, evidence based SOT NSIs need to be identified. Once SOT NSI outcomes are identified and operationalized, unit level, organizational level, provincial/state level and national level analyses can demonstrate quality and safety of nursing care over time.[11] Without SOT NSIs, SOT programs cannot internally benchmark nursing quality and safety within their organization or externally benchmark nursing quality and safety between organizations. Therefore, the purpose of this quality assurance (QA) project was to examine the literature and expert opinion on the utilization of NSIs for SOT. Measuring SOT NSIs may be one approach to promote transplant quality assurance. From a QA perspective, are there SOT specific NSIs for internal and external

benchmarking purposes?

METHODS

A two-phased approach was employed to investigate utilization of SOT specific NSIs. First, a literature review was conducted to assess the current state of SOT specific NSIs. Second, a convenience sample of SOT nurse experts in Canada and the United States were interviewed to gain more insights into the review. The Arksey and O'Malley scoping review framework was utilized.[21] Stage 1 clarifies and links the purpose of this project with the research question. [21] Stage 2 involves a systematic search strategy searching for research from four different sources: electronic databases, references list, hand searching key journals and lastly existing networks or relevant organizations. [21] Stage 3 includes selection of the studies from the four different levels outlined in stage 2. Stage 4 includes descriptive analysis of the reports and charting the data in a matrices (See table 1.).[21] Stage 5 identifies the implications of the studies findings for policy, practice, and research. [21]

Phase 1: Literature Review

The search strategy was an iterative process that focused on combinations of terms for "nurse," "transplant/solid organ transplant," "nurse sensitive," and "indicator/ outcome/ quality/ measurement/metrics" combined. CINAHL, PUBMED and MEDLINE electronic databases were utilized. The initial search revealed a dearth of empirical evidence on SOT specific NSIs. Therefore, the literature search was expanded to examine the question: Are there medical/surgical NSIs used for internal and external benchmarking? Three scientific databases (CINAHL, PUBMED and MEDLINE) were searched systematically. Manual scanning of key research articles' reference lists was also utilized. Search terms utilized were: patient outcomes, nurs* care, nurs*, NSI, nurse sensitive outcome, outcome measure, indicators, measur*, patient

outcome*, quality, and outcome. Consistent with Arksey and O'Malley's scoping review framework, search methodology was guided by the requirement to identify all relevant literature regardless of study design.[21] Inclusion criteria included English articles, no year limitation, and adult medical/surgical populations. Articles were further refined for inclusion if abstracts included NSIs, patient outcomes as dependent variables, and statistically significant results. All searches and methods of data handling were recorded. In line with scoping review methodology, the quality of each source was not systematically evaluated or graded.[21] Table 1 summarizes key findings from eight quantitative research papers that met inclusion criteria and answered the modified research question. These eight studies included one meta analysis, [22] one descriptive correlational study,[23] one prospective study, [24] four cross sectional studies ,[25–28] and one retrospective cohort study. [29]

Phase 2: SOT Nurse Expert Interviews

Purposeful snowball sampling technique was used to identify six SOT nurse experts in leading North American multi organ transplant centers. [30] Three Canadian nurse experts and three United States nurse experts were interviewed. These nurse experts hold titles such as transplant nurse managers, transplant nurse directors, advanced practice transplant nurses, transplant quality and safety nurses and transplant quality analysts. SOT nurse experts were contacted via emails with phone follow-ups during the month of January-April 2016. Explanatory emails described the nature of the QA project and its voluntary nature. Phone follow ups were digitally recorded for accurate note taking and erased after compiling interview question responses across the six SOT nurse experts. The following research questions were used in each phone interview:

1. What indicators do you use for transplant performance?

2. Do you have nurse sensitive transplant indicators?
3. Do you measure or track transplant indicators? If so, can you explain that process (who is involved, what system do you use, who reviews it)?
4. Do you think transplant nurse sensitive indicators improve quality patient care? Why or why not?

RESULTS

Phase 1: Literature Review

The four most commonly cited medical/surgical NSIs were falls,[24,28] hospital related mortality (HRM),[22,25,27] failure to rescue (FTR),[22,25–27,29] and infection. [22,23,26,27,29] These NSI indicators were examined with respect to Registered Nurse (RN) staffing ratios, [22,23,25] RN hours, [24,26,29] RN manager support, [27] and RN workgroup initiative .[28] Table 1 provides an overview of each study's research design, location, patient outcomes indicators and key findings.

