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Factors Influencing Novice and Beginner Nurses' Intention to Report Medication Errors and Near Misses

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Abstract

Introduction: Novice and beginner nurses make more medical errors than senior nurses. However, there is significant underreporting of medication errors and near misses among novice and beginner nurses.

Objective: To identify the factors that influence the intention of novice and beginner nurses to report medication errors and near misses**.**

Methods: A cross-sectional exploratory study was carried out among third-year nursing students in a Quebec university (n = 143). Data was collected through a self-reported questionnaire based on the adapted Theory of Planned Behavior. Simple descriptive analyses and a series of contingency analyses were performed using Chi-2 or Fisher exact tests. Correction of multiple tests was done using Bonferroni test.

Results: All theoretical constructs were significantly associated with intention. Sociodemographic factors (age, sex, experience and education program) were also associated with intention.

Discussion and conclusion: Further studies are needed to identify the determinants of intention to report medication errors and near misses among novice and beginner nurses. More attention is required in nursing practice and education to act on these factors, thus encouraging novice and beginner nurses to report medication errors and near misses.

Keywords

Canadian health care, reporting system, medication errors, nursing

Introduction

Medication errors and near misses are a leading cause of harm and injury in health care systems worldwide (WHO, 2020). Medication error is "any preventable event that may cause or lead to inappropriate medication use or patient harm while the medication is in the control of the health care professional, patient, or consumer" (National Coordinating Council for Medication Error Reporting and Prevention, 2017). The Institute for Safe Medication Practices further defines a near miss as "a medication error that doesn't cause harm or injury to patient" (Institute for Safe Medication Practices, 2009).

Globally, 2 million deaths are due to medication errors, with heavy annual costs that exceed 55 billion USD (WHO, 2020). In 2018, costs related to preventable medication errors hospitalisation in Canada were estimated at over $140 million CAD (Canadian Patient Safety Institute, 2018) and are over $40 billion each year in USA (SingleCare, 2023). In Quebec, the semi-annual report of the Ministry of Health and Social Services (MSSS, 2021) points out that medication errors rank second, after falls, among adverse events reported. In fact, more than 25.8% of adverse events declared in this report are due to medication errors and classified as follows: 22.19% medication errors and 3.61% near misses (MSSS, 2021). In addition, medication errors are responsible of 1.74% of general reported deaths (MSSS, 2021) and cause several harmful consequences in patients, including extended stays, re-hospitalization, pain, restlessness, and anxiety (MSSS, 2016).

Patient safety is one of the fundamental priorities of healthcare systems (WHO, 2020) because it constitutes a quality care dimension (SIDIEF, 2015). A reporting system is a risk management tool to ensure patient safety and a monitoring process (MSSS, 2020). In Quebec, reporting medication errors and near misses is a legal requirement for all healthcare providers. A specific form related to adverse

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event, the AH-223-1, must be completed on paper or electronically (MSSS, 2020). Healthcare providers have the responsibility to fill out the form that is forwarded and processed through administrative channels to analyze and identify the causes of medication errors and near misses and propose solutions to help prevent their recurrence and ensure patient safety (MSSS, 2020).

Nurses play an important role in the patient safety process and have an ethical and deontological responsibility to prevent medication errors and near misses (Phaneuf, 2012). However, there is an underreporting of medication errors and near misses (St-Amour, 2013). Less experienced nurses (novices and beginners) report medication errors less often than their more experienced counterparts (Duffield et al., 2011, Saintsing et al., 2011; Hung et al., 2016). In this context, a novice is a nurse who has not yet accumulated any clinical experiences. So, she uses only rules and course notes to resolve any clinical problem that she may confront (Benner, 2005). According to Benner, novice nurses "have no experience of the situations they are likely to encounter" (Benner, 2005, p.23). For their part, beginner nurses with little practical experience (under three years) "have faced enough real situations to note (themselves or on the advice of a tutor) the significant factors which recur in identical situations" (Benner, 2005, p.24).

