JNPD Journal for Nurses in Professional Development • Volume 34, Number 6, 303–312 • Copyright © 2018 Wolters Kluwer Health, Inc. All rights reserved.

Measuring Return on Investment for Professional Development Activities

CE 1.5 ANCC Contact Hours

2018 Updates

Cathleen Opperman, DNP, RN, NEA-BC, CPN ❍ Debra Liebig, MLA, BSN, RN-BC ❍ Judith Bowling, PhD, MHA, RN-BC ❍ Carol Susan Johnson, PhD, RN-BC, NE-BC

What is the return on investment for the time and resources spent for professional development activities? This is an update of the two articles published in 2016, which reviewed literature and demonstrated how financial analysis of educational activities can drive decision-making. Professional development activities are routinely planned based on needs assessments, implemented with evidence-based learning modalities, and evaluated for effectiveness through linkage to outcomes. The next level of evaluation is consideration of the economic impact of professional development activities. This article includes a review of the most recent studies that provide cost of educational interventions along with a description of economic outcomes and an update to the "Known Costs of Outcomes Table."

As nursing professional development (NPD) practitioners, we are challenged by the question "What is the return on investment (ROI) for professional development activities?" As described in Part I of this series, NPD practitioners are often the first to be called when a problem exists and among the first to have funding restricted when budgets are tight. Program evaluation models, a summary of the literature reporting on ROI for professional development activities, and the "Known Costs of Outcomes Table" were included in this first article (Opperman, Liebig, Bowling, Johnson, & Harper, 2016a). The second article added "how to" calculate financial impact with scenario examples, including simple cost analysis, benefit–cost ratios, cost-effectiveness analysis, and ROI (Opperman, Liebig, Bowling, Johnson, & Harper, 2016b). Through examples of various-sized educational programs, it was demonstrated how an NPD practitioner can use these calculations for decision-making.

Cathleen Opperman, DNP, RN, NEA-BC, CPN, is Professional Development Nurse Specialist, Nationwide Children's Hospital, Columbus, Ohio.

Debra Liebig, MLA, BSN, RN-BC, is Program Manager, Accreditation & Regulatory Readiness, Children's Mercy Kansas City, Missouri.

Judith Bowling, PhD, MHA, RN-BC, is Clinical Learning Educator, Baptist Health South Florida, Miami.

Carol Susan Johnson, PhD, RN-BC, NE-BC, is Principal, Innovations LLC, Fort Wayne, Indiana.

The authors declare no conflicts of interest.

ADDRESS FOR CORRESPONDENCE: Cathleen Opperman, Nationwide Children's Hospital, 255 East Main St., Columbus, OH 43205 (e-mail: oppermancs@gmail.com).

DOI: 10.1097/NND.0000000000000483

INTRODUCTION

This article builds on the themes of the prior two articles on ROI. Following these publications, presentations at the Annual ANPD Conventions, and numerous webinars, requests were received for updating the literature search and the tables on the Known Costs of Outcomes Table. These requests led to this article. This article will describe the recent literature including four articles having educational interventions with reported outcomes and financial impact published between 2014 and 2018. Following the literature review, the updated Known Costs of Outcomes Table lists the economic impact of a variety of conditions.

UPDATE OF LITERATURE REVIEW

The original project used the seven steps of evidence base practice described by Melnyk and Fineout-Overholt (2015). Using the same keywords, the literature was examined for interventional studies that included an educational intervention and calculation of financial impact. Four additional articles were found demonstrating increasing awareness of the need to calculate and publish financial impact of professional development activities (see Table 1).

Frampton et al. (2014) completed a literature search of studies reporting educational interventions for preventing vascular catheter bloodstream infections, resulting in 74 studies between 2000 and 2012. This 398-page report used a decision-analytic economic model to analyze the cost-effectiveness of educational interventions for preventing catheter bloodstream infections. The model showed diverse types of educational interventions reduce the incidence, increasing survival by 3.55 years and 2.72 QALYs (quality-adjusted life-years).

Kram, DiBartolo, Hinderer, and Jones (2015) implemented the ABCDE bundle for patients in the intensive

TABLE 1 Recent Educational Intervention Studies Including Calculation of Economic Impact (2014–2018)