Falls

Two studies examined patient falls in relation to nursing care delivery.[24,28] Patrician et al. [24] concluded that the number of falls significantly decreased as RN hours increased. Chang et al. [28] found that the number of falls significantly decreased as RN workgroup initiative increased. Workgroup initiative was defined as the ability of RN to take a proactive anticipatory approach to patient care go beyond formal job requirements to achieve safe patient care.[28] Both Patrician[24] and Chang[28] found that patient falls decreased as nursing care increased.

Hospital Related Mortality

Three out of the eight studies used HRM as a patient outcome variable.[22,25,27] HRM refers to in hospital mortality.[22] Kane et al. [22] concluded that increased RN staffing was associated with decreased HRM in surgical patients and medical patients. For example, an increase of 1 fulltime

RN position per patient day was associated with a 16% reduction in odds of death for surgical patients and a 6% reduction for medical patients. Similarly, Aiken et al.[25] found an increased likelihood of patients dying in hospital based on inaadequate RN staffing. Boyle [26] found significant associations between decreased HRM and increased manager support.

Failure To Rescue

Five out of the eight articles examined FTR in relation to nursing care [22,25–27,29]. FTR is commonly defined as a nurse's inability to intervene and save a patient's life when complications occur.[31] Kane et al. [22] identified significant associations between decreased RN staffing and the occurrence of FTR for surgical patients. Aiken et al.[25] found a 7% increase in the odds of FTR for each additional patient per nurse on general, orthopedic and vascular surgery units. Needleman et al.[26], Boyle [27] and Twigg et al. [25] did not define how they measured FTR. Both Needleman et al. [26] and Twigg [25]found that FTR decreased for medical/surgical patients as number of RN hours per patient increased. Boyle[25] found FTR decreased as RN autonomy and collaboration increased.

Hospital Acquired Infection

Five out of the eight articles found significant relationships between HAI and nursing care. HAIs included pneumonia, [22,29] surgical site infection, [23]and catheter acquire urinary tract infection (CAUTI).[26,27,32] Kane et al. [22] and Twigg et al. [29] concluded that patients had decreased odds of getting pneumonia with increased RN staffing levels. McGillis Hall et al.[23] found surgical site infection rates increased as RN staffing and RN levels of experience decreased. Boyle [27] examined the association of CAUTI to nursing autonmy and collaboration and found that CAUTI decreased as nursing autonmy and collaborating increased. Needleman et al.[26] examined rates of CAUTI in relation to the proportion of RN hours/day provided to patients.

They discovered that rates of CAUTI decreased as RN hours/day provided to patients increased.

Table 1 Medical/Surgical Patient Outcome Indicators

Author	**Year**	**Design**	**Location**	**Patient Outcome Indicator**	**Key Findings**
Aiken et al.[25]	2002	Cross- sectional	General Surgery, Vascular, Orthopedic units in USA	1.Failure to rescue (FTR) 2.Hospital related mortality (HRM)	1. FTR odds increased as patients per RN increased. 2. HRM odds increased as patients per RN increased.
Boyle et al.[27]	2004	Cross-sectional	Medical, Surgical units in USA	1 FTR 2.HRM 3. Infection- catheter acquired urinary tract infection (CAUTI)	1. FTR decreased as RN autonomy increased. 2. HRM decreased as RN manager support increased. 3. CAUTIs decreased with increased RN autonomy and collaboration.
Chang et al.[28]	2006	Retrospective Cross-sectional	Medical, Surgical units in USA	1. Falls	1. Number of falls significantly decreased as RN workgroup initiative increased.
Kane et al.[22]	2007	Meta-analysis	Medical, Surgical units in USA	1. FTR 2. HRM 3. Infection- Pneumonia, CAUTI	1. Decreased risk of FTR as RN staffing increased. 2. Decreased HRM associated with increased RN staffing. 3. Patient odds of acquiring pneumonia and CAUTI

