

SELF-ASSESSMENT OF OPERATING THEATRE NURSE COMPETENCE IN PERIOPERATIVE CARE

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Abstract. *Assessment of competence level of operating theatre nurses (OTN) has a significant role in ensuring patient safety, continuity of perioperative care, and positive care environment, allowing to identify shortcomings and address them. The competence level describes quantitatively the competence in perioperative care — a set of skills, attitudes, and knowledge required for effective and safe perioperative care. A simple method to assess the competence level is a self-assessment scale; however, this method has not been used in Latvia to establish the OTN competence level*

The goal of this work is to determine the perceived level of competence in the perioperative care of OTN in a multi-profile hospital in Latvia. For this purpose, a modified perioperative competence self-assessment scale was used, based on Gillespie's (2012) Perceived Perioperative Competence Scale-Revised (PPCS-R). The results show that OTN have a high perceived level of competence. However, the leadership subscale (which includes coordination and management) displayed lower levels of perceived competence, which shows the insufficiency of training. The results also show that certified OTN, those with more work experience, and OTN with a Bachelor's degree have a higher perceived competence level. The scale adapted to Latvian exhibits equally good internal consistency as other versions of PPCS-R.

Keywords: *competence in perioperative care, modified PPCS-R, operating theatre nurses (OTN), psychometric scale, self-assessed competence level.*

Introduction

One of the founders of nursing theory, Patricia Benner, defines competence as knowledge, skills, and attitudes that are used in specific situations of nursing care (Benner, 1984). The components of competence are important characteristics of nurse professional performance because of their impact on patient outcomes

(Gillespie, Chaboyer, Lingard, & Ball, 2012). A high level of competence is required to complete the work of operating theatre nurses (OTN) - to provide perioperative nursing - due to technologically complex nursing interventions and the high risk of patient morbidity (Bathish, McLaughlin, & Talsma, 2015). Assessing the level of competence of practising OTN is relevant for the evaluation of continuing education needs, including improvement of nontechnical competence.

Factors comprising the competence can be evaluated by comparison with a certain benchmark, which corresponds to expectations of performance in providing patient care, for instance, the standard of the profession. However, previous research has shown that different healthcare systems and professional standards have a set of empirical commonalities which allows conducting a general and universal comparison of competence levels (Meretoja, Isoaho, & Leino-Kilpi, 2004; Gillespie, Polit, Hamlin, & Chaboyer, 2012). In those studies, a psychometric test was used as an effective and simple instrument, which evaluates the level of competence by using a self-assessment scale. Although this methodology is easy to use, it has not been used previously to assess the competence level of Latvian OTN.

The aim of this study is to assess the level of competence in the perioperative care of OTN working at a single surgical centre of a multi-profile hospital in Latvia, based on the Perceived Perioperative Competence Scale-Revised (PPCS-R).

Use of self-assessment scale in the assessment of competence level

Relying on P. Benner's analysis of nurse competence, where competence is split into 7 roles - helping, coaching, diagnostic/patient observation, managing care, therapeutic interventions, care quality assurance, and organising care (Benner, 1984; Benner, Tanner, & Chesla, 1996) - Finnish researchers formulated a quantitative self-assessment scale which can be universally used to express the level of nursing competence, noting that these roles match the clusters of competencies in nursing care by their intents, functions, and meanings (Meretoja et al., 2004).

Performance of the scale is not equally good for all specialities of nurses, using the guidelines of nurses' professional organisations as the framework for expectations in professional attainment results in creating a scale that is too general and unsuitable for quantitative analysis (Gillespie, Chaboyer, Wallis, Chang, & Werder, 2009). Therefore, a group of Australian researchers led by B. Gillespie created a specific survey for nurses involved in perioperative care. The survey refines the domains proposed by Benner through both expert elicitation and rigorous statistical analysis. This survey is called Perceived Perioperative Competence Scale-Revised (PPCS-R) (Gillespie et al., 2009; Gillespie, Chaboyer, Wallis, & Werder, 2011).

