Statement of
Judith Shindul-Rothschild, Ph.D., MSN, RN
Associate Professor
William F. Connell School of Nursing, Boston College
September 8, 2018

Thank you for this opportunity to present a report on the estimated cost of increasing registered nurse staffing in Massachusetts hospitals in accordance with the Ballot Question 1 entitled, "Safe Patient Limits" hereafter referred to as "Question 1". I am a registered nurse who has practiced for over 40 years in the Commonwealth. I am employed as an associate professor at the William F. Connell School of Nursing at Boston College. The views expressed in this report are solely those of the researcher, Dr. Shindul-Rothschild and not those of Boston College

Executive Summary

- My analysis estimates the cost of implementing Question 1 ranges from a moderate cost of **$35,070,376** with a starting average RN hourly wage to a high cost of **$46,830,087.08** with an average RN hourly wage. If there is a reallocation of the proportion of RNs to total hospital personnel by 3% to match the proportion in California, costs to implement Question 1 would decline to **$23,618,869.33**. Based on my calculations, Question 1 would add **128 RNs per day** or between **539** and **1,617** full-time RNs annually to the 24,544 full-time RNs currently employed in the 67 Massachusetts acute-care hospitals cited in this report. This represents an increase in RNs employed in Massachusetts hospitals ranging from 2% - 7% (see Appendix A).

Ballot Question 1: Low Cost Estimate with California Benchmark

- This cost estimate was derived by calculating a proportion of RNs to total Massachusetts hospital personnel equivalent to California where RN to patient limits have been in effect since January 1, 2004. The proportion of RN full-time equivalents to total full time equivalent hospital personnel in California is 30% compared to the average in Massachusetts of 27% (AHA, 2016). The total annual estimated cost of RNs on medical-surgical, stepdown, behavioral health and emergency departments was subtracted from this sum (see Figures 1 & 3). Based upon this formula, thirty-seven Massachusetts hospitals (55%) would have no increase in costs if they increased the proportion of RNs to all hospital personnel by 3%. Using California as a benchmark for the hospital personnel resources allocated to RNs, the estimated cost to 67 acute care Massachusetts hospitals for implementing the Question 1 is **$23,618,869.33**.

Figure 1. Low estimated annual Massachusetts acute care hospital costs of Question 1 with the proportion of RNs to total Massachusetts hospital personnel equivalent to California hospitals
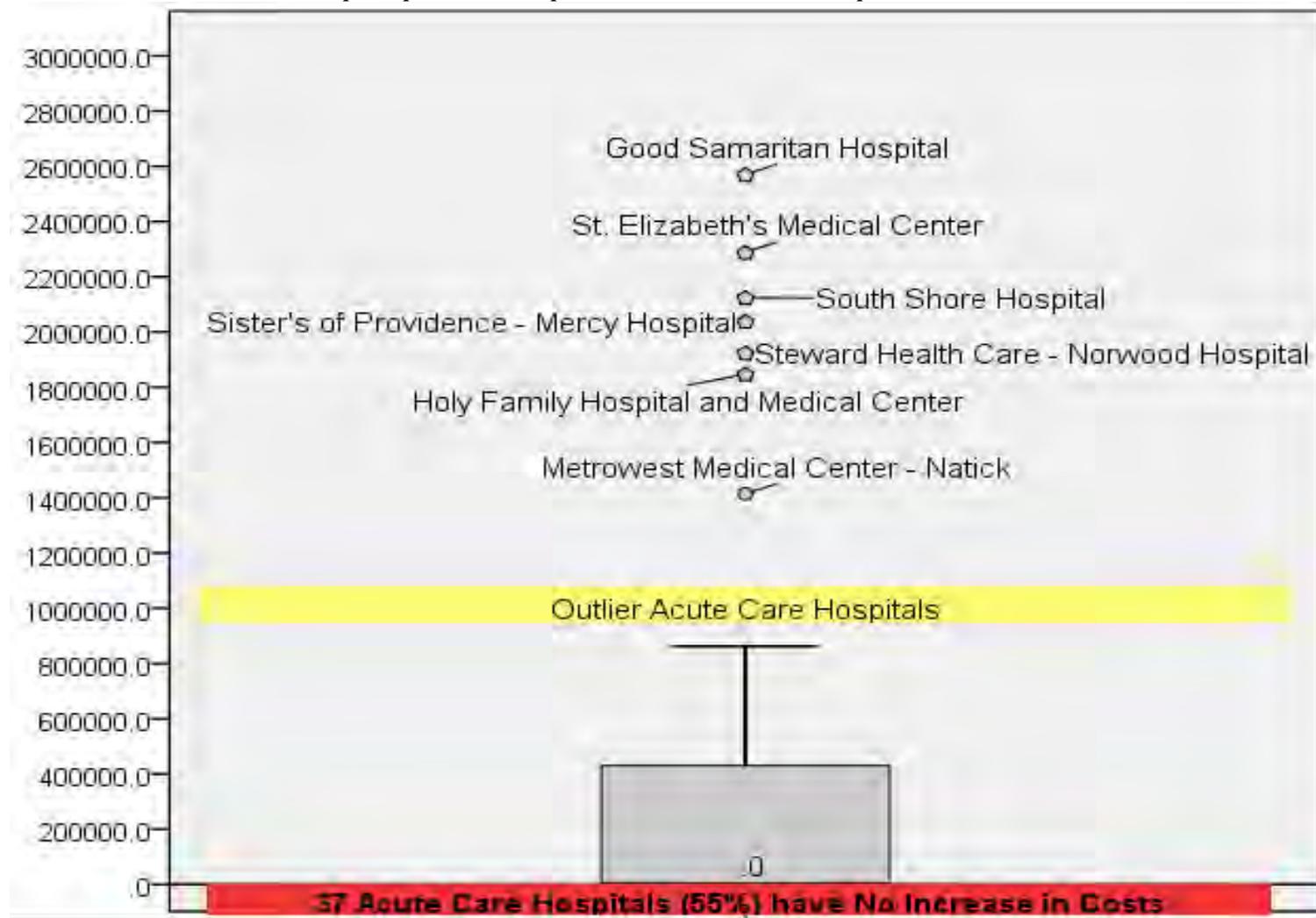
Mean = $352,520.44, SD± 636263.0, Median = .0000, Sum = $23,618,869.33   *N* = 67

95% Confidence Interval for Mean, Lower bound = 197323.70, Upper bound = 507717.18

Footnote: Proportion of RN Full-time Equivalents to Total Personnel Full-Time Equivalents from AHA (2016) *Annual Survey of Hospitals.*