					decreased as RN staffing levels increased.
McGillis Hall et al.[23]	2004	Descriptive-correlational	Medical, Surgical, Obstetrics units in Canada	1.Infection- Surgical site infection	1. Increased occurrence of surgical site infection infection as RN staffing levels and experience decreased.
Needleman et al.[26]	2002	Retrospective cross-sectional correlational	Medical, Surgical units in USA	1.FTR 2.Infection- CAUTI	1. Decreased risk of FTR as RN staffing increased. 2. Decreased rate of CAUTI as proportion of RN hours/day increased.
Patrician et al. [24]	2011	Prospective-Longitudinal	Medical, Surgical, High Acuity, ICU units in USA	1. Falls	1. Number of falls significantly decreased as RN hour's increased.
Twigg et al.[29]	2002	Retrospective Cohort study	Medical, Surgical units in Australia	1. FTR 2. Infection-Pneumonia, CAUTI	1. Decreased risk of FTR as RN staffing increased. 2. Patient odds decreased of acquiring pneumonia and CAUTI as RN staffing levels increased.

As the research evidence has shown, medical/surgical NSIs have been linked to a number of important patient and nurse outcomes. Nevertheless, are they appropriate to use for SOT patients to guide QA within and across SOT centers and are SOT specific indicators necessary? Some literature suggests that NSIs need to be contextualized and assessed for specific

populations, such as SOT patients and healthcare providers.[11,33] To learn more about types of NSIs being used by SOT centers, a second QA phase of interviews was conducted.

Phase 2: SOT Nurse Expert Interviews

Interviews with six SOT nurse experts revealed that currently SOT specific NSIs are not in use within some of the leading SOT centers in North America. Instead, medical/surgical NSIs are being used, and there are other indicators, SOT indicators, being used that are specific for SOT populations, but they have not been determined to be nurse sensitive at this time. One example of an SOT indicator is graft survival 1 year post-transplant. [34,35] Table 2 provides a summary of interview results.

What indicators do you use for transplant performance? Do you have nurse specific transplant indicators?

All six sites collect similar SOT indicators. Common SOT indicators used at all sites are: average length of hospital stay, unplanned return to OR, unplanned readmission rates within 30/90 days post-transplant, patient survival 1 year post-transplant, graft survival 1 year post-transplant, rejection within 1 year, and artery and vessel thrombosis. These SOT indicators are critical to use for internal/external benchmarking purposes because they identify vital SOT patient outcomes that are necessary for monitoring and improving quality of care over time. SOT indicators encompass care sensitive indicators that are influenced by all members of the interdisciplinary healthcare team.

All six sites use the following medical/surgical NSIs: catheter acquired urinary tract infection (CAUTI), falls with injury, and patient satisfaction. Some NSIs were used with variable frequency as indicated by the brackets (i.e., # sites/6 sites): hospital acquired pressure ulcer greater than stage 2 (4/6), central line associated bloodstream infection (3/6), restraint use (2/6),

surgical site infection (1/6), and patient pain assessment and intervention (1/6).

Do you measure or track transplant indicators? Do you think transplant nurse sensitive indicators improve quality patient care? Why or why not?

All six sites measure transplant performance through use of SOT indicators and medical/surgical NSIs, and these QA data are maintained in databases for internal and external benchmarking at different systems levels: unit level, hospital level, state/provincial level and national levels in both Canada and the US.

All SOT nurse experts explained that at the unit level, SOT indicators and medical/surgical NSIs are examined on a monthly basis. SOT indicators are typically reviewed by interdisciplinary teams, which examine exceptional cases for gaps in care and recommend QA strategies to minimize these gaps. These teams often include nurses, nurse educators and managers, infection control practitioners, quality and safety officers, and transplant physicians. In addition, all sites do unit level, monthly reviews of medical/surgical NSIs. In many instances, nurse shared governance councils have oversight for review of NSI data, often linking these data to nurse policies, procedures and evidence based practices.

At the hospital level, all SOT nurse experts stated that there are committees charged with examining unit level reports of SOT and NSI indicators. Committees are expected to make organization level recommendations with respect to systemic practice changes and financial and other resource allocations. These committees also ensure that data are shared internally and externally. External reports are often based on aggregated hospital level data (versus unit level data) and shared at provincial and state levels. Standardized unit and hospital level data collection of SOT indicators and medical/surgical NSIs facilitates internal and external benchmarking processes.