Analysis of PPCS-R results proved that such demographic factors as gender, clinical experience, specialisation, and hospital type are accountable for as much as a third of the variability of perceived level of competence (Gillespie, Hamlin, Polit, & Chaboyer, 2013). Considering latter majority of comparative studies includes at least part of these variables in the analysis of their results (Gillespie, Harbeck, Falk-Brynhildsen, Nilsson, & Jaensson, 2018).

Methodology

The aim of the study is to assess Latvian OTN perceived level of competence in perioperative care, using a modification of a previously validated self-assessment scale. The research tool in this study was a quantitative survey, based on the Perceived Perioperative Competence Scale-Revised (PPCS-R) (Gillespie et al., 2012b).

PPCS-R is based on the perceived competence scale PCS, which was developed by B. Gillespie as part of her doctoral thesis; it consists of only 12 items with a 5-point Likert response scale (Gillespie et al., 2011). In 2009, the group developed a 120 item survey Perceived Competence Scale-Revised (PCS-R) by conducting a literature review and focus group discussion with 27 OTN (Gillespie et al., 2009). The validity of the instrument was verified by a panel of 8 international experts who proposed a modification - removed 22 items, leaving 98 (Gillespie et al., 2011). Then the group conducted two pilot surveys; the first one was conducted with 345 respondents, concluding that it did not have enough statistical power and had an excessive internal consistency, which indicates redundancy of items (Gillespie et al., 2009). The final pilot study was conducted in 2012 with 1205 respondents; 58 items were rendered redundant using statistical analysis methods, leaving the scale with 40 statistically meaningful items (Gillespie et al., 2012b). The result of this work is the well-known PPCS-R, which is statistically robust and widely used.

The questionnaire in this study consists of two parts - one to collect demographic data and another for the self-assessment scale. The part for demographic data collection includes questions about participants' age, work experience as OTN, education, specialist certification, and native language (total of 5 questions). The survey uses a 40-item adapted PPCS-R - a version of PPCS-R, translated to the Latvian language following the guidelines of the International Test Commission without conducting a pilot study. Responses to items were given by a 5-point Likert response scale, where 1 corresponds to "never", but 5 corresponds to "always". The total score obtainable for the whole scale is 200 points. Items are split into two subscales - technical and nontechnical - which each include three domains as shown in Table 1.

Table 1 Classification of items in PPCS-R (Gillespie & Pearson, 2013)

Subscale	Domain	Number of items (j)	Conceptual definition of domain
Technical	Foundational	9	Behaviours that reflects foundational skills and knowledge, for instance, knowledge of procedures and surgical instrumentation
	Proficiency	6	Behaviours that characterise skills built upon exposure to clinical practice
	Professional development	6	Behaviours that sustain and improve practice standards like keeping up with the latest research
Nontechnical	Leadership	8	Behaviours that support leadership and management of patient care
	Collaboration	6	Behaviours that characterise seeking help and helping
	Empathy	5	Behaviours that establish a connection with patients

Ethics approval for the survey was given by the Ethics Committee of the Institute of Cardiology and Regenerative Medicine at University of Latvia.

This study was conducted in 2021 at the surgery centre of a single multi-profile hospital in Latvia, using a cross-sectional survey. The sample of 48 OTN was created from volunteers who work at the survey site. Inclusion criteria were (1) respondent must be a registered nurse, (2) respondent must have a qualification of operating theatre nurse, and (3) respondent must be contracted to work at the survey site (surgery centre of the hospital). Excluded were any potential participants not meeting the inclusion criteria (for instance, anaesthetic nurses who work in the operating theatre). A questionnaire used in the survey (total of 60 distributed) was freely available at the OTN break room, where the box for returns was also placed. In total, 80% of questionnaires were returned.