Ballot Question 1: Estimated Impact on Massachusetts Acute Care Hospital Profit or Loss

- The annual hospital costs of Question 1 with the proportion of RNs to total hospital personnel equivalent to California, was subtracted from the profit or loss Massachusetts hospitals reported for FY 2017 (CHIA, May 2018).   Based on this calculation, the mean profit of Massachusetts hospitals is estimated to be **$15,463,897.47** (See Figure 2). The 54 Massachusetts hospitals (81%) who reported a profit in FY17 will maintain profitable status. Thirteen Massachusetts hospitals (19%) reported a financial loss in FY17. In four of the hospitals reporting a financial loss, Question 1 will have no impact (Franklin, Nashoba, Northshore Medical Centers). The remaining nine hospitals (Carney, Wing, Clinton, Noble, Morton, Mass Eye & Ear, Metrowest Medical Centers, Nantucket), reporting a financial loss will incur a mean additional loss of (-$477,091) with a range from (-$55,670) to (-$1,414,242).

Figure 2. Estimated impact of Question 1 on total Massachusetts acute care hospital profit or loss, FY17
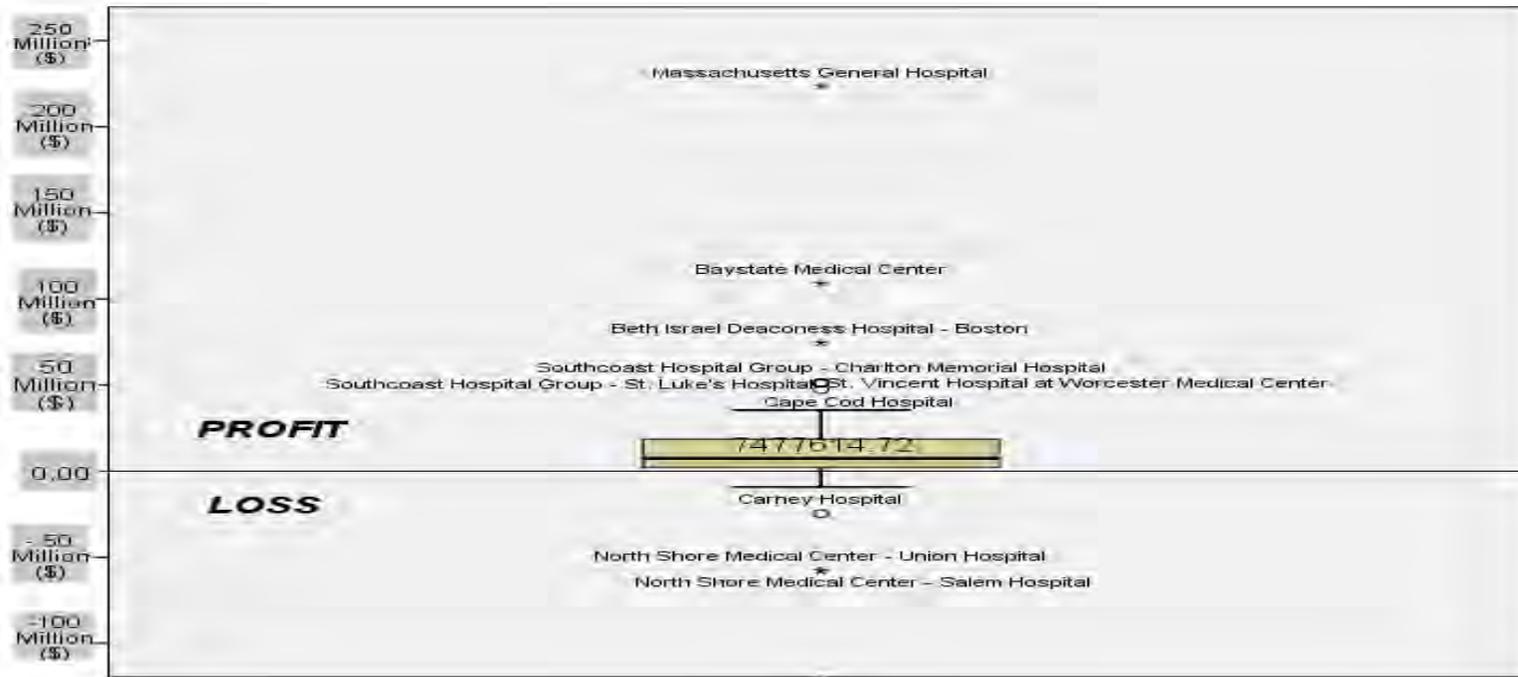
Mean = $15,463,897.47   SD± 35,377,857.28   Median = $7,477,614.72   Sum = $1,036,081,131.00   *N* = 67