At provincial/state levels, SOT nurse experts mentioned that SOT indicators and medical/surgical NSIs may be collected through standardized databases and reported to national level transplant research centers or agencies. While indicators at different levels support QA, internal and external benchmarking and administrative oversight for the quality and safety of healthcare delivery, SOT nurse experts unanimously agreed that more research is needed to determine what SOT indicators are most indicative of the quality and safety of nursing care delivery. In order to better understand nurse staffing needs for SOT patients and to improve SOT patient outcomes, SOT NSIs need to be developed.

Table 2 Results of Interview Questions

Question 1: What indicators do you use for transplant performance? **SOT indicators used by all centers:** Average length of hospital stay (6/6), Unplanned return to OR (6/6), Unplanned readmission rates within 30/90 days post-transplant (6/6), Patient survival 1 year post-transplant (6/6), Graft Survival 1 year post-transplant (6/6), Rejection within 1 year (6/6), Artery/Vessel Thrombosis (6/6).
Question 2: **Do you have nurse sensitive transplant indicators?** No SOT NSIs were identified. All centers use medical/surgical NSIs in all areas at their hospitals. **Medical/surgical NSIs used by all centers**: Catheter acquired urinary tract infection (6/6), Falls with injury (6/6), Patient satisfaction with nursing care (6/6), Hospital acquired pressure ulcer greater than stage 2 (4/6), Central line associated bloodstream infection (3/6), Restraint use (2/6), Surgical site infection (1/6), and Patient pain assessment and intervention (1/6).
Question 3: Do you measure or track transplant indicators? If so, can you explain that process (who is involved, what system do you use, who reviews it)? **Levels of measurement for all centers:** Unit level: SOT indicators and medical/surgical NSIs (6/6) Hospital level: Medical/surgical NSIs (6/6). Provincial/State level: SOT indicators and medical/surgical NSIs collected in standardized databases (6/6) National level: SOT indicators and medical/surgical NSIs collected in standardized databases (6/6)
Question 4: Do you think transplant nurse sensitive indicators improve quality patient

care? **Answer:** Yes (6/6)

Table 3 is a comparative table of key findings from the literature review and phone interviews. CAUTI, [8,19,21,22,24] patient satisfaction with nursing care, [36–38] falls, [24,28] and hospital acquired pressure ulcer greater than stage two[24–26] are the most common medical/surgical NSIs in use at SOT centers.

Table 3 Literature Reports of Medical-Surgical NSIs to Medical/Surgical NSIs in use at SOT centers to Non NSIs SOT Indicators

Literature-based NSIs	**Medical/surgical NSIs used in SOT centers**	**SOT indicators used in SOT centers**
Catheter acquired urinary tract infection [22,26,27,29]	Catheter acquired urinary tract infection (6/6)	Average length of hospital stay (6/6)
Pneumonia [22,29]	Patient satisfaction in nursing care (6/6)	Unplanned return to OR (6/6)
Surgical-site infection[23]	Falls (6/6)	Patient survival 1 year post transplant (6/6)
Falls[24,28]	Hospital acquired pressure ulcer greater than stage 2 (4/6)	Unplanned readmission rates within 30/90 days post transplant (6/6)
Failure to thrive[22,25–27,29]	Central line associated bloodstream infection (3/6)	Graft Survival 1 year post transplant (6/6)
Hospital related mortality[22,25,27]	Restraint use (2/6)	Artery/Vessel thrombosis (6/6)
	Surgical site infection (1/6)	Rejection within 1 year (6/6)
	Patient pain assessment and intervention (1/6)	

DISCUSSION

Some questions remain: a) Are medical/surgical NSIs sufficient to inform quality, safe nursing care delivery? b) If not, what are valid, reliable SOT NSIs to guide nursing practice? c) As we shift paradigms towards interdisciplinary care delivery, are there SOT indicators to inform care sensitive team-based practices? Until further research is conducted on SOT NSIs, SOT centers should continue to use evidence-based medical/surgical NSIs for QA and benchmarking

