

## Original Article

# Registered Nurses' Evidence-Based Practice Revisited: A Longitudinal Study in Mid-Career

Ann Rudman, RN, PhD  • Anne-Marie Boström, RN, PhD • Lars Wallin, RN, PhD • Petter Gustavsson, PhD, BSc Psychol • Anna Ehrenberg, RN, PhD

### Key words

evidence-based practice, nursing practice, quantitative methodology, repeated measures, research utilization, survey

### ABSTRACT

**Background:** To improve patient outcomes and patient safety and to reduce costs in health care, the implementation of evidence-based practice (EBP) is crucial.

**Aims:** To examine the use of the EBP process in Swedish health care. Specifically, to examine whether professional career development (years of experience, years in current position, specialist education, care setting) is associated with RNs' practice of EBP activities and changes in the extent of practicing the EBP process between early and mid-career.

**Methods:** In this observational longitudinal study, the extent of EBP activities was investigated in three national cohorts of 2,474 RNs. Nurses rated their own EBP levels 11–15 and three years after graduation. Six items measured the respondents' extent of practicing the EBP process. Comparisons of EBP levels between subgroups were tested using unpaired t-tests or one-way ANOVAs.

**Results:** On average, RNs used the EBP process occasionally every half year. RNs with specialist education reported a higher extent of EBP activities as did RNs who worked in outpatient and home care settings. There was a significant increase in the extent of EBP activities 11 to 13 years after graduation compared to three years after graduation.

**Linking Evidence to Action:** The findings raise some central questions for practice: How well equipped are RNs to practice the EBP process? What is needed to facilitate EBP in clinical settings? Building on the findings of this study, managers in clinical practice need to develop supportive organizational structures that facilitate EBP. This study suggests that mid-career RNs increased the extent of practicing the EBP process over time compared to previous reported practice in their first years as RNs. However, the level of EBP activities was low to moderate, and this modest increase took 11 to 13 years to achieve. To enhance the practice of EBP in nursing care, educational and organizational factors need to be considered.

### INTRODUCTION

To improve patient outcomes and patient safety and reduce costs in health care, the implementation of evidence-based practice (EBP) is crucial (Institute of Medicine, 2007). Although this fact is well known, EBP is still not sufficiently integrated in many healthcare organizations around the world. Previously, we have examined the extent of Swedish registered nurses' (RNs) practice of the EBP process during the first five years of their professional life. Specifically, we monitored changes over time regarding the EBP components formulating questions, searching databases, searching other sources, appraising research reports, implementing evidence, and evaluating practice (Rudman, Gustavsson, Ehrenberg, Boström, & Wallin, 2012). With newly collected data in

the two previously used cohorts and one additional one, we will here report on the extent of RNs practice of the EBP process in mid-career, 11–15 years post-graduation.

In the previous study, we identified a relatively low extent of practicing the EBP process. On an aggregated level, summarizing the six components of the EBP process used in our measure, yearly mean values remained at just above 2 on a 4-point frequency response scale (Rudman et al., 2012). This relatively low extent of EBP appears to be a general finding. In an integrated review on nurses' readiness for EBP, it was concluded that despite positive beliefs and attitudes toward EBP, skills and knowledge were insufficient for the employment of EBP, and best evidence was not used in practice (Saunders & Vehvilainen-Julkunen, 2016). In a recent overview of systematic reviews (Saunders,

© 2020 The Authors. *Worldviews on Evidence-based Nursing* published by Wiley Periodicals LLC on behalf of Sigma Theta Tau International

This is an open access article under the terms of the Creative Commons Attribution-NonCommercial-NoDerivs License, which permits use and distribution in any medium, provided the original work is properly cited, the use is non-commercial and no modifications or adaptations are made.

Gallagher-Ford, Kvist, & Vehvilainen-Julkunen, 2019) focusing on healthcare professionals' self-reported practice of EBP competencies, this finding was further underlined by the authors stating that "knowledge, skills, attitudes, and beliefs were at a moderate to high level, but they did not translate into EBP implementation" (p. 1; Saunders et al., 2019).