Citation	Project/Methodology	Financial Impact	Strategy/Intervention	Outcomes Measured
Frampton et al. (2014)	Systematic review (74 studies) Decision-analytic economic model—cost-effectiveness of education intervention to prevent catheter bloodstream infections	Cost-effective to implement educational interventions Huge variety of educational methods, length and number of contacts with learners	Diverse types of educational interventions reduce incidence of CLABSI Utilized both educational practices and noneducational activities	Model showed bundle saved 0.8 CLABSI and 0.3 lives per 100 patients Increased survival by 3.55 years and 2.72 QALYs Identified need for standardized definitions for blood stream infections
Garrison & Beverage (2018)	Process for NPD tracking ROI to increase awareness Reviewed 2 projects: peritoneal dialysis (PD) and colon clean closure (Colon).	PD: Results are 91% ROI; staff comfort level went from 2.8 to 4.2 Colon: 409% ROI if reduction of one SSI; staff comfort level was measured as 4.11	PD: Quarterly PD review, three stations with education and return demonstration Colon: 30-minute live, poster presentations and electronic learning module	PD: Increased nurse comfort level with PD; decreased LOS by 1 day/year; measured nurse comfort level and learning needs assessment Colon: Reduced SSI rates and increased comfort level of nursing staff to prevent SSIs
Kram et al. (2015)	ABCDE bundle, delirium, EBP Awakening, breathing, coordination, delirium, and early mobility	Saved an average of $2,156 per patient Did not provide the cost of educating staff	Live CE in evidence for bundle; live CE on proper administration of ICDSC tool; online module and paper version available	Decreased average LOS by 1.8 days; reduced length of mechanical ventilation by 1 day; established baseline delirium prevalence of 19% over 3 months
Young et al. (2015)	Quasiexperimental, quality improvement project with pre- and postmeasurement design	$27,019 cost education (84 nurses; 41 PCTs) Cost to care for single stage PrU can be up to $130,000, making this a good investment	Implementation of MEDLINE Pressure Ulcer Prevention program • Tracked for 24 months • Training: RN 7.5 hours, PCT 5.5 hours • New skin care products • Algorithm for tx protocols	Significant reduction in nosocomial PrU preprogram (mean = 5.9) and postprogram (mean = 0.2) Facility had nearly 6 PrUs per month, reduced to nearly 0

Note. CE = Continuing Education program; CLABSI = central line-associated bloodstream infections; ICDSC = Intensive Care Delirium Screening Checklist; LOS = length of stay; NPD = nursing professional development; PCTs = patient care technicians; PrU = pressure ulcer; QALYs = quality-adjusted life-years; ROI = return on investment; SSI = Surgical Site Infection; tx = treatment.

care unit (ICU) by educational interventions resulting in a decreased average length of stay and decreased mechanical ventilation days. The education included (a) a live presentation on the evidence regarding the ABCDE bundle for all nursing, respiratory therapy, and rehabilitation staff; (b) a nursing-specific class on proper administration of the Intensive Care Delirium Screening Checklist tool; and (c) an online module for all disciplines on the new administrative policy. The authors reported an average savings of $2,156 per patient after a combination of educational interventions. However, information on the cost of the educational intervention was not provided, so further economic impact calculations could not be made.

Young, Borris-Hale, Falconio-West, and Chakravarthy (2015) provided caregiver education by an interactive web-based program on pressure ulcer prevention strategies including how to use new skin care products and an algorithm for treatment of wounds. The RNs received 7.5 hours of education, and the patient care technicians had 5.5 hours. This education, the development of an algorithm and change in skin care products, resulted in a significant reduction in nosocomial pressure ulcers from a mean of 5.9/month to a mean of 0.2/month after the program. By educating the RNs and patient care technicians, significant cost avoidance was achieved in this long-term care setting. Though ROI was not calculated by the authors, enough information was reported to calculate a 381% ROI for their interventions.

Garrison and Beverage (2018) used the process described in Opperman et al. (2016b) to calculate the ROI

for two different programs: Peritoneal Dialysis Quarterly Review (reduce length of stay) and a Colon Clean Closure program (reduced surgical site infection). In 2017, their NPD practitioners challenged themselves to each completed an ROI calculation for at least one project, resulting in a total of 13 calculations. From this effort, they reported an increased awareness of program effectiveness and economic impact of the NPD department activities and a collection of objective data to help with "future project decision-making." Garrison and Beverage listed lessons learned as the need to (a) identify an economic impact leader within NPD; (b) repeatedly revisit the topic with articles, examples, and reminders to keep NPD practitioners engaged; (c) lead by example through completing calculations and sharing them with the team; (d) offer assistance with calculating financial impact with projects; and (e) add measuring economic impact of programs to the planning stage of programs. This NPD department's process to incorporate economic impact into their practice is a challenge to all NPD practitioners. With publication of more financial measures, the value of NPD contributions will become more apparent to decision makers.

Each of these articles contributes to the body of literature demonstrating the value of professional development activities through economic impact evaluations. Through increasing awareness of the financial side of education, the authors pointed out the role education plays, which is beneficial to both patients and healthcare organizations by

- reducing central line-associated bloodstream infections—both infection rates and saving lives;
- decreasing length of stay;
- preventing pressure injuries;
- improving staff confidence in high-risk, low-volume procedures, that is, peritoneal dialysis; and
- decreasing surgical site infections.

As nurses, our focus is on improving the well-being and comfort of our patients, including decreasing patient length of stay, decreasing risk of infections, and preventing pressure ulcers. As NPD practitioners, calculating the financial impact of educational interventions by measuring the outcomes can change the perspective of organizational leaders toward education from one of activities to meaningful accomplishments with great benefit to the organization.