purposes, such as CAUTI. We should also examine the value of using some medical/surgical NSIs with SOT patients. For example, if the prevalence of falls in SOT patients is very low, measuring and reporting this medical/surgical NSI may provide little direction for improving nursing care delivery. Potential SOT indicators include graft survival 1-year post transplant and rejection within 1-year post transplant. These are two examples of unique SOT indicators that reflect measurable patient outcomes influenced by healthcare team delivery. Because they are unique to SOT populations, these indicators have the potential to advance quality of SOT care delivery and patient outcomes and contain financial costs. SOT indicators reflect patient outcomes influenced by multiple healthcare disciplines. As we move towards team based care delivery, care sensitive SOT indicators may augment SOT NSIs. On the other hand, there may always be a place for NSIs to assist organizations in determining nurse skill mix and staff complements to achieve best SOT patient outcomes.[4]

Limitations

While the Arksey and O'Malley scoping review framework guided evidence selection, a systematic evaluation of quality of evidence was not conducted.[39] Some bias was present from convenience sampling using a snowball technique and the limited size of the expert panel.

Implications and Conclusions

Developing SOT NSIs would not only quantify nursing contribution to SOT performance but would also help determine accurate nursing complement needed to deliver best patient care to SOT population.[40] While CAUTI and patient satisfaction are supported in the literature as relevant patient outcomes for SOT populations, at this time, there are no SOT specific NSIs.[38,41–43] Some SOT indicators hold promise, given the roles nurses play, such as education related to

anti-rejection medications and the rejection process, but more research is needed to assess if they are specific to nursing.[20,41]

SOT NSIs need to be identified and developed through further research. Delphi studies with more robust samples of SOT nurse experts need to be conducted to identify NSIs unique to SOT populations. Feasibility, reliability, and validity of potential SOT NSIs need to be investigated in order to confirm that these outcome indicators are sensitive to nursing care. To achieve this, potential SOT NSIs need to be piloted at multiple major SOT centers across North America. Standardized conceptual and operational definitions need to be confirmed prior to collecting data on these indicators. Data collection guidelines and tools need to be standardized across participating sites. Descriptive and correlational study design have been heavily utilized to investigate NSIs in acute care settings.[3] More rigorous quantitative designs, such as RCTs, are needed to advance the quality of evidence available.

Once SOT NSIs are developed, internal and external benchmarking can proceed to enhance SOT performance outcomes. Internally, SOT NSIs will help units identify safe nursing complements to deliver best patient care and will provide accurate patient outcome measures that units can utilize for QA purposes. Externally, SOT NSIs can be collected by standardized databases on provincial/state and national levels to improve SOT efficiencies and inform SOT best practice standards on a widespread scale.