Several factors have been hypothesized to impact on RNs' ability to work according to the EBP process, including their educational background, clinical experience, and the clinical setting. RNs with a graduate degree seem to report more use of EBP (Saunders & Vehvilainen-Julkunen, 2016). RNs with a master's level education used more cognitive skills to analyze and synthesize information and employ EBP than those with a lower education level in some European settings (Watkins, 2011). This was further confirmed in a systematic review where most studies reported that competencies acquired during a master's program were applied in the workplace (Zwanikken, Dieleman, Samaranayake, Akwataghibe, & Scherpbier, 2013). There are some indications that longer clinical experience is linked to the practice of the EBP process among RNs. A study from hospital settings in the UK showed that junior RNs were disempowered when it came to practicing EBP and that RNs with more experience were more active in applying the principles of EBP (Gerrish, Ashworth, Lacey, & Bailey, 2008). Similarly, a Chinese cross-sectional study showed that RNs who had more work experience, administrative positions, research experience, a lighter workload, and more favorable attitudes to EBP reported higher rates of practicing EBP (Zhou, Hao, Guo, & Liu, 2016). The influence of the clinical setting on RNs' use of the EBP process has not been studied in depth. In previously published papers, we have reported that RNs working with the care of older people in the municipalities and in psychiatric care had higher rates of EBP activities than their colleagues working in hospitals and primary care settings (Boström, Ehrenberg, Gustavsson, & Wallin, 2009), particularly when searching sources of knowledge other than data bases, compiling information, implementing evidence, and evaluating practice (Boström, Rudman, Ehrenberg, Gustavsson, & Wallin, 2013).

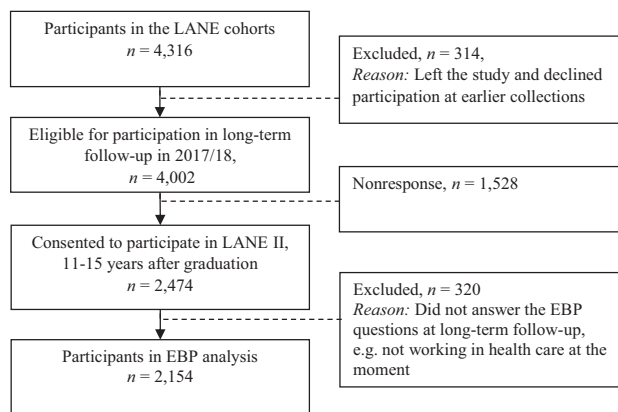
In 2014, the Swedish Agency for Health Technology Assessment and Assessment of Social Services found a lack of longitudinal research with longer follow-ups and called for specific knowledge about the health, career and societal effects of long-term exposure to stressors in the work environment (Aronsson et al., 2017; SBU, 2014). As high-quality longitudinal data were available in the LANE study (Rudman, Omne-Ponten, Wallin, & Gustavsson, 2010), a new data collection was planned and performed in 2017. As there is a lack of studies with this type of data and long-term perspective on nurses use of evidence-based practice, the EBP measure (Rudman et al., 2012; Wallin,

Boström, & Gustavsson, 2012) was enclosed in the survey. In the previous study where we prospectively investigated RNs' self-reported practice of the EBP process, we found a remarkably stable extent of EBP during the first five years of working as an RN. Individual differences existed that also remained stable over time (Rudman et al., 2012). We know from the literature that the application of the EBP process is generally low and knowledge is limited regarding development over time and associated factors, such as further education, clinical experience and setting. Thus, the aim of this study was to examine: (1) the extent of practicing the EBP process in Swedish health care in three national cohorts of RNs 11–15 years post-graduation, (2) whether professional career development (years of experience, years in current position, specialist education, care setting) is associated with RNs' practice of the EBP process, and (3) changes in the extent of RNs' practice of the EBP process from early to mid-career.