HIGHLIGHTS FROM ARTICLES NOT INCLUDED IN SYNTHESIS

Through review of the literature, five additional articles revealed benefits to the effort to demonstrate the economic value of NPD activities but did not have all the information needed for inclusion in the synthesis. Spetz, Brown, Aydin, and Donaldson (2013) studied implementing nursing approaches to prevent hospital-acquired pressure ulcers. The authors' conclusion was that surveillance and prevention of hospital-acquired pressure ulcers can be cost-saving and should be considered a strategy by nurse executives as demonstrated by a net savings of $127.51 per patient. This study did not provide information on costs for personnel training, except in the fixed costs, so it was excluded from synthesis.

Curado and Teixeira (2014) used the Kirkpatrick levels model to evaluate training programs in a small logistics company. The authors estimated the fifth level of the model—ROI by reviewing (a) performance reports, (b) attained objectives, (c) service and productivity levels, (d) quality audits, and (e) accounting data. The training programs addressing work quality and conditions had above average returns, and the program on corporate social responsibility produced below average results. Barriers to successful ROI estimation were reported as lack of qualification to calculate personnel time and financial resources consumed. Curado and Teixeira discussed the long-term challenge of human resource managers to pragmatically obtain accurate data to calculate learning benefits as stymied until Phillips and Phillips (2009) and Noe (2010) added ROI to the fifth level of Kirkpatrick's model.

Herzer, Niessen, Constenla, Ward, and Pronovost (2014) listed the cost of education as $3,579 of total program ($192,292) on central line-associated bloodstream infections prevention. The total initiative was a multifaceted quality improvement program in ICUs reporting employee education as only a small part of efforts. The basis of the initiative was to examine the cost-effectiveness of the Keystone ICU project (Waters et al., 2011) using hospital data and nationally representative data sources. We excluded this study because the NPD economic impact was difficult to sort out from the impact of the other interventions. The estimate of costs for education of clinicians was very low, creating questions about how it was calculated.

Quinn et al. (2014) reported a cost avoidance of $1.6 million from nonventilator hospital-acquired pneumonia as a result of implementing oral nursing care. However, the cost and methods of educating the nurses was not described in the article; therefore, it was not included in the synthesis.

Finally, Simmons et al. (2017) studied training nonnursing staff to provide caloric supplementation for nutritionally at-risk nursing home residents. These authors concluded that it is cost-effective to train nonnurses to provide caloric supplementation, and the practice had a positive effect on the residents' intake. This was excluded from our synthesis because the method of calculating the costs of training was unclear and the participants were largely nonprofessionals, adding questions regarding correlation to NPD.

KNOWN COSTS OF OUTCOMES TABLE

The original Known Costs of Outcomes Table published in 2016 (Opperman et al., 2016b) made it easier for NPD practitioners to identify the financial value of improved outcomes and calculate economic impact. In particular,

TABLE 2 Updated Known Costs of Outcomes Table 2018

Conditions	Recent Cost Estimate	References
Absenteeism	Productivity losses due to absenteeism: $1,685 per employee annually	Stinson (2015)
Adverse drug events	Estimated extra cost per case in 2015: $5,746	AHRQ (2017)
Asthma		
Asthma/COPD treatment	$539 annual mean cost of outpatient visits $16,600 annual mean cost of inpatient visits $1,164 annual mean cost of ED visits $690 annual mean medication cost	AHRQ (2018)
Children	Average per child expenditure for treatment of asthma: $690	AHRQ (2015)
Chronic disease management—complications and hospitalizations	Cost savings from fewer ED visits/hospitalizations resulted in ROI of 1.33; add benefits due to reduced missed school days and missed work days, the societal ROI increased to 1.85	Bhaumik et al. (2013)
Self-management education and home-based interventions	Review of 26 intensive outpatient asthma self-management education and home visit programs 20 had greater than $1 ROI per $1 invested; 3 had less than $1 ROI per $1 invested; 3 were variable	Hsu, Wilhem, Lewis, & Herman, (2016)
Autism spectrum disorder	$17,081 per year	Lavelle et al. (2014)
Breast milk	Biological mother ranged $0.51 to $7.93; donor human milk cost was $14.84; commercial formula was $3.18	Jegier et al. (2013)
	A year's supply of human milk costs $20,000–$35,000; a year's supply of powdered milk costs $1,500–$2,000	Dale (2013)
Cancer		
Canadian	CAN$2,776 for 3 months	Tsimicalis et al. (2013)
Family support network for child with cancer	Family assistance: Admission bag: $100 Gas & food cards: provided Adopt a family: toys, supplies, essential household items Beds: provided Wigs: provided Ronald McDonald House: efficiency/apt Scholarships to survivors/immediate family members	Children's Cancer Network (2018)
Cancer treatment	Partners with pediatric oncology teams $3,247 annual mean cost of outpatient visits $21,329 annual mean cost of in-patient visits $2,204 annual mean medication cost	AHRQ (2018)
Cataract surgery	$8.786 (IP)	CDC VFC Publications: Supplement (2014)
Catheter-associated urinary tract infections	Estimated cost per case in 2015: $13,793	AHRQ (2017)
Clostridium difficile infection	Estimated cost per care in 2015: $17,260	AHRQ (2017)
Central line-associated bloodstream infections	Estimated cost per case in 2015: $48,108	AHRQ (2017)