Survey data were analysed using free statistical computing software *R* 3.6.1. Descriptive and inferential statistics were used for the analysis. Inferential statistics include only nonparametric tests to compare statistical differences between the groups — Kruskal-Wallis test for multiple groups and pairwise Wilcoxon rank-sum test for pairs. Cronbach's alpha coefficient was used to express the internal consistency of both scale and subscales. The statistical significance threshold was set at $p < 0.05$.

Results

Table 2 characterises respondents' demographic data. Selected categories correspond to those used in the analysis.

Table 2 Summary statistics of respondents (n = 48) (created by authors)

Variable	Mean ± standard deviation	Amplitude	Category	Relative frequency (%)	Absolute frequency (n)
Age	39±11	(23; 60)	-	-	-
Clinical experience	11±13	(1; 40)	<5 years	40	19
			5–10 years	27	13
			>10 years	33	16
Education	-	-	Secondary	23	11
			1 st level vocational higher	17	8
			Bachelor's	60	29
			Masters'	0	0
			Doctorate	0	0
Specialist certification	-	-	Yes	67	32
			No	33	16
			N/A	0	0
Native language	-	-	Latvian	53	25
			Other	40	19
			N/A	7	4

The majority of respondents had a Bachelor's degree and specialist certificate while the rest of the variables were spread more evenly among categories. Data about gender were not collected because all OTN at the survey site are female. Clinical experience (discretised for further analysis), age and scale responses were collected as continuous variables, but the rest of the variables were collected as categorical.

Table 3 summarises the main results - mean score with its standard deviation, confidence interval, relative score (% of maximum), and Cronbach's alpha coefficient (the indicator of internal consistency of the scale elements).

The mean score for the whole scale in this study matches the results of other studies (Gillespie et al., 2018; Falk-Brynhildsen, Jaensson, Gillespie, & Nelson, 2018). This indicates that Latvian OTN have a similar perceived level of competence. Splitting PPCS-R into technical and nontechnical subscales shows lower scores in the nontechnical subscale, which demonstrates lower confidence in nurses' abilities in these domains of competence.

Table 3 Descriptive statistics of the scale and its subscales (created by authors)

Scale (j = number of items)	Mean score of the scale		Relative score (%)	Cronbach's alpha	
	Mean ± standard deviation	Confidence interval (95%)		Coefficient	Confidence interval (95%)
Whole scale (j = 40)	168±15	(162; 174)	84	0,910	(0,84; 0,94)
Technical subscale (j = 21)	91±9	(87; 94)	86	0,908	(0,83; 0,95)
Nontechnical subscale (j = 19)	77±9	(74; 81)	81	0,845	(0,77; 0,89)

The internal consistency of scale is good as it matches the range of Cronbach's alpha values between 0.85 and 0.97 given by previous studies (Gillespie & Pearson, 2013; Gillespie et al., 2013; Ajorpaz, Tafreshi, Mohtashami, Zayeri, & Rahemi, 2017; Jaensson, Falk-Brynhildsen, Gillespie, Wallentin, & Nilsson, 2018; Sönmez & Ayoğlu, 2018). Translated PPCS-R versions (in Swedish, Persian, and Turkish) overall show lower internal consistency, indicating that translation procedure has a higher impact than local peculiarities (Gillespie et al., 2018).

The scale can be split into six domains (as shown in Table 1) - each subscale having three domains. Figure 1 displays respondents' mean relative score for each domain with a 95% confidence interval.