## METHODS

### Design and Participants

In this observational longitudinal study, the extent of EBP was investigated in three national cohorts of RNs 11–15 years after graduation (in 2017/18.). These cohorts are part of the LANE study (Longitudinal Analysis of Nursing Education/Entry in work life; Rudman et al., 2010). The cohorts were formed based on RNs who had graduated from 26 Swedish nursing programs in the years 2002, 2004, and 2006 (thus named EX2002 [i.e., EXpected graduation in 2002], EX2004 [i.e., EXpected graduation in 2004], and EX2006 [i.e., EXpected graduation in 2006]). A total of 1,155 (68%), 1,702 (73%), and 1,459 (69%) graduates consented to participate. A long-term follow-up was initiated in 2017 based on the 4,002 respondents who were still eligible for participation (Figure 1). The response rate at the long-term follow-up was 62% (2,474). The response rate at follow-up was higher in the oldest cohort (EX2002:  $n = 758$ , 71% EX2004:  $n = 872$ , 57%; EX2006:  $n = 844$ , 60%). The response rate was also higher among older participants (50 years and older, 70%); however, it was somewhat lower among male participants (56%). At long-term follow-up data collection, 90% of the RNs were female, 41% were under the age of 39 years, 35% were aged 40–49 years, and 26% were over 50 years old. Since graduation from their nursing program, almost 57% of participants had undergone specialist education. In total, 68% had more than five years' experience in the nursing profession (with or without specialty education or midwifery), and 53% were employed in their current position for more than five years. The most common employment positions were in outpatient care settings (43%), followed by inpatient care settings (39%) and home care settings (19%). Data were self-reported and collected via mail survey and web survey. Three reminders were sent.



**Figure 1.** Flow chart of recruitment and participation for the LANE II (three cohorts 11–15 years after graduation) data collection in 2017/18.

### Measures

Six items measuring the respondents' extent of practicing the components of EBP, based on the conceptualization of EBP as a process (Sackett, Richardson, Rosenberg, & Haynes, 2000), were used in this study. In brief, the items captured the following components from Sackett et al. (2000): 1. defining a question (one item), 2–3. seeking out relevant information to answer this question (two items), 4. critically appraising and compiling the identified information (one item), 5. changing practice according to current knowledge (one item), and 6. evaluating practice in relation to current knowledge (one item; see Table 1). The items were initiated by the question: "How often do you perform the following tasks in your work?" and the respondents were asked to rate the extent of their EBP activities using a 4-point response format (1 = seldom/never, 2 = occasionally/every half year, 3 = occasionally/every month, 4 = several times every month). A mean value across all items was computed for each individual with resulting scale scores ranging from 1 to 4 (i.e., 1 = low extent of EBP and 4 = high extent of EBP). Cronbach's alpha was estimated on current data to 0.76. The content validity of the items has previously been examined (Boström et al., 2009), and content validity indices ranged between 0.8 and 1.0 across the six items, indicating good content validity. Factor analysis has been used to explore the possibility of an underlying common factor explaining correlations among items, and the results suggested that one factor may underlie item responses to the six items (Rudman et al., 2012). In addition to the EBP items, questions reflecting details about work experience, years in a current position, specialist education, and care setting were also used in the analysis.

### Data Analysis

The extent of applying EBP was estimated on item levels for the total group and for the three cohorts. In the case of

early career data, missing data were handled by imputation by the nearest neighbor in time, based on the finding that the extent of EBP was stable over time (Rudman et al., 2012). Comparisons of EBP levels between subgroups were based on the scale scores and tested with unpaired t-tests or one-way ANOVAs. A paired t-test was used to compare levels 11 and 13 years after graduation with levels three years after graduation. Note that the comparison with three-year data was done with the two cohorts EX2004 and EX2006 (Rudman et al., 2010, 2012) because the EBP measure was not included in the earlier data collections of EX2002. The extent of EBP three years after graduation was not associated with participation at long-term follow-up ( $t = 0.62$ ,  $p = .516$ ). All analyses were performed in IBM SPSS version 24 (2016).

### Ethical Considerations

The study was approved by the Regional Research Ethics Committee at Karolinska Institute, Stockholm, Sweden (Dnr 01-045) and the Regional Ethical Review Board in Stockholm, Sweden (Dnr 04-587 and 2016/793-32). Informed consent was provided by all respondents. All respondents received information about the study underlining the fact that participation was voluntary and could be terminated at any time. Confidentiality was guaranteed.

### RESULTS

The extent of practicing the EBP process is shown in Table 1 for three national cohorts of RNs at 11, 13, and 15 years after graduation. The scale mean, 2.29, corresponds to using the EBP process occasionally every half year. The extent of practicing the EBP components shows a considerable difference across components (Table 1). In the following, the practice is described based on reporting of monthly performance for each component. "Appraising research reports" (item 4) was least frequent, with approximately 12% of the respondents reporting this to be performed each month. "Formulating questions to search evidence-based knowledge" (item 1) was the second least frequent (26.5%), closely followed by "Participating in evaluating whether clinical practice reflects current knowledge" (item 6, 30.4%). Furthermore, "Contributing to change by implementing current knowledge" (item 5) was reported by 38.6% of the respondents to be performed each month and "Using databases to search for knowledge" (item 2) was reported by 52%. The most frequently performed component of the EBP process was "Using other information sources" (item 3), which was performed on a regular monthly basis by more than 87% of the RNs.