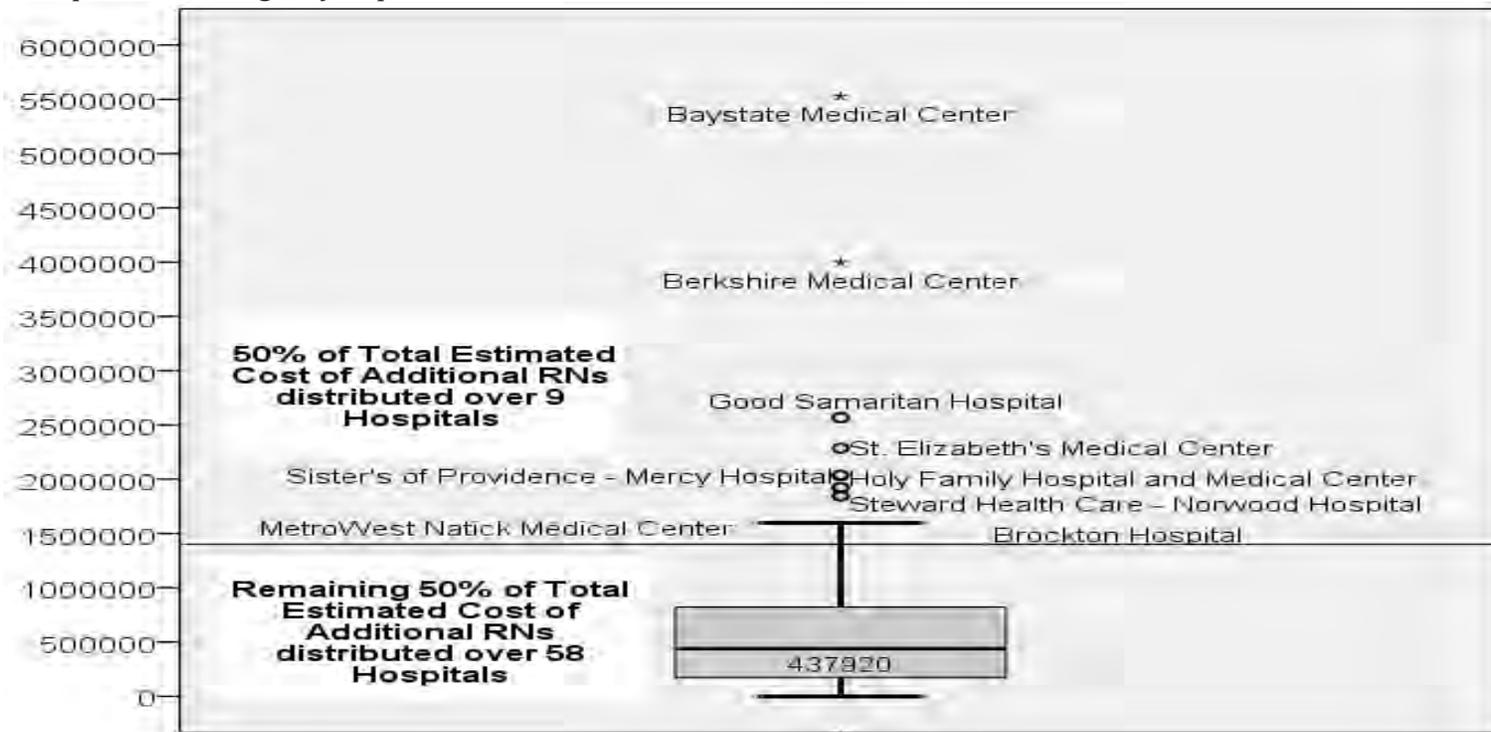95% Confidence Interval for Mean,   Lower bound = $6,834,560.04   Upper bound = $24,093,234.90

Footnote: Data on Massachusetts hospital financial performance from the Center for Health Information and Analysis (August 2018). *Massachusetts Acute Hospital and Health System Financial Performance: FY 2017.* Pub.No. 18-214-CHIA-01. Retrieved from
http://archives.lib.state.ma.us/bitstream/handle/2452/792887/ocn994684730-FY2017.pdf?sequence=1&isAllowed=y

Ballot Question 1: High Estimate for Total Annual Costs of Additional RNs

- The high estimated total annual costs of Question 1 with an average RN hourly wage on medical-surgical, stepdown, emergency department and behavioral health units for 67 Massachusetts acute care hospitals is **$46,830,087.08.** (See Figure 3.). Nine hospitals account for almost half ($23,049,317.42) of the estimated increase in costs of Question 1. A detailed analysis of costs by hospital is shown in Appendix B, "Question 1 Estimated Annual Massachusetts Acute Care Hospital Costs for RNs with Average Hourly Wage"

Figure 3. High estimated annual Massachusetts acute care hospital costs of with average RN hourly wage on medical-surgical, stepdown, emergency department and behavioral health units

Mean = $698,956.52, SD± $931,522.91, Median = $437,919.93, Sum = $46,830,087.08   *N* = 67

95% Confidence Interval for Mean, Lower bound = $471,740.23, Upper bound = $926,172.81

Footnote: RN average hourly wage data from MNA union contracts effective 2015 - 2018 (or) Nonunion hospitals by Department of Labor (May 2017) RN average hourly wage by Massachusetts MSA or NonMSA. RN staffing data was calculated from MHA (2016 & 2017)PatientCareLink.

Ballot Question 1: Moderate to High Estimate of Total Annual Costs for Additional RNs

- The total annual cost for implementing on Question 1 medical-surgical, behavioral health, emergency departments and stepdown units in acute care hospitals ranges from a high estimate of **$46,830,087.08** with an average RN hourly wage to a moderate estimate of **$35,070,376** with an RN starting hourly wage (See Figure 4). Labor costs were calculated using RN average hourly wage data from MNA union contracts effective from 2015 to 2018 (or) in nonunion hospitals by Bureau of Labor Statistics (May 2017) RN average hourly wage by Massachusetts MSA or NonMSA.   Nonunion hospital starting RN hourly wage data was calculated with zipcode match, MSA or NonMSA zipcode match with MNA contract hospitals. RN staffing data was calculated from Massachusetts Hospital Association (2017 & 2016) PatientCareLink publically available data on nurse staffing.

Figure 4. Moderate to high estimated annual cost of Question 1 on medical-surgical, behavioral health, stepdown units and emergency departments in Massachusetts acute care hospitals with average and starting RN hourly wage
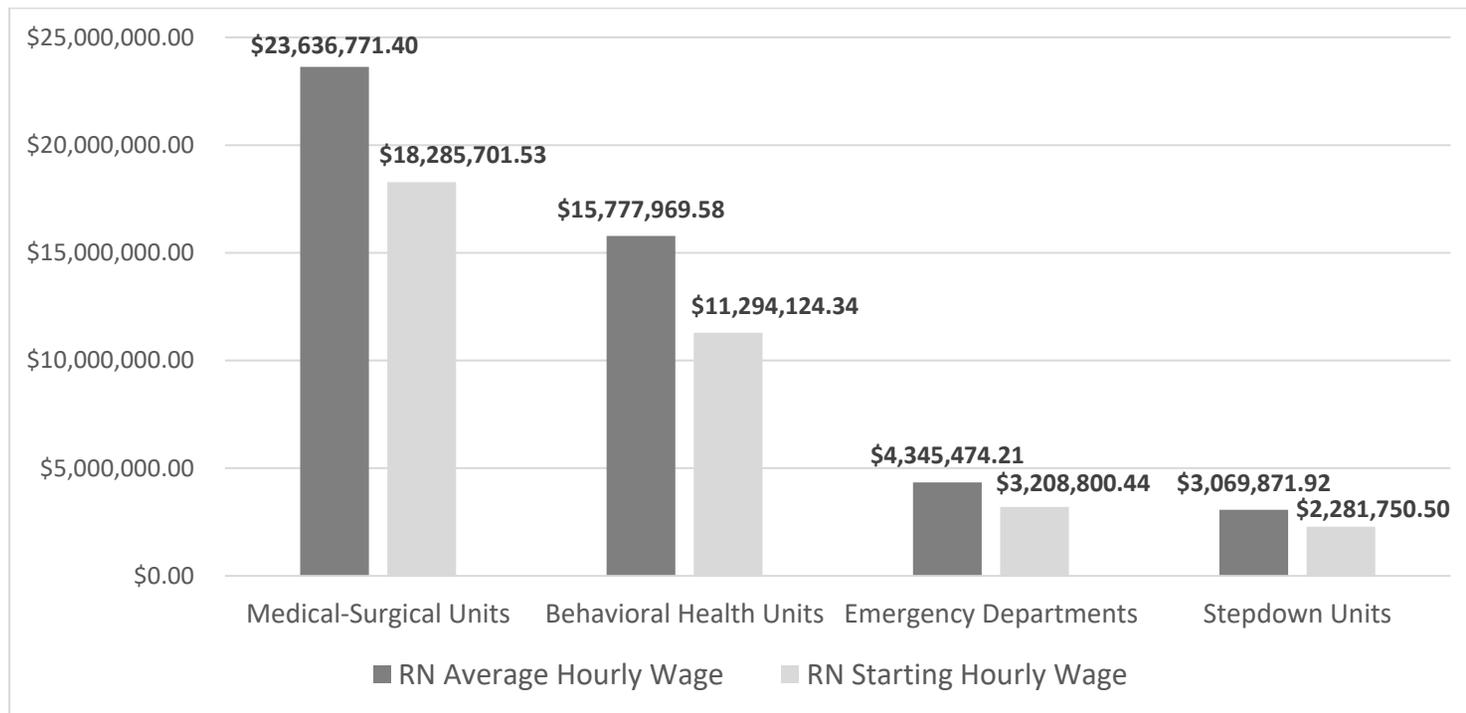
Ballot Question 1: High Estimate of Annual Cost for Additional Medical-Surgical RNs