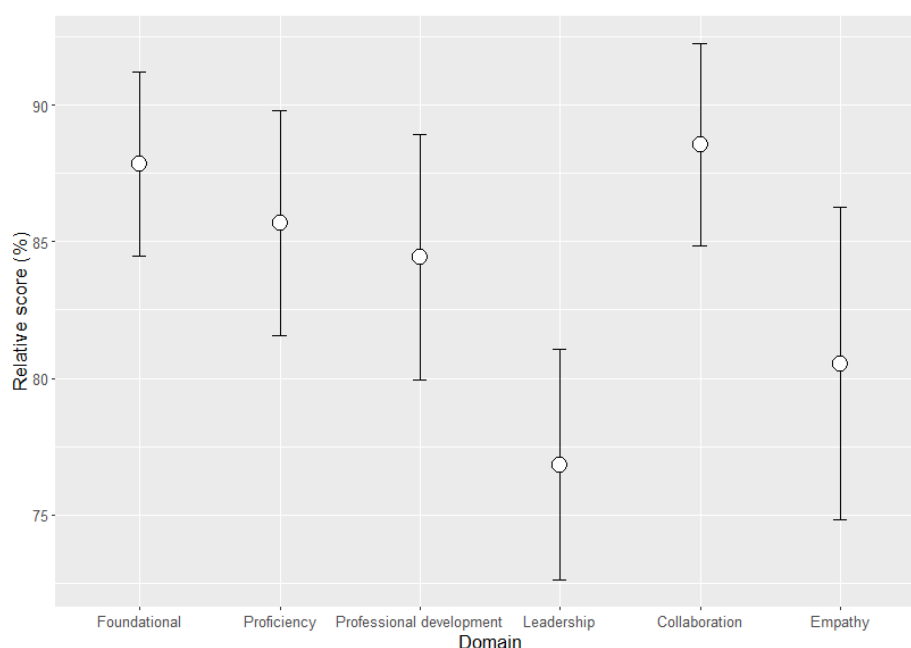


Figure 1 Self-assessment score (% of maximum sum per domain; mean ± 95% CI) for each domain (created by authors)

Respondents have evaluated their foundational competence (technical) and collaboration (nontechnical) as their strongest competence in perioperative care. Proficiency was also scored highly, meaning that respondents regard their competence in nursing interventions as high. For domains of the technical subscale, the variance is lower than for the nontechnical domains. In addition, the lowest scores were given to competence of leadership and empathy. The lack of competence in the empathy domain can be explained by the lack of connection in the anaesthetised patient–nurse dyad (Brodin, Hellzén, & Häggström, 2017; Blomberg, Lindwall, & Bisholt, 2019). The lack of respondents’ confidence in the organisation of operations and management of care actions is not interpretable with the available data. However, it is an important question. A study conducted in Scotland (n = 428), where original PPCS-R was used, also observed that the leadership domain is the weakest, with respondents obtaining only 72% of the total score in the domain (Gillespie & Pearson, 2013).

Analysing respondents’ responses by demographic criteria, Kruskal-Wallis test showed statistically significant impact only for clinical experience ($p = 0.036$), education ($p = 0.043$), and specialist certification ($p = 0.004$). Figure 2 shows clinical experience versus the score.