Generally, the mean levels of the summarized EBP scale show similar levels over the three cohorts despite differences in work experience (i.e., 11, 13, and 15 years, respectively;  $F = 1.10$ ,  $p = .333$ ).

**Table 1.** Mean Levels and Extent of Evidence-Based Practice (EBP) Activities Summated Scale and Components 11, 13, and 15 Years After Graduation

	EX2002	EX2004	EX2006	All
	Year 15	Year 13	Year 11	Year 11, 13, and 15
Evidence-based practice summated scale	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)
	2.319 (.651)	2.269 (.632)	2.285 (.632)	2.290 (.638)
Evidence-based practice components	n (%)	n (%)	n (%)	n (%)
<b>1. Formulating questions to search research-based knowledge</b>				
Seldom or never	330 (50.4)	370 (49.2)	338 (45.7)	1,038 (48.4)
Once or twice/every 1/2 year	154 (23.5)	192 (25.5)	192 (26.0)	538 (25.1)
Once or twice/month	121 (18.5)	134 (17.8)	145 (19.6)	400 (18.6)
Several times/month	50 (7.6)	56 (7.4)	64 (8.7)	170 (7.9)
Total	655	752	739	2,146
<b>2. Using databases to search for knowledge</b>				
Seldom or never	172 (26.2)	232 (30.6)	213 (28.8)	617 (28.6)
Once or twice/every 1/2 year	118 (18.0)	135 (17.8)	164 (22.2)	417 (19.4)
Once or twice/month	138 (21.0)	178 (23.5)	154 (20.8)	470 (21.8)
Several times/month	228 (34.8)	213 (28.1)	209 (28.2)	650 (30.2)
Total	656	758	740	2,154
<b>3. Using other information sources (e.g., books, journals, or asking colleagues)</b>				
Seldom or never	15 (2.3)	18 (2.4)	21 (2.8)	54 (2.5)
Once or twice/every 1/2 year	65 (9.9)	87 (11.5)	63 (8.5)	215 (10.0)
Once or twice/month	186 (28.3)	222 (29.4)	223 (30.2)	631 (29.3)
Several times/month	392 (59.6)	429 (56.7)	432 (58.5)	1,253 (58.2)
Total	658	756	739	2,153
<b>4. Appraising research reports</b>				
Seldom or never	405 (62.5)	450 (60.2)	463 (63.3)	1,318 (62.0)
Once or twice/every 1/2 year	159 (24.5)	206 (27.5)	178 (24.4)	543 (25.5)
Once or twice/month	64 (9.9)	68 (9.1)	75 (10.3)	207 (9.7)
Several times/month	20 (3.1)	24 (3.2)	15 (2.1)	59 (2.8)
Total	648	748	731	2,127
<b>5. Contributing to change by implementing current knowledge</b>				
Seldom or never	143 (21.8)	169 (22.4)	169 (23.0)	481 (22.4)
Once or twice/every 1/2 year	248 (37.9)	306 (40.5)	282 (38.4)	836 (39.0)
Once or twice/month	179 (27.3)	179 (23.7)	196 (26.7)	554 (25.8)
Several times/month	85 (13.0)	101 (13.4)	88 (12.0)	274 (12.8)
Total	655	755	735	2,145
<b>6. Participating in evaluating whether clinical practice reflects current knowledge</b>				
Seldom or never	210 (32.2)	267 (35.5)	256 (34.7)	733 (34.2)
Once or twice/every 1/2 year	235 (36.0)	262 (34.8)	261 (35.4)	758 (35.4)
Once or twice/month	144 (22.1)	150 (19.9)	152 (20.6)	446 (20.8)
Several times/month	64 (9.8)	74 (9.8)	68 (9.2)	206 (9.6)
Total	653	753	737	2,143

The mean levels of EBP were investigated in relation to years of work experience, years in current position, specialist education (or not), and care setting. Results are presented in Table 2. Results showed that neither years of work experience nor years in current position showed any significant association with mean levels of EBP activities. However, mean levels were associated with specialist education and care setting. RNs with specialist education reported a higher extent of EBP activities, as did RNs who worked in outpatient and home care settings (compared to RNs in inpatient settings).