- The average hospital cost for implementing Question 1 on **medical-surgical units** with an average RN hourly wage is **$352,787.63.** Twenty-four Massachusetts hospitals (36%) who meet the Question 1 standard of 4 patients per RN have no increase in costs. Thirty-two hospitals (48%) have an annual increase in cost of less than $500,000. Medical-surgical units in pediatric specialty hospitals and post-acute hospitals were not included in this analysis. A detailed analysis of costs by acute care hospital is in Appendix C, "Question 1 Massachusetts acute care hospital costs for medical-surgical RNs".

Figure 5. Question 1 Massachusetts acute care hospital costs for medical-surgical RNs with average hourly wage, 2017
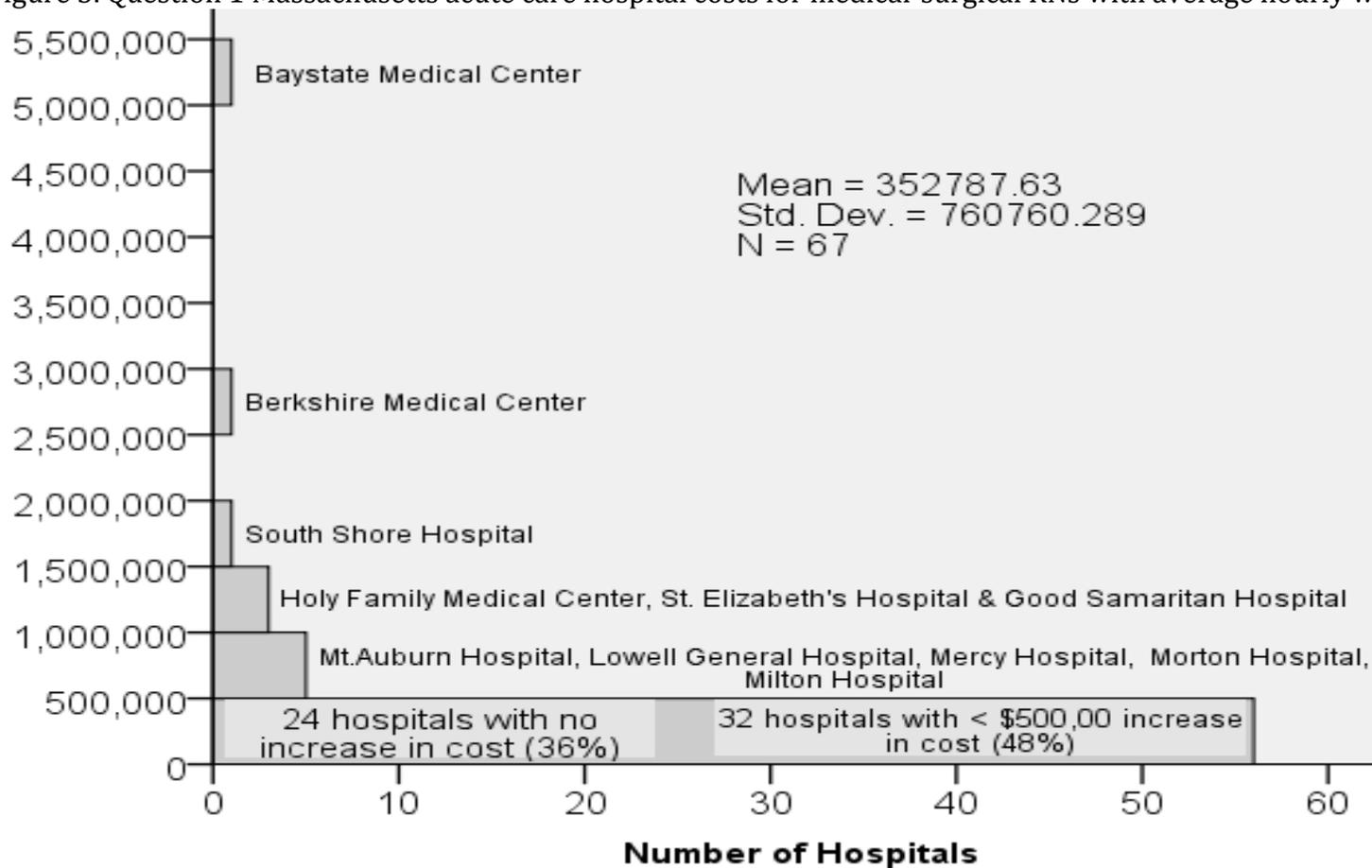
Ballot Question 1: High Estimate of Annual Cost for Additional Behavioral Health RNs