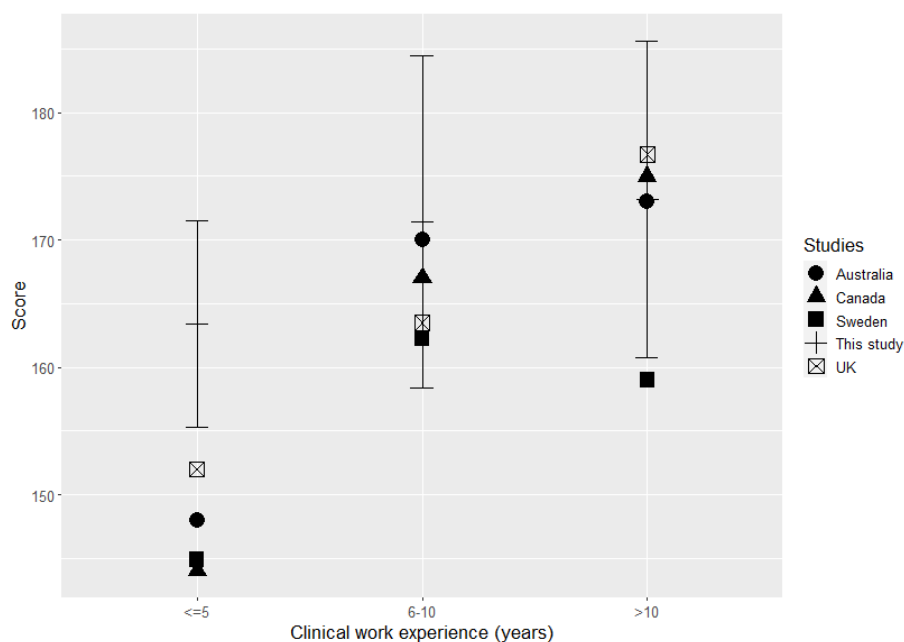


Figure 2 Self-assessment score (mean ± 95% CI) dependent on clinical experience, compared to research in other countries (Gillespie et al, 2018)

More experience is related to a higher score. The least experienced OTN (experience ≤ 5 years) have statistically significant (Wilcoxon rank-sum test $p = 0.047$) lower scores than the most experienced. Comparing these results to previous studies, the respondents in the least experienced group have assessed their competence higher than their counterparts abroad (the mean values do not

match within confidence interval). In other groups, the data largely match, except the outlier value for the most experienced in Sweden (which is explained by cultural differences of older Swedish people or rapid change of the qualifications system after the start of their career). Overall, the results are compatible with P. Benner's nursing theory because more clinical experience improves nurses' ability to use their foundational knowledge and improve proficiency.

Figure 3 displays the relationship between respondents' education and specialist certification status and the score obtained in PPCS-R. The figure shows box-whisker plots. To enable comparison with earlier figures, the mean value with a 95% confidence interval is also shown.

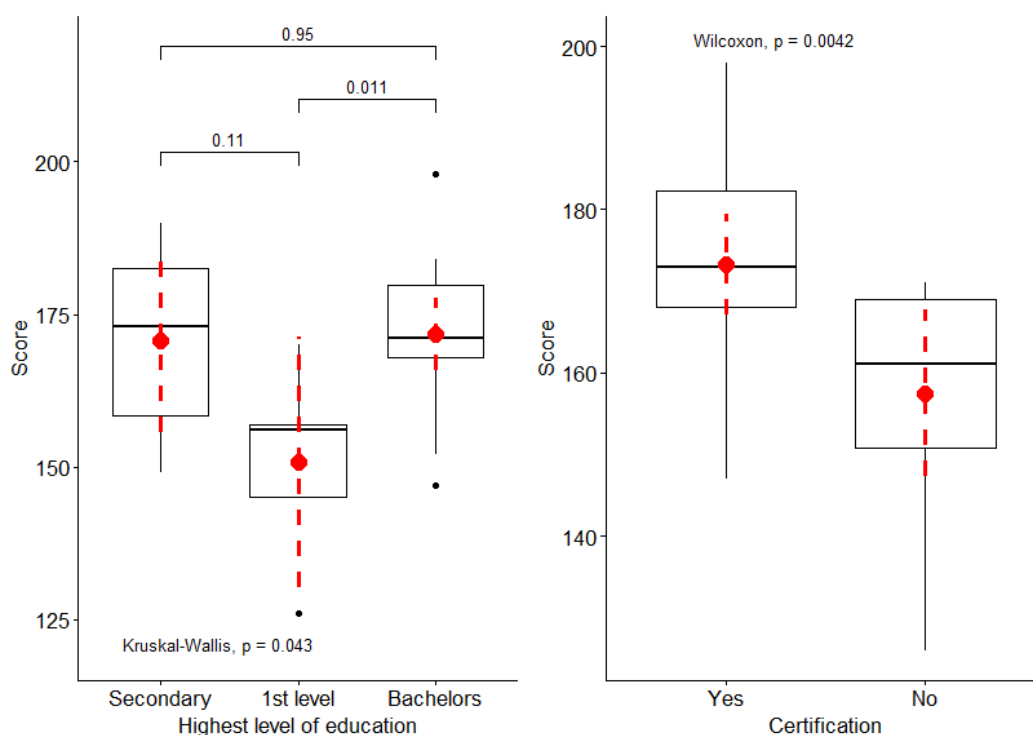


Figure 3. Box-whisker plot for the score dependent on education (on the left) and certification status (on the right). Red features show the mean score with 95% confidence interval; braces indicate p-values of pairwise Wilcoxon rank sum test (created by authors)