Finally, the current extent of EBP activities was compared to rates assessed three years after graduation (Table 3). In comparison with previous rates, there was a significant increase 11 to 13 years after graduation (i.e., in the two cohorts EX2004 and EX2006).

## DISCUSSION

This study provides unique results on the longitudinal development of RNs' practice of the EBP process, comprising national cohorts of RNs from graduation to mid-career, 11–15 years after graduation. The study design and the high response rate enable us to draw conclusions on RNs' self-reported practice of EBP activities at mid-career. No comparable studies have been reported from other countries, as most studies employ cross-sectional designs (Saunders & Vehvilainen-Julkunen, 2016). Therefore, the discussion of our results is based on comparisons with data from cross-sectional studies.

The results show that the extent of practicing the various EBP components varied from low to moderate. The extent of practicing the EBP process increased significantly over time. Although the increase was not large,

it may have relevance for improvements in clinical practice, considering the representativeness of our sample to the large population of Swedish RNs. Neither number of years of work experience nor number of years in current position showed any significant association with mean levels of EBP at 11–15 years post-graduation. However, RNs with specialist education and those working in outpatient and home care settings reported a higher extent of EBP activities.

As we have no other longitudinal data to compare our results to, it is challenging to discuss what should be the expected extent of practicing the EBP process over time. Also, the variations in instruments and response scales used to measure EBP (Leung, Trevena, & Waters, 2014) hamper comparisons across studies. However, when compared with the findings of systematic reviews in the field reporting an overall practice of EBP components at the lower end (Saunders et al., 2019; Saunders & Vehvilainen-Julkunen, 2016), our findings are similar. The participants in our study reported contribution to critical appraisal of research reports to be the least commonly employed EBP activity. This is not surprising as it can be the most demanding phase of the EBP process, as it requires substantial skills in research methodology that clinical RNs do not always possess. The low level of formulating questions is a disturbing finding as it is intrinsic to EBP to employ a culture of critical inquiry in order to be able to question common practice and contribute to the development of patient care. The most common EBP activity was reported to be using sources of information other than databases. Previous studies have shown that asking a colleague has been the most common source of knowledge for RNs in clinical practice (Spenceley, O'Leary, Chizawsky, Ross, & Estabrooks, 2008). Our data do not provide details regarding what kind

**Table 2.** Professional Career Developments (Years of Experience, Years in Current position, Specialist Education, Care Setting) Association to Mean Levels of Evidence-Based Practice Activities (EBP Summated Scale) at Follow-up (11, 13, 15 Years After Graduation)

EBP summated scale	M (SD)		t/F*	p
	<5 years	≥5 years		
Years of work experience	2.27 (0.66)	2.30 (0.63)	1.12	.264
Years in current position	2.30 (0.63)	2.28 (0.64)	0.55	.585
Specialist education	RN	Specialist RN	4.01	.001
Care setting	Inpatient	Outpatient	5.56*	.004
	2.24 (0.67)	2.32 (0.61)	2.36 (0.62)	

\*All tests are t-tests except comparison of care settings.

**Table 3.** Development Over Time of Nurses' Practice of EBP Processes in Two Cohorts (i.e., EX2004 and EX2006) 3 and 11–13 Years After Graduation Respectively

EBP summated scale	Year 3		Year 11, 13		t	p
	M	SD	M	SD		
	2.094	0.816	2.275	0.6310	7.811	0.001

of other information sources the participants referred to, but asking colleagues may be assumed to be the firsthand choice.

It may be questioned whether clinical RNs should be expected to work according to the principles of EBP. It is not reasonable that clinical RNs should participate in the production of systematic reviews to establish evidence-based knowledge (i.e., systematic searches of databases, compilation and critical appraisal of the literature). Such endeavors demand high levels of expertise and knowledge in research designs and methods and are typically performed by designated groups of experts at regional or national level or by teams of researchers. However, in accordance with Swedish law (SFS 2010:659), clinical RNs are expected to keep up to date with new knowledge by questioning their everyday practice, searching for new evidence, for example, in clinical practice guidelines, applying best available evidence, and evaluating the effects in their clinical setting.