➕ The average hospital cost for implementing Question 1 on **behavioral health units** with an average RN hourly wage is **$384,828.53.** Four Massachusetts hospitals (10%) meet the MNA ballot standard of 5 patients have no increase in costs. Eleven hospitals (37%) have an annual increase in cost of less than $200,000. Behavioral health units included geriatric, adult, adolescent, child psychiatric units and substance use units in acute care hospitals. Sixteen free standing Massachusetts psychiatric hospitals were not included in this analysis. An analysis of costs by acute care hospital is shown in Appendix D, "Question 1 Massachusetts acute care hospital costs for behavioral health RNs".
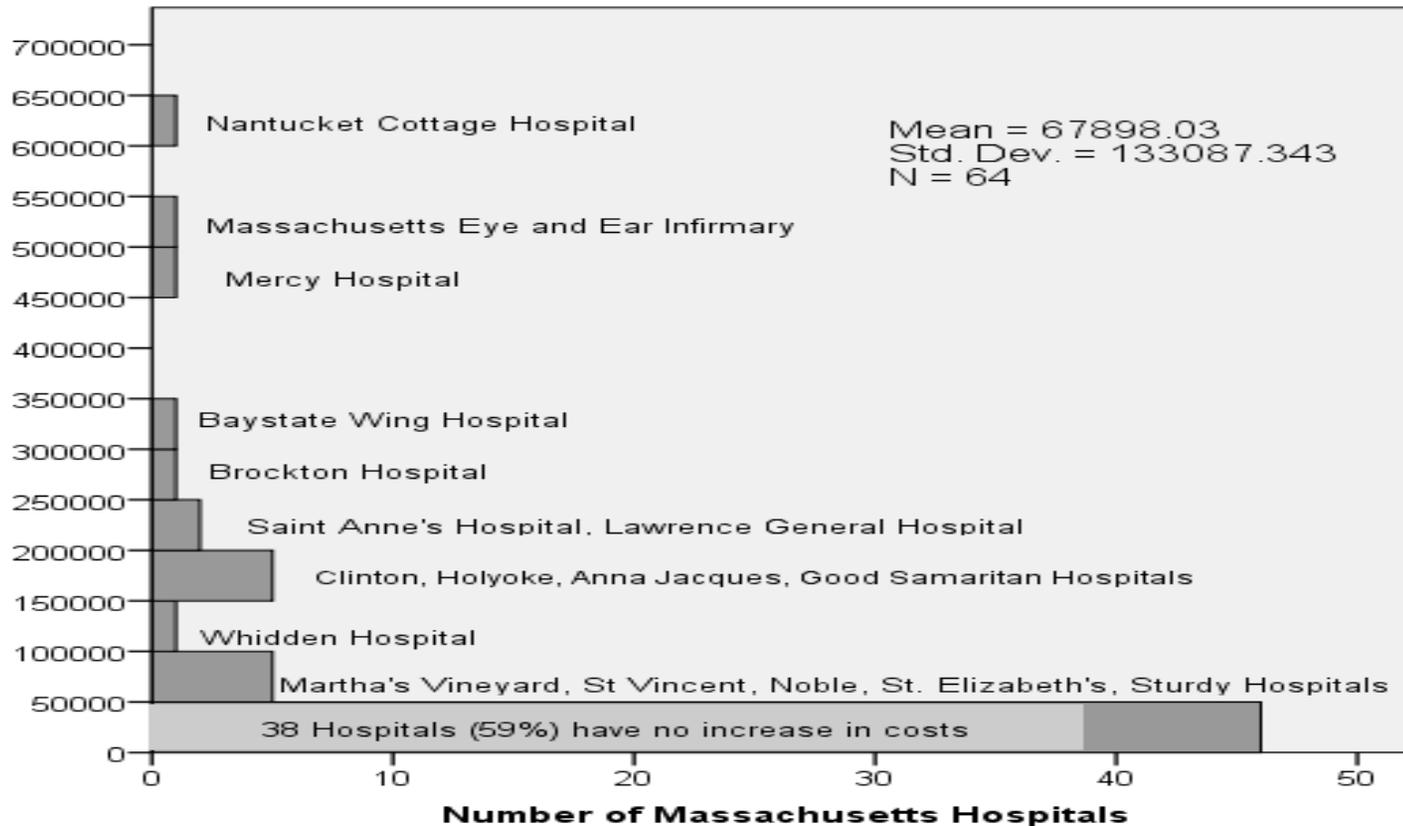
Figure 6. Question 1 Massachusetts acute care hospital cost for behavioral health RNs with average hourly wage, 2017
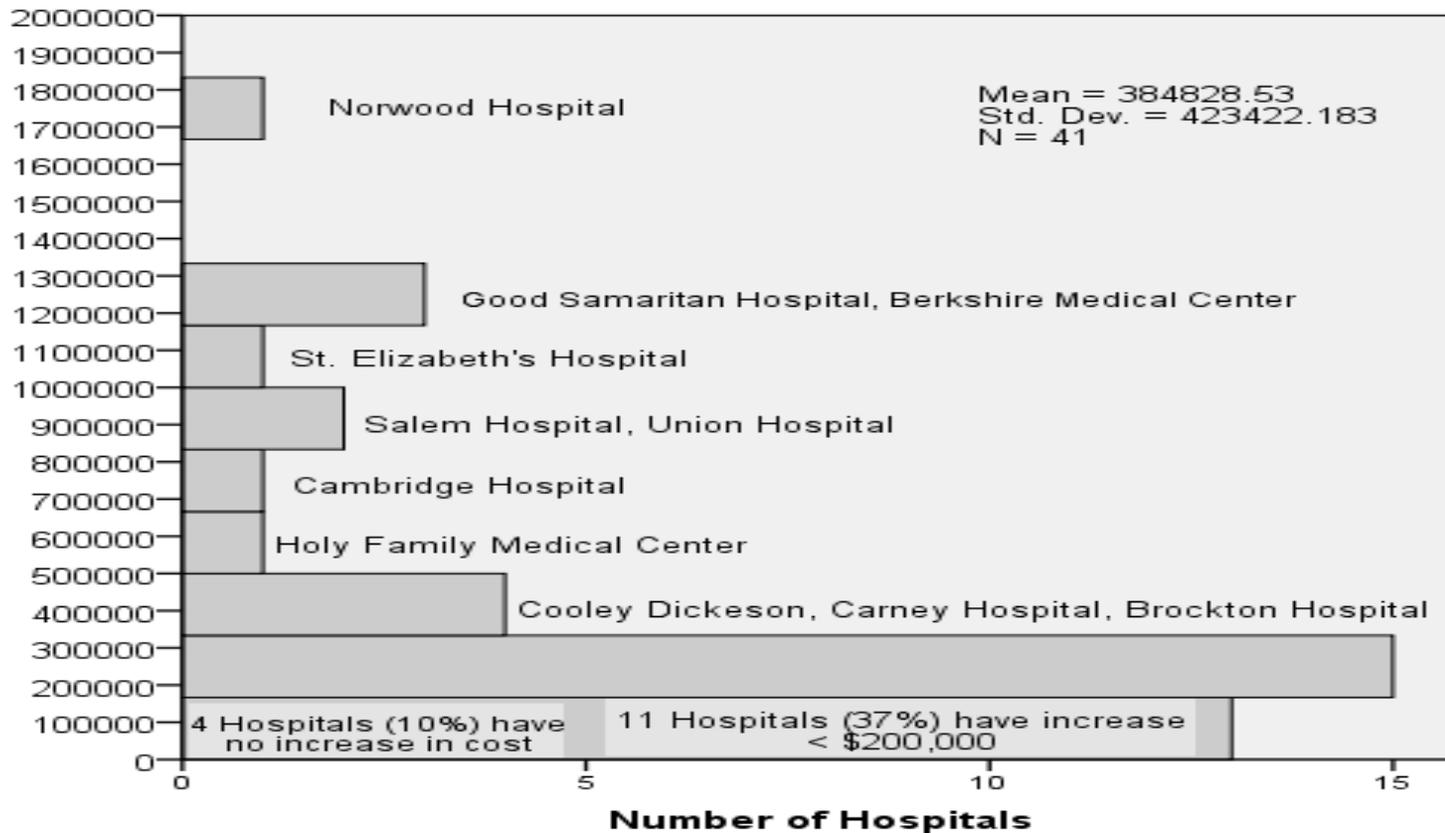
Ballot Question 1: High Estimate of Annual Cost for Additional Emergency Department RNs