The difference of score means is statistically significant only between the group with 1st level vocational higher education and Bachelor's degree ($p = 0.011$) and between respondents with a specialist certificate and those without ($p = 0.004$). Respondents with secondary education have similar mean and median scores as those who have obtained a Bachelor's degree, but both the interquartile range and confidence interval are broader. The broadest confidence interval is for those who have 1st level vocational higher education. The reason for this is the small sample for this group; however, the highest dispersion (indicated by a larger interquartile range) is for the group of respondents with secondary education. A large number of more experienced respondents (experience > 10 years) received

their education before the introduction of higher vocational education in nursing; therefore, more clinical experience can compensate for the lack of formal qualifications.

The group of uncertified respondents have a slightly higher dispersion of their scores. To retain the certificate, nurses should invest considerable resources in continuing education (Latvijas Māsu asociācija, 2019). In addition, the certificate can only be obtained by passing special exams. These factors might explain a higher level of perceived competence among certified respondents.

Regarding the technical and nontechnical subscales, demographic criteria were only statistically significant for the technical subscale. Even then they were significant only for basic competence and proficiency domains.

Conclusions

Adaption of PPCS-R in Latvian exhibits a similar level of internal consistency as other translated versions and the original version. Similarly to studies in other countries, respondents have evaluated their level of competence as high, obtaining a mean score of 84 ± 1 % of the maximum. The weakest competence domains were leadership (the organisation and management of care) and empathy. Respondents had higher perceived competence in technical than nontechnical subscale.

The only significant demographic factors found in this study were clinical experience, education, and specialist certification status. More clinical experience and specialist certification were related to a higher perceived level of competence. Respondents with secondary education only assessed their level of competence to be similar to those holding a Bachelor's degree. However, the variance is higher in the former. The lowest measure of central tendency was for those who have received 1st level vocational higher education, but the reliability is low due to the small sample size for this group.

Formal education had less impact than expected; however, continuing education might be one of the factors explaining why the status of specialist certification has a strong impact on the perceived level of competence. In future studies, it would be useful to elucidate the reasons why leadership is among the weakest domains of competence and what kind of changes in continuing education are needed to improve this domain.