With increasing knowledge and skills in specialist nursing and research methodology, RNs with a post-graduate education can be expected to practice the EBP process to a higher extent and to take on more responsibility for the implementation of EBP and quality of care in the clinical setting. Our finding of a positive association between RNs with a higher level of education and practice of the EBP process has also been described in studies from other countries (Melnyk, Fineout-Overholt, Gallagher-Ford, & Kaplan, 2012; Melnyk et al., 2018; Wilson et al., 2015). RNs working in outpatient clinics and home care settings reported a significantly higher frequency of applying the EBP process compared to RNs working with inpatient settings (hospital units). This difference may be attributed to RNs' levels of autonomy, accountability, and power in the healthcare organization. RNs in Swedish primary care and municipality settings often work independently with responsibility for outpatient clinics and nursing care. All Swedish municipalities have a chief nurse who is responsible for auditing the quality of care of older people. The Swedish government has invested resources into quality registries of the care of older people to enable audit and follow-up of nursing care, which could be expected to enhance the use of EBP (Edvinsson, Rahm, Trinks, & Høglund, 2015). On the other hand, hospital settings do not seem to support RNs in practicing the EBP process, where RNs are less autonomous and

nursing care has less leadership support, with few RNs on higher management levels (Gunningberg, Brudin, & Idvall, 2010; Johansson, Fogelberg-Dahm, & Wadensten, 2010). Furthermore, in many Swedish hospitals there is a lack of positions dedicated to supporting RNs in their nursing care, for example, mentorship and nursing development programs. Saunders and colleagues (2017) concluded that there is a need for EBP mentors with an advanced nursing degree to promote frontline RNs' uptake of EBP.

#### METHOD DISCUSSION/LIMITATIONS

The current study has some obvious strengths; the data cover a long term follow-up 11–15 years after nursing education in three independent cohorts. Also, the study was based on national samples with relatively good response rates and these samples have been found to be representative of the national population of newly graduated nurses (Rudman et al., 2010). The selection effects in the long-term follow-up sample are small, and based on this, in combination with the fact that the mean extent of EBP early in a career does not predict participation in long-term follow-up, we conclude that the bias of the results is limited. One limitation of the study is that all data were self-reported, and the assessment of EBP may therefore be subject to socially desirable responses. However, the extent of EBP application reported here was low to moderate in the majority of the assessments indicating that RNs seem to acknowledge that they do not apply the EBP process at a high rate thereby suggesting limiting social desirability effects.

#### IMPLICATIONS FOR PRACTICE

The Institute of Medicine has declared that 90% of nurses' decisions should be evidence-based by the year 2020 (Institute of Medicine, 2007). Our findings reveal that there is still a long way to go to achieve this goal. The findings of this study raise some central questions for practice: How well equipped are RNs after their undergraduate education program to apply EBP? What is needed to facilitate EBP in the clinical setting? Building on the findings from this study, managers in clinical practice need to develop supportive organizational structures that facilitate EBP for RNs. In such a system, RNs with specialist education should have a clear role with the responsibility and authority to support junior RNs and the authority to make changes in

practice, for example, by implementing EBP to enhance the quality of patient care.

## CONCLUSIONS

This study suggests that mid-career RNs increase the extent to which they practice the EBP process over time compared to the previously reported rates in the early stage of their careers as RNs. However, the level of practicing is still low to moderate, and this modest increase has taken between 11 and 13 years from graduation to achieve. Having a specialist nursing education and working in outpatient and home care settings were associated with an increased extent of practicing the EBP process. To enhance EBP in nursing care, educational and organizational factors need to be considered. **WVN**



### LINKING EVIDENCE TO ACTION

Actions suggested based on the evidence presented in the paper:

- Our findings reveal that there is still a long way to go to achieve the Institute of Medicine's goal that 90% of nurses' decisions should be evidence-based by the year 2020 which calls for improvement strategies.
- Mid-career RNs increase the extent to which they practice the EBP process over time but the level of EBP activities was low to moderate, and this modest increase took 11 to 13 years to achieve.
- To enhance EBP in nursing care, educational and organizational factors need to be considered.
- RNs need to be better educated and equipped to practice the EBP process.
- Managers in clinical practice need to develop supportive organizational structures that facilitate EBP for RNs.
- RNs with specialist education should have a clear role with the responsibility and authority to support junior RNs and the authority to make changes in practice, for example, by implementing EBP to enhance the quality of patient care.