(continues)

TABLE 2 Updated Known Costs of Outcomes Table 2018, Continued

Conditions	Recent Cost Estimate	References
Employee		
Injury	Multiple physical injuries per incidence: Direct cost $73,749 Indirect cost $81,123 Total cost $154,872	OSHA Safety Pays Program Estimator (2017)
Musculoskeletal injuries	Strain: Direct $33,140 Indirect $36,454 Total $69,594 Sprain: Direct $29,989 Indirect $32,987 Total $62,976	OSHA Safety Pays Program Estimator (2017)
Needle stick	Needle stick and sharps injury management among healthcare personnel Median of the means for aggregate (direct + indirect) costs Int$747 (range Int$199–Int$1,691)	Mannocci et al. (2016)
Falls	Estimated extra cost per case in 2015 dollars: $6,694	AHRQ (2017)
	Cost in 2015: Noninjurious patient falls: $1,139–$2,033 Injurious patient falls: $7,136–$15,444 Serious patient injury cost: $17,567–$30,931	Spetz, Brown, & Aydin (2015)
	Mean cost of hospitalization related to a fall is $17,483 per event	Trepanier & Hilsenbeck (2014)
Hospital-acquired pressure ulcer (HAPU)	Estimated extra cost per case in 2015: $14,506	AHRQ (2017)
Stage IV pressure ulcers	Avg. hospital treatment cost for Stage IV pressure ulcers and complications was $129,248 for HAPU for one admission and $124,327 for community-acquired ulcers over an average of 4 admissions.	Brem et al. (2010)
Stage IV pressure ulcers	Estimated cost per case for Stage IV pressure ulcers: $18,731.47–$21,410	Spetz et al. (2013)
Heart disease	$1,377 annual mean cost of outpatient visits $19,378 annual mean cost of inpatient visits $571 annual mean medication cost $1,807 annual mean ED visits cost	AHRQ (2018)
Heart surgery	Heart bypass surgery: $70,000–$200,000 or more Heart valve replacement: $80,000–$200,000 or more According to the United Network for Organ Sharing, the total cost of a heart transplant can reach almost $800,000 or more	DeLong (2017)
Acute myocardial infarction	$23,000 average hospital cost for discharges/case in 2014	AHRQ (2016), p. 8
Hospital stay Average cost per day	Average cost per inpatient day varies across 50 states	Rappleye (2015)
Medication errors	Annual cost of 400,000 ADEs = $3.5 billion annually	Patient Safety (2016)

(continues)

TABLE 2 Updated Known Costs of Outcomes Table 2018, Continued

Conditions	Recent Cost Estimate	References
Mental health Hospitalizations for pediatric mental health disorder	Total resource utilization charges/mean charges/visits (pediatrics): Depression: 1.33 billion/$13,200 Bipolar: 702 million/$17,058 Psychosis: 540 million/$19,676 Externalizing disorder: 264 million/$18,784 Anxiety disorder: 149 million/$19,118 ADHD: 133 million/$19,118 Eating disorder: 108 million/$46,130 Substance abuse: 102 million/$12,098 Reaction disorder: 100 million/$8,444	Bardach et al. (2014)
Hospital-based in-patient psychiatric services	Average expenditure per child for treatment of mental disorders: $2,195	AHRQ (2015)
Treatment of mental disorders (adult)	$1,143 annual mean cost of outpatient visits $12,126 annual mean cost of in patient visits $966 annual mean medication cost $1,020 annual mean ED visits cost	AHRQ (2018)
Suicide risk Follow-up calls for suicidal ideation or self-harm	Estimated ROI was $1.76 for commercial insurance and $2.43 for Medicaid for patients discharged from a hospital Estimated ROI was $1.70 for commercial insurance and $2.05 for Medicaid for patients discharged from an emergency department; study support business case for payers to invest in postdischarge follow-up calls	Richardson, Mark, & McKeon (2014)
Methicillin-resistant staph aureus	Estimate cost per patient up to $60,000	Sannazzaro (2015)
Narcan use	Narcan kit of 1–2 doses costs $130–$140	Park (2017)
Nosocomial infections Single-bed ICU rooms	5 year analysis (costs, infection risk, length of stay, and cost savings from reduction of nosocomial infections) in single-bed rooms—substantially outweighed additional construction and operational expenses: ROI 56.18%	Sadatsafavi, Niknejad, Zadeh, & Sadatsafavi (2016)
OB adverse events	Estimated extra cost per case in 2015: $602	AHRQ (2017)
Opioid treatment	Methadone treatment annual cost: $6,552 Buprenorphine treatment annual cost: $5,980 Naltrexone treatment annual cost: $14,112	National Institute on Drug Abuse NIH (2015)
Orientation New RN	$49,000–$92,000 (includes replacement costs)	Trepanier, Early, Ulrich, & Cherry (2012)
Surgical site infections	Estimated extra cost per case in 2015: $28,219	AHRQ (2017)
Stroke	$16,000 average hospital cost for discharges per case in 2014	AHRQ (2016), p. 18
Subcutaneous drug delivery	Administration: Subcutaneous: $30.19 Intravenous: $113.13	Dychter, Gold, & Haller (2012)