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References

- Ajorpaz, N. M., Tafreshi, M. Z., Mohtashami, J., Zayeri, F., & Rahemi, Z. (2017). Psychometric Testing of the Persian Version of the Perceived Perioperative Competence Scale–Revised. *Journal of Nursing Measurement*, 25(3), E162–E172. DOI: <http://dx.doi.org/10.1891/1061-3749.25.3.E162>
- Bathish, M., McLaughlin, M., & Talsma, A. N. (2015). Relationship Between Operating Room Nursing Staff Expertise and Patient Outcomes. *Journal of Nursing Care Quality*, 30(2), 167–174. DOI: <https://doi.org/10.1097/NCQ.0000000000000092>
- Brodin, K., Hellzén, O., & Häggström, M. (2017). Intraoperative Care of the Conscious Patient from the Perspective of the Operating Theatre Nurse: A Grounded Theory. *Open Journal of Nursing*, 7, 1086–1099. DOI: <https://doi.org/10.4236/ojn.2017.79079>
- Benner, P. E. (1984). *From Novice to Expert: Excellence and power in clinical nursing practice*. Menlo Park, CA: Addison-Wesley.
- Benner, P., Tanner, C. A., & Chesla, C. A. (1996) *Expertise in Nursing Practice. Caring, Clinical Judgement and Ethics*. New York: Springer Publishing Co.
- Blomberg, A.-C., Lindwall, L., & Bisholt, B. (2019). Operating theatre nurses' self-reported clinical competence in perioperative nursing: A mixed method study. *Nursing Open*, 6, 1510–1518. DOI: <https://doi.org/10.1002/nop2.352>
- Falk-Brynhildsen, K., Jaensson, M., Gillespie, B. M., & Nilsson, U. (2018). Swedish Operating Room Nurses and Nurse Anesthetists' Perceptions of Competence and Self-Efficacy. *Journal of PeriAnesthesia Nursing*, 34(4), 842–850. DOI: <https://doi.org/10.1016/j.jopan.2018.09.015>
- Gillespie, B. M., Chaboyer, W., Wallis, M., Chang, H.-A., & Werder, H. (2009). Operating Theatre nurses' perceptions of competence: A focus group study. *Journal of Advanced Nursing*, 65(5), 1019–1028.
- Gillespie, B. M., Chaboyer, W., Lingard, S., & Ball, S. (2012a). Perioperative nurses' perceptions of competence: implications for migration. *Journal of Operating Room Nurses Association of Canada*, 25(4), 32–38. Retrieved from <https://www.researchgate.net/publication/232253173>
- Gillespie, B. M., Polit, D. F., Hamlin, L., & Chaboyer, W. (2012b). Developing a model of competence in the operating theatre: Psychometric validation of the Perceived Perioperative Competence Scale-Revised. *International Journal of Nursing Studies*, 49(1), 90–101. DOI: <https://doi.org/10.1016/j.ijnurstu.2011.08.001>
- Gillespie, B. M., Chaboyer, W., Wallis, M., & Werder, H. (2011). Education and Experience Make a Difference: Results of a Predictor Study. *AORN Journal*, 94(1), 78–90. DOI: 10.1016/j.aorn.2010.11.037
- Gillespie, B. M., & Pearson, E. (2013). *ACORN Journal of Perioperative Nursing*, 26(1), 29–34. Retrieved from <https://research-repository.griffith.edu.au/handle/10072/58689>
- Gillespie, B. M., Hamlin, L., Polit, D. F., & Chaboyer, W. (2013). The influence of personal characteristics on perioperative nurses' perceived competence: implications for workforce planning. *The Australian Journal of Advanced Nursing*, 30(3), 14–25. Retrieved from <https://www.researchgate.net/publication/282886202>
- Gillespie, B. M., Harbeck, E. B., Falk-Brynhildsen, K., Nilsson, U., & Jaensson, M. (2018). Perceptions of perioperative nursing competence: a cross-country comparison. *BMC Nursing*, 17, 12. DOI: <https://doi.org/10.1186/s12912-018-0284-0>
- Jaensson, M., Falk-Brynhildsen, K., Gillespie, B. M., Wallentin, Y. F., & Nilsson, U. (2018). Psychometric Validation of the Perceived Perioperative Competence Scale-Revised in

the Swedish Context. *Journal of PeriAnaesthesia Nursing*, 33(4), 499–511. DOI: <http://dx.doi.org/10.1016/j.jopan.2016.09.012>

Latvijas Māsu asociācija. (2019). Ārstniecības personu sertifikācijas un resertifikācijas nolikums. Pieejams: http://www.masuasociacija.lv/wp-content/uploads/2020/01/Sertifik%C4%81cijas_nolikums_2019_A.pdf

Meretoja, R., Leino-Kilpi, H., & Kaira, A.-M. (2004). Comparison of nurse competence in different hospital work environments. *Journal of Nursing Management*, 12, 329–336. DOI: <https://doi.org/10.1111/j.1365-2834.2004.00422.x>

Sönmez, B. & Ayoğlu, T. (2019). Validity and reliability of the Perceived Perioperative Competence Scale–Revised. *Nursing & Health Sciences*, 1–8. DOI: <https://doi.org/10.1111/nhs.12612>