### Author information

Ann Rudman, Associate Professor, Division of Psychology, Department of Clinical Neuroscience, Karolinska Institutet, Stockholm, Sweden; Anne-Marie Boström, Associate Professor, Division of Nursing, Department of Neurobiology, Care Sciences and Society, Karolinska Institutet, Stockholm, Sweden; Theme Aging, Karolinska University Hospital,

Stockholm, Sweden; R&D Unit, Stockholms Sjukhem, Stockholm, Sweden; Lars Wallin, Professor in Nursing, School of Education, Health and Social Studies, Dalarna University, Falun, Sweden; Petter Gustavsson, Professor of Psychology, Division of Psychology, Department of Clinical Neuroscience, Karolinska Institutet, Stockholm, Sweden; Anna Ehrenberg, Professor in Nursing, School of Education, Health and Social Studies, Dalarna University, Falun, Sweden

The LANE study was supported by grants from AFA Insurance (project nr 150284), which was otherwise not involved.

Address any correspondence to Ann Rudman, Researcher, Division of Psychology, Department of Clinical Neuroscience, Karolinska Institutet, Nobels väg 9, Solna, Stockholm, Sweden, SE-171 65.ann.rudman@ki.se

Accepted 26 February 2020

© 2020 Sigma Theta Tau International

### References

- Aronsson, G., Theorell, T., Grape, T., Hammarstrom, A., Hogstedt, C., Marteinsdottir, I., ... Hall, C. (2017). A systematic review including meta-analysis of work environment and burnout symptoms. *BMC Public Health*, 17(1), 264. <https://doi.org/10.1186/s12889-017-4153-7>
- Boström, A. M., Ehrenberg, A., Gustavsson, J. P., & Wallin, L. (2009). Registered nurses' application of evidence-based practice: A national survey. *Journal of Evaluation in Clinical Practice*, 15(6), 1159–1163. <https://doi.org/10.1111/j.1365-2753.2009.01316.x>
- Boström, A. M., Rudman, A., Ehrenberg, A., Gustavsson, J. P., & Wallin, L. (2013). Factors associated with evidence-based practice among registered nurses in Sweden: A national cross-sectional study. *BMC Health Services Research*, 13, 165. <https://doi.org/10.1186/1472-6963-13-165>
- Edvinsson, J., Rahm, M., Trinks, A., & Høglund, P. J. (2015). Senior alert: a quality registry to support a standardized, structured, and systematic preventive care process for older adults. *Quality Management in Health Care*, 24(2), 96–101. <https://doi.org/10.1097/QMH.0000000000000058>
- Gerrish, K., Ashworth, P., Lacey, A., & Bailey, J. (2008). Developing evidence-based practice: experiences of senior and junior clinical nurses. *Journal of Advanced Nursing*, 62(1), 62–73. <https://doi.org/10.1111/j.1365-2648.2007.04579.x>
- Gunningberg, L., Brudin, L., & Idvall, E. (2010). Nurse Managers' prerequisite for nursing development: A survey on pressure ulcers and contextual factors in hospital organizations. *Journal of Nursing Management*, 18(6), 757–766. <https://doi.org/10.1111/j.1365-2834.2010.01149.x>
- IBM Corp (2016). *IBM SPSS Statistics for Windows, Version 24.0*. Armonk, NY: IBM Corp.
- Institute of Medicine. (2007). *The learning healthcare system: Workshop summary*. Washington, DC: National Academies Press.