- The average acute care hospital cost for implementing Question 1 in **emergency departments** with an average RN hourly wage is **$67,898.** Thirty-eight Massachusetts hospitals (59%) who meet the MNA ballot standard of 5 stable patients have no increase in costs. Eleven hospitals (37%) have an annual increase in cost of less than $200,000.   Cost estimates were not calculated for non-stable patients in the emergency department because of the wide variation in patient acuity in trauma and non-trauma emergency departments. A detailed analysis of costs by acute care hospital is shown in Appendix E, "Question 1 Massachusetts acute care hospital costs for emergency department RNs".

Figure 7. Question 1 Massachusetts acute care hospital cost for emergency department RNs with average hourly wage, 2016

Ballot Question 1: High Estimate of Annual Cost for Additional Stepdown RNs

- The average acute care hospital cost for implementing Question 1 on **stepdown** units with an average RN hourly wage is **$146,184.38**. Eleven Massachusetts hospitals (52%) who meet the MNA ballot standard of 3 patients have no increase in costs. A detailed analysis of costs by acute care hospital is shown in Appendix F, "Question 1 Massachusetts acute care hospital costs for stepdown RNs".

Figure 8. Question 1 Massachusetts acute care hospital cost for Stepdown RNs with average hourly wage, 2016
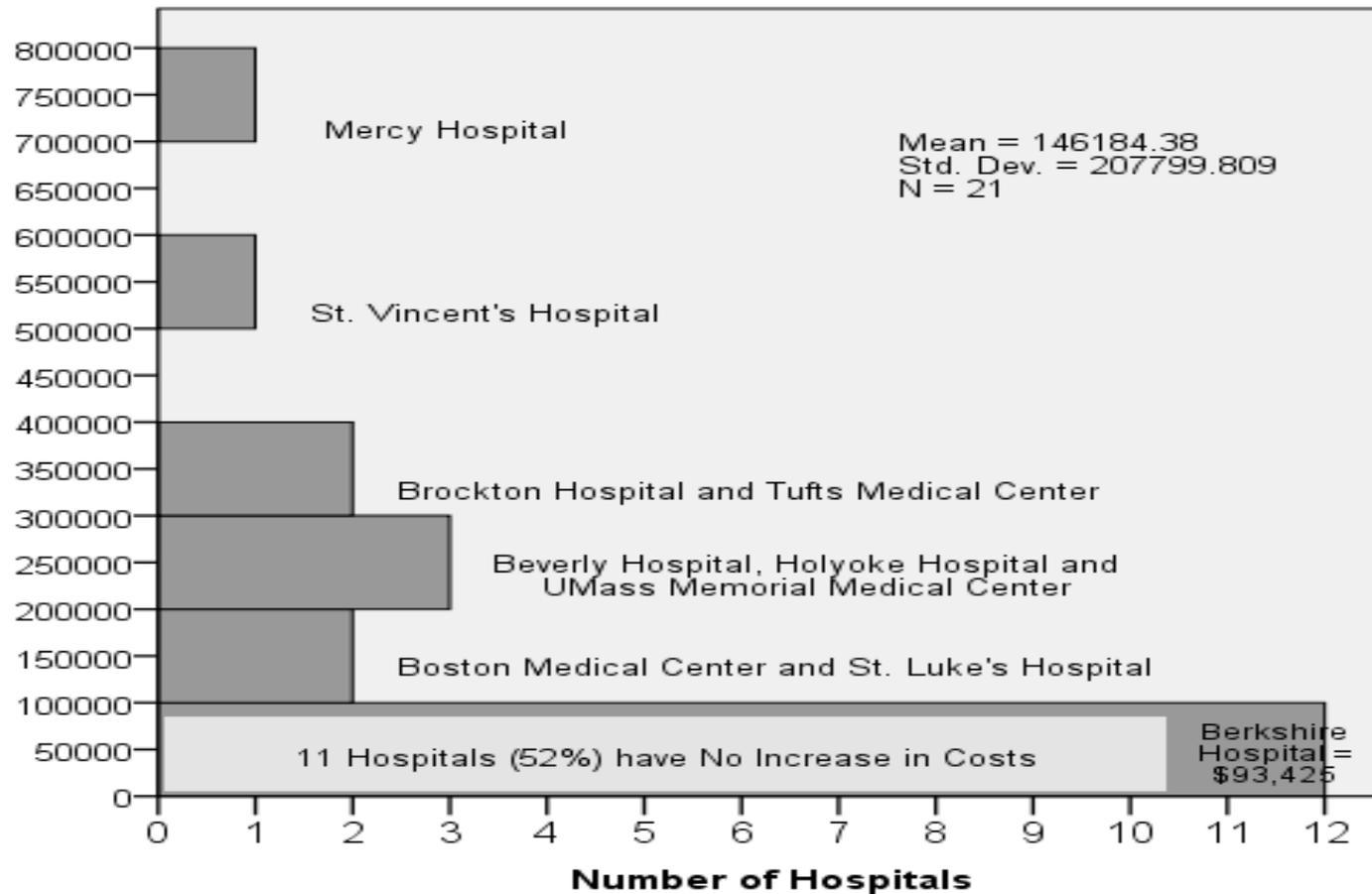
Limitations