(continues)

TABLE 2 Updated Known Costs of Outcomes Table 2018, Continued

Conditions	Recent Cost Estimate	References
Substance abuse	Imprisonment cost annually per person: $24,000, the average cost for methadone treatment	National Institute on Drug Abuse NIH (2018)
Tobacco use	Per capita annual health care spending for 45–64 years age group: $7,650 for recent quitters $5,540 for current smokers $5,040 for never smokers	Surgeon General (2014), Table 11.10S, p. S-453
Trauma Treatment of related disorders	$1,378 annual mean cost of outpatient visits $20,786 annual mean cost of in patient visits $144 annual mean medication cost $1,209 annual mean ED visits cost	AHRQ (2018)
Turnover RN	RN replacement cost: $22,000–$64,000 with avg. per RN leaving $36,567 Average cost of turnover for a bedside RN ranges from $38,900 to $59,700; each percent change in RN turnover will cost/save the average hospital an additional $410,500	Robert Wood Johnson Foundation (2009) Nursing Solutions Inc. 2017 National Health Care Retention & RN Staffing Report.
Vaccine-preventable disease	Cost per hospitalization and per outpatient visit Diphtheria: $16,982 (IP), $100 (OP visit) Tetanus: $102,584 (IP), $100 (OP visit) Pertussis: $10,765–$22,410 (IP), $100–$173 (OP visit) H-Flu/meningitis: $4,111–$38,270 (IP), $100–$353 (OP) H-Flu acute: $18,195–$49,236 (IP), $310–$570 (OP) Poliomyelitis: $7,781–$50,554 (IP), $100 (OP visit) Measles: $4,032–$46,000 (IP), $88–$526 (OP visit) Mumps: $11,196–$46,060 (IP), $110–$556 (OP visit) Rubella: $4,886–46,060 (IP), $89–$651 (OP visit) Congenital rubella syn: $62,233 (IP), $110 (OP) Hepatitis B: $15,662–$27,051 (IP), $214–$599 (OP) Varicella: $4,136–$22,113 (IP), $83–$254 (OP visit) Pneumococcal: $3,798–$25,848 (IP), $86–$272 (OP) Rotavirus: $3,195–$4,793 (IP), $135–$455 (OP visit)	CDC VFC Publications: Supplement (2014)

(continues)

TABLE 2 Updated Known Costs of Outcomes Table 2018, Continued

Conditions	Recent Cost Estimate	References
Ventilator-associated pneumonia (VAP)	Estimated extra cost per case in 2015: $47,238	AHRQ (2017)
Hospital-acquired pneumonia (HAP)	VAP represents 1/4 of all ICU-acquired pneumonia infections. Meta-analysis: 13 studies. HAP/VAP added 8.37 days to the ICU LOS (*N* = 11). The pooled hospital costs attributable to HAP for all international settings were $28,008. In 2 U.S./Canadian studies, the excess costs were higher ($65,589)	Kalsekar, Amsden, Kothari, Shorr, & Zilberber (2010)
	Median treatment costs per outpatient episode: $346 (range $195–$551). Median costs per inpatient episode: $4,851 (range $3,313–$7,669)	Konomura, Nagai, & Akazawa (2017)
	High risk: $2,464–$5,885 with invasive ventilation; $2,386–$5,739 with noninvasive ventilation; $40–$248 postdischarge cost Moderate risk: $852–$2,678; $34–$207 postdischarge cost	Tumanan-Mendoza, Mendoza, Punzalan, Reganit, & Bacolcol (2015)
Violence-workplace		
Violence intervention (hospital-based)	Savings of $4,100 for 100 individuals Average hospital costs postrecidivism (base case): $6,513 (range $1,996–$100,000) Cost of VIP: $2,810	Juillard & Smith (2015)
Hospital-centered violence intervention	Average hospital costs postrecidivism with standard referrals: $18,722	Chong et al. (2015)
Vancomycin-resistant enterococci	Mean cost per patient: CAN$13,949–$21,464	Valiquette, Chakra, & Laupland (2014)
Venous thromboembolism post op	Estimated extra cost per case in 2015: $17,367	AHRQ (2017), ''Exhibit 7. Summary of meta-analysis additional cost estimates''
Postop venous thromboembolism	Estimated extra hospitalization cost: $8000	AHRQ (2014)
Wellness screening Flu vaccine, metabolic syndrome	Per Wellness Council of America: $100–$150/employee/year to promote wellness Add another $300 per employee annually if incentives and health coaching are included	Hall (2011)

Note. ADE = Adverse Drug Event; ADHD = Attention-Deficit/Hyperactivity Disorder; AHRQ = Agency for Healthcare Research & Quality; COPD = Chronic obstructive pulmonary disease ; ED = Emergency Department; Int$ = International US dollars; IP = Inpatient; NIH = National Institutes for Health; OP= Outpatient; ROI = return on investment.

benefit–cost ratios and ROI percentages require a monetary balancing measure to the expenses of the interventions. A search was conducted for published costs associated with a wide variety of conditions. This update of the Known Costs of Outcomes Table (see Table 2) includes (a) most recent costs reported since 2010, (b) a revised format organizing the conditions with similar topics, (c) an increased number of conditions, and (d) an alphabetized order for ease of locating the correct table.