- Johansson, B., Fogelberg-Dahm, M., & Wadensten, B. (2010). Evidence-based practice: The importance of education and leadership. *Journal of Nursing Management*, 18(1), 70–77. <https://doi.org/10.1111/j.1365-2834.2009.01060.x>
- Leung, K., Trevena, L., & Waters, D. (2014). Systematic review of instruments for measuring nurses' knowledge, skills and attitudes for evidence-based practice. *Journal of Advanced Nursing*, 70(10), 2181–2195. <https://doi.org/10.1111/jan.12454>
- Melnik, B. M., Fineout-Overholt, E., Gallagher-Ford, L., & Kaplan, L. (2012). The state of evidence-based practice in US nurses: Critical implications for nurse leaders and educators. *The Journal of Nursing Administration*, 42(9), 410–417. <https://doi.org/10.1097/NNA.0b013e3182664e0a>
- Melnik, B. M., Gallagher-Ford, L., Zellefrow, C., Tucker, S., Thomas, B., Sinnott, L. T., & Tan, A. (2018). The first U.S. study on nurses' evidence-based practice competencies indicates major deficits that threaten healthcare quality, safety, and patient outcomes. *Worldviews on Evidence-Based Nursing*, 15(1), 16–25. <https://doi.org/10.1111/wvn.12269>
- Rudman, A., Gustavsson, P., Ehrenberg, A., Boström, A. M., & Wallin, L. (2012). Registered nurses' evidence-based practice: A longitudinal study of the first five years after graduation. *International Journal of Nursing Studies*, 49(12), 1494–1504. <https://doi.org/10.1016/j.ijnurstu.2012.07.007>
- Rudman, A., Omne-Ponten, M., Wallin, L., & Gustavsson, P. J. (2010). Monitoring the newly qualified nurses in Sweden: The Longitudinal Analysis of Nursing Education (LANE) study. *Human Resources for Health*, 8(1), 10. <https://doi.org/10.1186/1478-4491-8-10>
- Sackett, D., Richardson, W., Rosenberg, W., & Haynes, R. (2000). *Evidence-based medicine: How to practice and teach EBM*. New York, NY: Churchill Livingstone.
- Saunders, H., Gallagher-Ford, L., Kvist, T., & Vehviläinen-Julkunen, K. (2019). Practicing healthcare professionals' evidence-based practice competencies: An overview of systematic reviews. *Worldviews on Evidence-Based Nursing*, 16(3), 176–185. <https://doi.org/10.1111/wvn.12363>
- Saunders, H., & Vehviläinen-Julkunen, K. (2016). The state of readiness for evidence-based practice among nurses: An integrative review. *International Journal of Nursing Studies*, 56, 128–140. <https://doi.org/10.1016/j.ijnurstu.2015.10.018>
- SBU. (2014). *Arbetsmiljöns betydelse för symptom på depression och utmattningssyndrom. En systematisk litteraturoversikt. SBU-rapport nr 223*. Stockholm, Sweden: SBU-Statens Beredning för Medicinsk Utvärdering.
- Spenceley, S. M., O'Leary, K. A., Chizawsky, L. L., Ross, A. J., & Estabrooks, C. A. (2008). Sources of information used by nurses to inform practice: An integrative review. *International Journal of Nursing Studies*, 45(6), 954–970.
- Wallin, L., Boström, A. M., & Gustavsson, J. P. (2012). Capability beliefs regarding evidence-based practice are associated with application of EBP and research use: Validation of a new measure. *Worldviews on Evidence-Based Nursing*, 9(3), 139–148. <https://doi.org/10.1111/j.1741-6787.2012.00248.x>
- Watkins, D. (2011). The influence of masters education on the professional lives of British and German nurses and the further professionalization of nursing. *Journal of Advanced Nursing*, 67(12), 2605–2614. <https://doi.org/10.1111/j.1365-2648.2011.05698.x>
- Wilson, M., Sleutel, M., Newcomb, P., Behan, D., Walsh, J., Wells, J. N., & Baldwin, K. M. (2015). Empowering nurses with evidence-based practice environments: Surveying Magnet, Pathway to Excellence, and non-magnet facilities in one healthcare system. *Worldviews on Evidence-Based Nursing*, 12(1), 12–21. <https://doi.org/10.1111/wvn.12077>
- Zhou, F., Hao, Y., Guo, H., & Liu, H. (2016). Attitude, knowledge, and practice on evidence-based nursing among registered nurses in traditional Chinese medicine hospitals: A multiple center cross-sectional survey in China. *Evidence-Based Complementary and Alternative Medicine*, 2016, 5478086. <https://doi.org/10.1155/2016/5478086>
- Zwanikken, P. A., Dieleman, M., Samaranayake, D., Akwataghibe, N., & Scherpbier, A. (2013). A systematic review of outcome and impact of master's in health and health care. *BMC Medical Education*, 13, 18. <https://doi.org/10.1186/1472-6920-13-18>

10.1111/wvn.12468

WVN 2020;17:348–355