The cost estimates described in this report are based upon the Massachusetts Hospital Association's (2016 & 2017) publically available staffing plans for medical-surgical, stepdown, behavioral health and emergency departments in acute care hospitals. RN staffing in post-acute hospitals, free standing psychiatric hospitals, three pediatric specialty hospitals, as well as maternity units and operating rooms in acute care hospitals, are not publically reported and were not included in this analysis. Boston Children's Hospital met the standards in Question 1 and given other pediatric specialty hospitals were excluded, Boston Children's Hospital was not included in a summary of findings.   Massachusetts Chapter 155 regulates RN to patient limits in intensive care units, critical care units, and NICUs therefore these hospital units were not included in the cost analysis.

Summary

Multiple studies have found strong evidence of a positive relationship between patient outcomes and the adequacy of registered nurse staffing. In this cost analysis of Question 1, statistically significant differences in the number of patients cared for by RNs were found between Massachusetts acute care hospitals with no additional costs, and those with high costs on medical-surgical ($p < .001$), behavioral health ($p = .003$), intensive care ($p = .005$), and emergency departments ($p = .013$) (see Appendix G). My research publications describe data-based evidence of the relationship between nurse staffing and patient outcomes in Massachusetts and California hospitals. Associations between specific RN to patient ratios in Massachusetts acute care hospitals and patient outcomes is detailed in testimony I have provided to Massachusetts legislators and regulatory agencies in the Commonwealth. Based on my research findings, in my opinion, limits on the number of patients cared for by RNs improves the quality of nursing care and patient outcomes, especially in hospitals that assign RNs more patients than peer institutions. Studies have also reported lower rates of occupational injury and turnover of registered nurses in California hospitals after laws were enacted limiting on the number of patients assigned to RNs.

All too commonly, when hospitals face financial challenges, one of the first responses is to cut labor costs by cutting the numbers of RNs available to care for patients or replacing RNs with unlicensed personnel.   Throughout my career, and in testimony over several decades in the Commonwealth, I have emphasized that to sustain quality and access to care in Massachusetts hospitals it is vital that we assure there are adequate numbers of registered nurses at the bedside.   Given the findings of my research, I believe more strongly now, than I did decades ago, that there must be limits to the numbers of patients cared for by registered nurses to assure every patient, on every unit, in every Massachusetts hospital, receives safe, quality nursing care.

Summary of Abstracts from Publications examining RN staffing and patient outcomes in California and Massachusetts Hospitals

1. Stamp, K. D., Flanagan, J. M., Gregas, M. & Shindul-Rothschild, J. (2014). Predictors of excess heart failure readmissions: Implications for nursing practice. *Journal of Nursing Care Quality, 29*(2), 115-123.

Abstract: In this study of California, Massachusetts and New York hospitals, 6 factors predicted 27.6% of readmissions for heart failure (HF) patients. We found higher admissions per bed, teaching hospitals, and poor nurse-patient communication increased HF readmissions. Conversely, the HF readmissions were lower when nurse staffing was greater, more patients reported receiving discharge information and for hospitals in California. The implications for nursing practice in the delivery of care to HF patients are discussed.

2. Flanagan, J., Stamp, K., Gregas, M. & Shindul-Rothschild, J. (2016). Predictors of 30 day readmission for pneumonia. *Journal of Nursing Administration, 46*(2), 69-74

Abstract: Objective: This study examined data from 4 sources: number of hospital-acquired conditions, patient perception of care, quality outcome measures and demographic data to explain variances associated with 30 day pneumonia readmission rates.

Background: Patients readmitted within 30 days for pneumonia increases the length of hospital stay by 7 to 9 days, increases crude mortality rate 30 to 70%, and costs of $40,000 or greater per patient.

Methods: Variances in outcomes measures associated with 30 day pneumonia readmissions from 577 nonfederal general hospitals in Massachusetts, California and New York were analyzed using datasets from Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS), Centers of Medicare and Medicaid Services (CMS), Agency for Healthcare Research and Quality (AHRQ) and American Hospital Association (AHA).

Results: Three factors increased pneumonia readmission rates: poor nurse-patient communication, poor staff responsiveness to patient needs, and iatrogenic pneumothorax. Conversely, factors lowering pneumonia readmission rates included patients hospitalized in California, higher registered nurse staffing, and higher proportions of nursing staff to total hospital personnel.

Conclusions: Findings suggest lower nurse staffing, poor nurse-patient communication and nurse responsiveness to patient needs contribute to increased pneumonia readmission rates.

3. Shindul-Rothschild, J., Flanagan, J. M., Stamp, K. D., & Read, C. E. (2017). Beyond the pain scale: provider communication and staffing predictive of patients' satisfaction with pain control. *Pain Management Nursing*, 18 (6), 401-409. Doi: http://dx.doi.org/10.1016/j.pmn.2017.05.003

Abstract: Purpose: The aim of this study was to examine hospital characteristics, staffing and nursing care associated with patient self-report of pain control measured in the Hospital Consumer Assessment of Health Care Providers Systems (HCAHPS). Design: This cross-sectional study analyzed factors associated with patients' self-report of pain control in 464 non-federal hospitals in California, Massachusetts and New York. Methods: Twenty-one factors correlated with patients' reports of pain control were included in the stepwise linear regression analysis. Analysis of variance examined the relationship between staffing and patients' perception of pain control. Findings: Patients' perception of pain control significantly improved with higher numbers of registered nurses (p = .045), nursing staff (p = .005) and hospitalists (p = .035) and worsened with higher numbers of residents or interns (p = .010). Six predictors explained 79% of the variance in patients' self-reports of pain control. Pain was poorly controlled when patients did not receive help as soon as they wanted (p < .001), with poor nurse communication (p < .001), poor medication education (p < .001), and in teaching hospitals (p < .001). Pain control improved with higher numbers of nursing staff (p = .001) and in non-profit hospitals (p =.001). Conclusion: Nurse staffing and nurse communication are predictive of patients' perception of pain management. In teaching hospitals, with rotating intern/resident assignments, patients reported less satisfaction with pain management. Clinical Relevance: This study provides new evidence for the importance of adequate nurse staffing, provider-patient communication and interdisciplinary collaboration in controlling pain of hospitalized patients.