IMPLICATIONS FOR NPD

A consistent method was not found in the literature to describe the financial and clinical impact of professional development activities. The original articles demonstrate how to calculate cost analysis, benefit–cost ratio, cost-effectiveness analysis, and ROI with educational interventions. Within this article, updated literature shows greater reporting in publications, but disseminating more economic impact of educational interventions will contribute to the body of evidence regarding the value of professional development activities. NPD practitioners routinely measure the impact of education interventions but seldom addressed the financial impact. More consistent measuring and reporting of the financial and clinical impact of NPD activities is warranted.

References

Agency for Healthcare Research & Quality. (2014). *Saving lives and saving money: Hospital-acquired conditions update. Interim data from national efforts to make care safer 2010–2014* (p. 13, Exhibit A3).

Retrieved from https://archive.ahrq.gov/professionals/quality-patient-safety/quality-resources/tools/p4p/interimhacrate2014.pdf

Agency for Healthcare Research & Quality. (2015, April). *Medical Expenditure Panel Survey. Statistical Brief #472*. Retrieved from https://meps.ahrq.gov/data_files/publications/st472/stat472.pdf

Agency for Healthcare Research & Quality. (2016). H-CUP projections. Acute myocardial infarction (AMI) and acute stroke 2005 to 2016. Report #2016-01. Retrieved from https://hcup-us.ahrq.gov/reports/projections/2016-01.pdf

Agency for Healthcare Research & Quality. (2017, November). *Final report: Estimating the additional hospital inpatient cost and mortality associated with selected hospital-acquired conditions* (AHRQ Publication No. 18-0011-EF). Retrieved from www.ahrq.gov/professionals/quality-patient-safety/pfp/haccost2017.html

Agency for Healthcare Research & Quality. (2018). *Medical Expenditure Panel Survey. Table 3a: Mean expenses per person for selected conditions by type of service: United States, 2014*. Retrieved from https://meps.ahrq.gov/data_stats/tables_compendia_hh_interactive.jsp?_SERVICE=MEPSSocket0&_PROGRAM=MEPSPGM.TC.SAS&File=HCFY2014&Table=HCFY2014_CNDXP_CA&_Debug=

Bardach, N. S., Coker, T. R., Zima, B. T., Murphy, J. M., Knapp, P., Richardson, L. P., … Mangione-Smith, G. (2014). Common and costly hospitalizations for pediatric mental health disorders. *Pediatrics*, *133*(4), 602–609.

Bhaumik, U., Norris, K., Charron, G., Walker, S. P., Sommer, S. J., Chan, E., … Woods, E. R., (2013). A cost analysis for a community-based case management intervention program for pediatric asthma. *Journal of Asthma*, *50*(3), 310–317.

Brem, H., Maggi, J., Nierman, D., Rolnitzky, L., Bell, D., Rennert, R., … Golinko, M., (2010). High cost of stage IV pressure ulcers. *American Journal of Surgery*, *200*(4), 473–477.

CDC VFC Publications: Supplement. (2014, April 23). *Table 2. Probabilities and costs of hospitalizations, and outpatient visits for selected vaccine preventable diseases*. Retrieved from https://www.cdc.gov/vaccines/programs/vfc/pubs/methods/index.html

Children's Cancer Network. (2018). Retrieved from https://www.childrenscancernetwork.org/programs-and-services/family-assistance/

Chong, V. E., Smith, R., Garcia, A., Lee, W. S., Ashley, L., Marks, A., … Victorino, G. P. (2015). Hospital-centered violence intervention programs: A cost-effectiveness analysis. *The American Journal of Surgery*, *209*(4), 597–603.

Curado, C., & Teixeira, S. (2014). Training evaluation levels and ROI: The case of a small logistics company. *European Journal of Training and Development*, *38*(9), 845–870. doi:10.1108/EJTD-05-2014-0037.

Dale, E. (2013). Rising price of breast milk: Costs of breastfeeding. *HuffPost Blog*, Retrieved from https://www.huffingtonpost.com/elisabeth-dale/rising-price-of-breast-mi_b_3416768.html

DeLong, R. (2017). U.S. tops world for coronary artery bypass surgery cost at $75,345. Retrieved from https://blog.transonic.com/blog/u.s.-coronary-artery-bypass-surgery-cost

Dychter, S. S., Gold, D. A., & Haller, M. F. (2012). Subcutaneous drug delivery. *The Art and Science of Infusion Nursing*, *35*(3), 154–160.