References

1. Institute of Medicine. *Crossing the Quality Chasm: A New System for the 21st Century.* Washington, DC.: National Academy Press; 2001.
2. American Nurses Association. Nursing-Sensitive Indicators. 2015. http://www.nursingworld.org/MainMenuCategories/ThePracticeofProfessionalNursing/PatientSafetyQuality/Research-Measurement/The-National-Database/Nursing-Sensitive-Indicators_1. Accessed May 15, 2015.
3. Burston S, Chaboyer W, Gillespie B. Nurse-sensitive indicators suitable to reflect nursing care quality: A review and discussion of issues. *J Clin Nurs*. 2014;23(13-14):1785-1795. doi:10.1111/jocn.12337.
4. Jeffs L, Doran D, Hayes L, et al. Implementation of the National Nursing Quality Report Initiative in Canada: Insights From Pilot Participants. *J Nurs Care Qual*. 2015;30(4):E9-E16. doi:10.1097/NCQ.0000000000000122.
5. Brown C, Finnell D. Provisions of the Code of Ethics for for Nurses: Interpretive statements for transplant nurses. *Am Nephrol Nurses Assoc*. 2015;42(1):37-45.
6. Dubois C a, D'Amour D, Pomey MP, Girard F, Brault I. Conceptualizing performance of nursing care as a prerequisite for better measurement: a systematic and interpretive review. *BMC Nurs*. 2013;12(1):7. doi:10.1186/1472-6955-12-7.
7. Sherwood G, Zomorodi M. A new mindset for quality and safety: the QSEN competencies redefine nurses' roles in practice. *Nephrol Nurs J*. 2014;41(1):1-15. doi:10.1017/CBO9781107415324.004.
8. Institute of Medicine. *Crossing the Quality Chasm.*; 2001. doi:10.1200/JCO.2003.01.044.
9. Heslop L, Lu S. Nursing-sensitive indicators: A concept analysis. *J Adv Nurs*. 2014;(July). doi:10.1111/jan.12503.
10. Doran D, Mildon B, Clarke S. Towards a national report card in nursing: a knowledge synthesis. *Nurs Leadersh (Tor Ont)*. 2011;24(2):38-57. doi:10.12927/cjnl.2011.22464.
11. Griffiths P, Richardson A, Blackwell R. Outcomes sensitive to nursing service quality in ambulatory cancer chemotherapy: Systematic scoping review. *Eur J Oncol Nurs*. 2012;16(3):238-246. doi:10.1016/j.ejon.2011.06.004.
12. VanFosson CA, Jones TL, Yoder LH. Unfinished nursing care: An important performance measure for nursing care systems. *Nurs Outlook*. 2016:1-13. doi:10.1016/j.outlook.2015.12.010.
13. Institute of Medicine. *The Future of the Public's Health in the 21st Century*. Washington: National Academy Press; 2003.
14. Katabathina V, Menias CO. Complications of Immunosuppressive Therapy in Solid Organ Transplantation. *Radiol Clin North Am*. 2016;54(2):303-309.
15. UNOS. United Network for Organ Sharing. 2015. https://www.unos.org/. Accessed February 28, 2016.
16. LaPointe Rudow D, Cabello CC, Rivellini D. Quality improvement in the care of live liver donors: implementation of the Designated Donor Nurse Program. *Prog Transplant*. 2010;20(4):372-379. http://search.proquest.com.sire.ub.edu/docview/818750524/fulltextPDF?accountid=15293#.
17. Canadian Society of Transplantation. Transplant Programs and OPOS. 2016.

http://www.cst-transplant.ca/cgi/page.cgi/transplant-programs-opos.html. Accessed January 22, 2016.
18. Lucey, Michael, Terrault, Norah, Ojo, Lolu, Hay, Eileen, Neuberger, James, Blumber, Emily, Teperman L. Long-Term Management of the Successful Adult Liver Transplant: 2012 Practice Guideline by the American Association for the Study of Liver Diseases and the Amercian Society of Transplantation. *Liver Transplant*. 2013;19(3):465-466. doi:10.1002/lt.
19. Idemoto BK, Kresevic DM. Emerging Nurse-Sensitive Outcomes and Evidence-Based Practice in Postoperative Cardiac Patients. *Crit Care Nurs Clin North Am*. 2007;19(4):371-384. doi:10.1016/j.ccell.2007.07.005.
20. Taylor R. Immunosuppression for solid organ tranplantation in children. *Pediatr Nurs*. 2004;16(2):39-43.
21. Arksey H, O'Malley L. Scoping studies: towards a methodological framework. *Int J Soc Res Methodol*. 2005;8(1):19-32. doi:10.1080/1364557032000119616.
22. Kane RL, Shamliyan TA, Mueller C, Duval S, Timothy J. The assocation of registered nurse staffing levels and patient outcomes: systematic review and meta-analysis. *Med Care*. 2007;45(12):1195-1204.
23. McGillis Hall L, Doran D, Pink GH. Nurse staffing models, nursing hours, and patient safety outcomes. *J Nurs Adm*. 2004;34(1):41-45. doi:10.1097/00005110-200401000-00009.
24. Patrician P a, Loan L, McCarthy M, et al. The association of shift-level nurse staffing with adverse patient events. *J Nurs Adm*. 2011;41(2):64-70. doi:10.1097/NNA.0b013e31820594bf.
25. Aiken LH. Hospital nurse staffing and patient mortality, nurse burnout, and job dissatisfaction. *JAMA J Am Med Assoc*. 2002;288(16):1987-1993. doi:10.1001/jama.288.16.1987.
26. Needlemen J, Mattke S, Stewart M, Zelevinsky K. Nurse-staffing levels and the quality of care in hospitals. *N Engl J Med*. 2002;246(22):1715-1722.
27. Boyle S. Nursing unit characteristics and patient outcomes. *Nuring Econ*. 2004;22(3):111-123.
28. Chang Y-K, Hughes LC, Mark B. Fitting in or standing out. *Nurs Res*. 2006;55(6):373-380. doi:10.1097/00006199-200611000-00001.
29. Twigg D, Duffield C, Bremner A, Rapley P, Finn J. Impact of skill mix variations on patient outcomes following implementation of nursing hours per patient day staffing: A retrospective study. *J Adv Nurs*. 2012;68(12):2710-2718. doi:10.1111/j.1365-2648.2012.05971.x.
30. Polit D, Beck C. *Nursing Research: Generating and Assessing Evidence for Nursing Practice*. 9th ed. Philadelphia: Lippincott, Williams, and Wilkins.; 2012.
31. Clarke S, Aiken L. Needless deaths are prime examples of the need for more nurses at the bedside. *Am J Nurs*. 2003;103(1):43-45.
32. Huis A, Hulscher M, Adang E, Grol R, van Achterberg T, Schoonhoven L. Impact of a team and leaders-directed strategy to improve nurses' adherence to hand hygiene guidelines: A cluster randomised trial. *Int J Nurs Stud*. 2013;50(4):518-526. doi:10.1016/j.ijnurstu.2012.11.016.
33. Clifford T. Perianesthesia Nurse-Sensitive Indicators. *J PeriAnesthesia Nurs*. 2014;29(6):519-520. doi:10.1016/j.jopan.2014.08.001.