Summary of Abstracts from Publications examining RN staffing and patient outcomes in Massachusetts Hospitals

4. Shindul-Rothschild, J., Read, C., Stamp, K. D., & Flanagan, J. M. (2017). Nurse staffing and hospital characteristics predictive of time to diagnostic evaluation for patients in the emergency department. *Journal of Emergency Nursing*, *43*(2), 138–144. http://doi.org/10.1016/j.jen.2016.07.003

Abstract: Introduction: In the 2014 Emergency Department Benchmarking Alliance Summit, for the first time, participants recommended tracking nursing and advanced practice nurse hours. Performance data from the Centers for Medicare and Medicaid Services provides an opportunity to analyze factors associated with delays in emergency care. The purpose of this study was to investigate hospital characteristics associated with time to a diagnostic evaluation in 67 Massachusetts emergency departments from 2013 to 2014. Methods: Covariates significantly correlated with time to diagnostic evaluation and factors associated with timely care in emergency departments were included in the stepwise linear regression analysis. Differences in nurse staffing and performance measures in trauma and non-trauma emergency departments was examined with analysis of variance and t-tests. Results: Two predictors explained 38% of the variance in time a diagnostic evaluation: (1) nurse staffing (p < .001) and (2) trauma centers (p <.001). In trauma centers, the time to a diagnostic evaluation significantly increased (p = .042) from 30.2 minutes when a nurse cared for fewer than 11.32 patients in 24 hours, to 61.4 minutes when a nurse cared for 14.85 or more patients in 24

hours. Discussion: Efforts to improve patient flow often focus on process interventions such as improved utilization of observation beds or transfers of patients to inpatient units. In this study, time to diagnostic evaluation significantly increased when emergency nurses care for higher numbers of patients. The findings present new evidence identifying the relationship of specific nurse to patient ratios on wait time in emergency departments.

5. Read, C. E., Shindul-Rothschild, J., Flanagan, J. M., & Stamp, K. D. (2018). Factors Associated with Removal of Urinary Catheters after Surgery. *Journal of Nursing Care Quality, 33*(1), 9-37. doi: 10.1097/NCQ.0000000000000287 .

Abstract: Publicly available data from the Centers for Medicaid & Medicare Services were used to analyze factors associated with removal of the urinary catheter within 48 hours after surgery in 59 Massachusetts hospitals. Three factors explained 36% of the variance in postoperative urinary catheter removal: fewer falls per 1000 discharges, better nurse-patient communication, and higher percent of Medicare patients. Timely urinary catheter removal was significantly greater in hospitals with more licensed nursing hours per patient day.

Disclosures:
The research by Dr. Shindul-Rothschild used in this report was solely supported by Boston College.

Disclaimer:
The views expressed in this report are solely that of the researcher, Dr. Shindul-Rothschild, and not those of Boston College.

Further Information on Measures Referenced in this Testimony:

American Hospital Association (2016). *AHA Annual Survey Database.* AHA: Chicago.
Center for Health Information and Analysis (August 2018). *Massachusetts Acute Hospital and Health System Financial Performance: FY 2017.* Pub.No. 18-214-CHIA-01. Retrieved from http://archives.lib.state.ma.us/bitstream/handle/2452/792887/ocn994684730-FY2017.pdf?sequence=1&isAllowed=
Massachusetts Hospital Association (2016 & 2017). *Staffing Plans and Reports.* Retrieved from: http://patientcarelink.org/healthcare-provider-data/hospital-data/staffing-plans-reports/
Massachusetts Nurses Association (2017). *MNA Wages Division of Membership Annual Report.* Acute care hospitals. By permission of author.
U.S. Department of Labor (May 2017). *Registered Nurse Salaries in Metropolitan and Nonmetropolitan Areas, Massachusetts.* Retrieved from: https://www.bls.gov/oes/current/oessrcma.htm

Recent Testimony in Massachusetts:

Shindul-Rothschild, J. (October 20, 2015). Testimony on behalf of the Massachusetts Nurses Association in support of S.1206/H.1958, *An Act Relative to Patient Safety* to the Joint Senate House Committee on Public Health. Oral testimony available at: https://www.youtube.com/watch?v=YNecgx7rFT0

Shindul-Rothschild, J. (March 25, 2015). *Nurse Staffing Quality Measures*. Comment on behalf of the Massachusetts Nurses Association to the Health Policy Commission hearing on ICU Nurse Staffing Law, MGL c. 111, sec. 231. Available at: http://www.mass.gov/anf/budget-taxes-and-procurement/oversight-agencies/health-policy-commission/nurse-staffing/20150325-mna-judith-shindul-rothschild.pdf

Shindul-Rothschild, J. (December 23, 2014). *Nurse Staffing Quality Measures.* Comment on behalf of the Massachusetts Nurses Association to the Committee on Patient Protection and Quality Improvement, Health Policy Commission hearing on ICU Nurse Staffing Law, MGL c. 111, sec. 231. Available at: http://www.mass.gov/anf/budget-taxes-and-procurement/oversight-agencies/health-policy-commission/nurse-staffing/quality-measures-mna.pdf

Shindul-Rothschild, J. (October 29, 2014). *ICU Nurse Staffing Regulations.* Public Testimony to the Committee on Patient Protection and Quality Improvement, Health Policy Commission hearing on ICU Nurse Staffing Law, MGL c. 111, sec. 231. Available at: http://www.mass.gov/anf/budget-taxes-and-procurement/oversight-agencies/health-policy-commission/nurse-staffing/20141029-public-testimony-mna-judith-shindul-rothschild.pdf

Shindul-Rothschild, J. (March 24, 2014). Testimony on behalf of the Massachusetts Nurses Association in support of S. 557 and H. 1008, An Act Relative to Patient Safety to the Joint Senate House Committee on Health Care Financing. Oral testimony available at: https://www.youtube.com/watch?v=wTx_0PXFXn4

Shindul-Rothschild, J. (March 20, 2010). Health care cost trends: Cost drivers. Massachusetts Office of Health and Human Services. Retrieved on November, 2011 from: http://www.mass.gov/chia/docs/cost-trend-docs/oral-testimony/oral-testimony-shindul-rothschild.pdf

Author Contact Information:
Judith Shindul-Rothschild, PhD, RN
Associate Professor
William F. Connell School of Nursing, Boston College
140 Commonwealth Ave.
Chestnut Hill, MA. 02167
Email: judith.shindul-rothschild@bc.edu
Office: (617) 552-4270