Frampton, G. K., Harris, P., Cooper, K., Cooper, T., Cleland, J., Jones, J., … Cuthbertson, B. H. (2014). Educational interventions for preventing vascular catheter bloodstream infections in critical care: Evidence map, systematic review and economic evaluation. *Health Technology Assessment*, *18*(15), 1–365.

Garrison, E., & Beverage, J. (2018). Implementing a process to measure return on investment for nursing professional development. *Journal for Nursing Professional Development*, *34*(1), 8–11.

Hall, D. (2011). *How much does a good wellness program cost? Wellsource Inc.*. Retrieved from https://www.wellsource.com/wpcontent/uploads/2015/08/How_Much_Should_a_Wellness_Program:Cost.pdf

Herzer, K. R., Niessen, L., Constenla, D. O., Ward, W. J.Jr., & Pronovost, P. J. (2014). Cost-effectiveness of a quality improvement programme to reduce central line-associated bloodstream infections in intensive care units in the USA. *BMJ Open*, *4*(9), e006065. doi:10.1136/bmjopen-2014-006065.

Hsu, J., Wilhelm, N., Lewis, L., & Herman, E. (2016). Economic evidence for US asthma self-management education and home-based interventions. *Journal of Allergy and Clinical Immunology in Practice*, *4*(6), 1123–1134.e27. doi:10.1016/j.jaip.2016.05.012.

Jegier, B. J., Johnson, T. J., Engstrom, J. L., Patel, A. L., Loera, F., & Meier, P. (2013). The institutional cost of acquiring 100 mL of human milk for very low birth weight infants in the neonatal intensive care unit. *Journal of Human Lactation*, *29*(3), 390–399.

Juillard, C., & Smith, R. (2015). Saving lives and saving money: Hospital-based violence intervention is cost-effective. *Journal Trauma Acute Care Surgery*, *78*(2), 252–257; discussion 257–258.

Kalsekar, I., Amsden, J., Kothari, S., Shorr, A., & Zilberber, M. (2010). Economic and utilization burden of hospital-acquired pneumonia (HAP): A systematic review and meta-analysis. *Chest*, *138*(4. meeting abstracts, 739A).

Konomura, K., Nagai, H., & Akazawa, M. (2017). Economic burden of community-acquired pneumonia among elderly patients: A Japanese perspective. *Pneumonia*, *9*, 19. Retrieved from https://pneumonia.biomedcentral.com/articles/10.1186/s41479-017-0042-1.

Kram, S. L., DiBartolo, M. C., Hinderer, K., & Jones, R. A. (2015). Implementation of the ABCDE bundle to improve patient outcomes in the intensive care unit in a rural community hospital. *Dimensions of Critical Care Nursing*, *34*(5), 250–258.

Lavelle, T. A., Weinstein, M. C., Newhouse, J. P., Munir, K., Kuhlthau, K. A., & Prosser, L. A. (2014). Economic burden of childhood autism spectrum disorders. *Pediatrics*, *133*(3), e520–e529.

Mannocci, A., De Carli, G., Di Bari, V., Saulle, R., Unim, B., Nicolotti, N., … La Torre, G. (2016). How much do needlestick injuries cost? A systematic review of the economic evaluations of needlestick and sharps injuries among healthcare personnel. *Infection Control Hospital Epidemiology*, *37*(6), 635–646.

Melnyk, B., & Fineout-Overholt, E. (2015). *Evidence-based practice in nursing & healthcare: A guide to best practice* (3rd ed.). Philadelphia, PA: Lippincott Williams & Wilkins.

National Institute on Drug Abuse National Institutes for Health. (2018). *Is drug addiction treatment worth its cost?* Retrieved from https://www.drugabuse.gov/publications/principles-drug-addiction-treatment-research-based-guide-third-edition/frequently-asked-questions/drug-addiction-treatment-worth-its-cost

National Institute on Drug Abuse National Institutes for Health. (2015). *How much does opioid treatment cost?* Retrieved from https://www.drugabuse.gov/publications/research-reports/medications-to-treat-opioid-addiction/how-much-does-opioid-treatment-cost

Noe, R. (2010). *Employee training and development* (5th ed.). Singapore: McGraw-Hill International.

Nursing Solutions Inc. (2017). *National health care retention & RN staffing report*. Retrieved from http://www.nsinursingsolutions.com/Files/assets/library/retention-institute/NationalHealthcareRNRetentionReport2017.pdf

Opperman, C., Liebig, D., Bowling, J., Johnson, C. S., & Harper, M. (2016a). Measuring return on investment for professional development activities: A review of the evidence. *Journal for Nursing Professional Development*, *32*(3), 122–129.

Opperman, C., Liebig, D., Bowling, J., Johnson, C. S., & Harper, M. (2016b). Measuring return on investment for professional development activities: Implications for practice. *Journal for Nursing Professional Development*, *32*(4), 176–184.