34. Lee KW, Park JB, Oh DK, et al. Short-Term Outcomes of ABO-Incompatible Living Donor Kidney Transplantation With Uniform Protocol: Significance of Baseline Anti-ABO Titer. *Transplant Proc*. 2016;48(3):820-826. doi:10.1016/j.transproceed.2016.01.027.
35. Scientific Registry of Transplant Recipients. Scientific Registry of Transplant Recipients. 2016. http://www.srtr.org/who.aspx. Accessed March 4, 2016.
36. Frank-Bader M, Beltran K, Dojlidko D. Improving transplant discharge education using a structured teaching approach. *Prog Transplant*. 2011;21(4):332-339. doi:PP1042023304P710 [pii].
37. Haspeslagh A, De Bondt K, Kuypers D, Naesens M, Breunig C, Dobbels F. Completeness and satisfaction with the education and information received by patients immediately after kidney transplant: a mixed-models study. *Prog Transpl*. 2013;23(1):12-22. doi:10.7182/pit2013249.
38. Omondi NA, Denzen EM, Jacobson DJ, Payton TJ, Pederson K, Murphy EA. Evaluating patient satisfaction with the Office of Patient Advocacy. *J Cancer Educ*. 2011;26(1):44-50. doi:10.1007/s13187-010-0153-3.
39. Levac D, Colquhoun H, O'Brien KK. Scoping studies: advancing the methodology. *Implement Sci*. 2010;5(69):1-9. doi:10.1186/1748-5908-5-69.
40. Riehle AI, Hanold LS, Sprenger SL, Loeb JM. Specifying and Standardizing Performance Measures for Use at a National Level. *Med Care Res Rev*. 2007;64:64S. http://queensu.summon.serialssolutions.com/link/0/eLvHCXMwQ4wAwMqDxPR0IooDIyNzM1NdS_B2McT-fqSy3k2UQc7NNcTZQxdWZsan5OTEAytoYJPbxNTE0JAvxkQ-55qA18eFm5m7gmzuNwIASmgpdw.
41. Frank-Bader M, Beltran K, Dojlidko D. Improving transplant discharge education using a structured teaching approach. *Prog Transplant*. 2011;21(4):332-339. doi:PP1042023304P710 [pii].
42. Lucena A de F, Echer IC, Silva de Assis, Michelli Cristina Lukasewicz Ferreira SA, Teixeira C de C, Steinmetz QL. Literature Integrative Review Article Infectious Complications in Kidney Transplant and Its Implications To Nursing Interventions : Integrative Review. *J Nurs*. 2013;7:953-959. doi:10.5205/reuol.3934-31164-1-SM.0703esp201316.
43. Ferreira SAL, Echer IC, Lucena A de F. Nursing diagnoses among kidney transplant recipients: evidence from clinical practice. *Int J Nurs Knowl*. 2014;25(1):49-53. doi:10.1111/2047-3095.12006.