OSHA Safety Pays Program Estimator. (2017). Retrieved from https://www.osha.gov/dcsp/smallbusiness/safetypays/estimator.html

Park, A. (2017, October 26). *Time Health*. Retrieved from http://time.com/4999223/what-is-narcan/

Patient Safety. (2016). Final report national quality forum (3-15-2017). Retrieved from http://www.qualityforum.org/Publications/2017/03/Patient_Safety_Final_Report.aspx

Phillips, J., & Phillips, P. (2009). Using ROI to demonstrate performance value in the public Sector. *Performance Improvement*, *48*(4), 22–28.

Quinn, B., Baker, D. L., Cohen, S., Stewart, J. L., Lima, C. A., & Parise, C. (2014). Basic nursing care to prevent nonventilator hospital-acquired pneumonia. *Journal of Nursing Scholarship*, *46*(1), 11–19.

Rappleye, E. (2015). *Average cost per inpatient day across 50 states*. Retrieved from https://www.beckershospitalreview.com/finance/average-cost-per-inpatient-day-across-50-states.htmlMarch 2018.

Richardson, J. S., Mark, T. L., & McKeon, R. (2014). The return on investment of postdischarge follow-up calls for suicidal ideation or deliberate self-harm. *Psychiatric Services*, *65*(8), 1012–1019.

Robert Wood Johnson Foundation. (2009). Retrieved from https://www.rwjf.org/en/library/research/2009/07/business-case-cost-of-nurse-turnover.html

Sadatsafavi, H., Niknejad, B., Zadeh, R., & Sadatsafavi, M. (2016). Do cost savings from reductions of nosocomial infections justify additional costs of single-bed room in intensive care units? A simulation case-study. *Journal of Critical Care*, *31*(1), 193–199.

Sannazzaro, A.(2015, December 29). MRSA: The superbug poised to cost hospitals super sums. *Infection Control Today*. Retrieved from http://www.infectioncontroltoday.com/news/2015/12/mrsa-the-superbug-poised-to-cost-hospitals-super-sums.aspx

Simmons, S. F., Hollingsworth, E. K., Long, E. A., Liu, X., Shotwell, M. S., Keeler, E., … Silver, H. J. (2017). Training nonnursing staff to assist with nutritional care delivery in nursing homes: A cost-effectiveness analysis. *Journal of the American Geriatrics Society*, *65*(2), 313–322.

Spetz, J., Brown, D. S., & Aydin, C. (2015). The economics of preventing hospital falls: Demonstrating ROI through a simple model. *The Journal of Nursing Administration*, *45*(1), 50–57.

Spetz, J., Brown, D. S., Aydin, C., & Donaldson, N. (2013). The value of reducing hospital-acquired pressure ulcer prevalence: An illustrative analysis. *Journal of Nursing Administration*, *43*(4), 235–241.

Stinson, C. (2015, January 28). *Worker illness and injury costs U.S. employers $225.8 billion annually. Centers for Disease Control and Prevention (CDC) Foundation*. Retrieved from https://www.cdcfoundation.org/pr/2015/worker-illness-and-injury-costs-us-employers-225-billion-annually

Surgeon General. (2014). *The health consequences of smoking—50 years of progress. A report of the surgeon general 2014*. https://www.surgeongeneral.gov/library/reports/50-years-of-progress/full-report.pdf

Trepanier, S., Early, S., Ulrich, B., & Cherry, B. (2012). New graduate nurse residency program: A cost–benefit analysis based on turnover and contract labor usage. *Nursing Economic$*, *30*(4), 207–214.

Trepanier, S., & Hilsenbeck, J. (2014). A hospital system approach at decreasing falls with injuries and cost. *Nursing Economic$*, *32*(3), 135–141.

Tsimicalis, A., Stevens, B., Ungar, W. J., Greenberg, M., McKeever, P., Agha, M., … Moineddin, R., (2013). Determining the costs of families' support networks following a child's cancer diagnosis. *Cancer Nursing*, *36*(2), E8–E19.

Tumanan-Mendoza, B. A., Mendoza, V. L., Punzalan, F. E. R., Reganit, P. F. M., & Bacolcol, S. A. A. (2015). Economic burden of community-acquired pneumonia among adults: Equity & policy implications in the case rate payments of the Philippine Health Insurance Corp. *Value in Health Regional Issues*, *6*, 118–125. https://www.ispor.org/economic-evaluation_pneumonia_adults_Philippines.pdf

Valiquette, L., Chakra, C. N., & Laupland, K. B. (2014). Financial impact of health care-associated infections: When money talks. *Canadian Journal of Infectious Diseases and Medical*, *25*(2), 71–74.

Waters, H. R., Korn, R. Jr, Colantuoni, E., Berenholtz, S. M., Goeschel, C. A., Needham, D. M., … Pronovost, P. J., (2011). The business case for quality: Economic analysis of the Michigan keystone patient safety program in ICUs. *American Journal of Medical Quality*, *26*(5), 333–339.

Young, D. L., Borris-Hale, C., Falconio-West, M., & Chakravarthy, D. (2015). A single long-term acute care hospital experience with a pressure ulcer prevention program. *Rehabilitation Nursing*, *40*(4), 224–234.

For 2 additional continuing education articles related to the topic of ROI, go to NursingCenter.com\CE.