Several studies have investigated the phenomenon of medication errors underreporting among nurses in general, and they found that underreporting is influenced by many organizational factors, including organizational culture (blame or security culture); leadership commitment; feedback; and knowledge about the reporting process (Aboshaiqah, 2013; Bayazidi et al., 2012). Beyond these organizational factors, certain individual factors could explain the problem of underreporting. In fact, some studies affirm that personal factors such as motivation, commitment, and honesty are the main determinants favoring reporting (Bayazidi et al., 2012). The study by Ben Natan et al. (2017) shows a significant association between knowledge on reporting of medication errors and intention of reporting medication errors among nursing students (Ben Natan et al., 2017). Secginli et al. (2021) suggest that nursing students' attitude was the main significant predictor of intention to report medication errors. Despite underreporting being more widespread among inexperienced nurses, relatively few studies have investigated individual factors influencing reporting among nursing students (Ben Natan et al., 2017; Lapkin et al., 2015; Secginli et al., 2021). These studies have used the Theory of Planned Behavior (TPB) (Ajzen, 1991) to analyse the nursing students' intention to report medication errors in the light of TPB construct. To our best knowledge there is no study that investigate this topic in the context of novice and beginner nurses.

Because reporting of medication errors and near misses is a professional practice (AIIC, 2004), it can be analyzed with a focus on individual behavior, more specifically by way of psychosocial theories such as the TPB (Ajzen, 1991; Godin, 2012). According to the TPB, behavior is determined in a direct way by two fundamental concepts, namely intention and perception of behavioral control, provided that such control corresponds to reality (Godin, 2012). Intention is a mental state that acts on an individual's choice of behavior by motivating the person to react in order to achieve a particular goal (Ajzen & Fishbein, 2005). Intention is influenced directly by attitude, subjective norm, and perception of behavioral control (Ajzen, 1991, Ajzen, 2019) (Figure 1). Also, intention is predicted indirectly by behavioral beliefs, normative behavior and control beliefs through attitude, subjective norm, and perception of behavioral control respectively (Ajzen, 1991, Ajzen, 2019) (Figure 1). Attitude involves assessing whether or not to behave in a certain way. This construct is influenced by the beliefs of positive or negative consequences of a given behavior (behavioral beliefs) (Ajzen, 1991, Ajzen, 2019). Subjective norm is the perception of pressures brought to bear by groups of people or the society to perform or refrain from certain types of behavior (Ajzen, 1991, Ajzen, 2019). This construct is influenced by beliefs regarding the expectations of a group of people or the society as a whole (normative behavior) (Ajzen, 1991, Ajzen, 2019). Perception of behavioral control is the perception of barriers to, and factors facilitating the performance of, a given behavior (Ajzen, 1991, Ajzen, 2019). This construct is in turn influenced by beliefs in the presence of these factors (control beliefs) (Ajzen, 1991, Ajzen, 2019). Intention is also influenced indirectly by external variables (individual variables such as gender and age and the environment) (Godin, 2012).

Ajzen is amenable to adding other constructs to his original theory if the addition of these constructs has been scientifically proven to improve intention explication (Godin, 2012). Hence, since medication error and near miss reporting constitutes a mandatory act of nursing care according to deontological and ethical codes, we have added to the original TPB three constructs (Figure 1): anticipated regret, moral norm, and professional norm. Anticipated regret is the regret that a person anticipates if they do not adopt the appropriate behavior (Godin, 2012). Moral norm is one of the constructs of Triandis' Theory of Interpersonal Behavior (Triandis, 1980). It consists in behavior adopted to align with one's personal values. Professional norm involves behavior adopted due to professional obligations (Godin, 2012). The proposed adapted TPB is in line with the integrated model for studying healthcare professionals' behaviors proposed by Godin (2012).

To our knowledge, no studies have investigated factors influencing intention to report medication errors and near misses among novice and beginner nurses. Given the lack of knowledge of individual factors related to the reporting of medication errors and near misses and the importance of this topic in hospital risk management and patient safety,

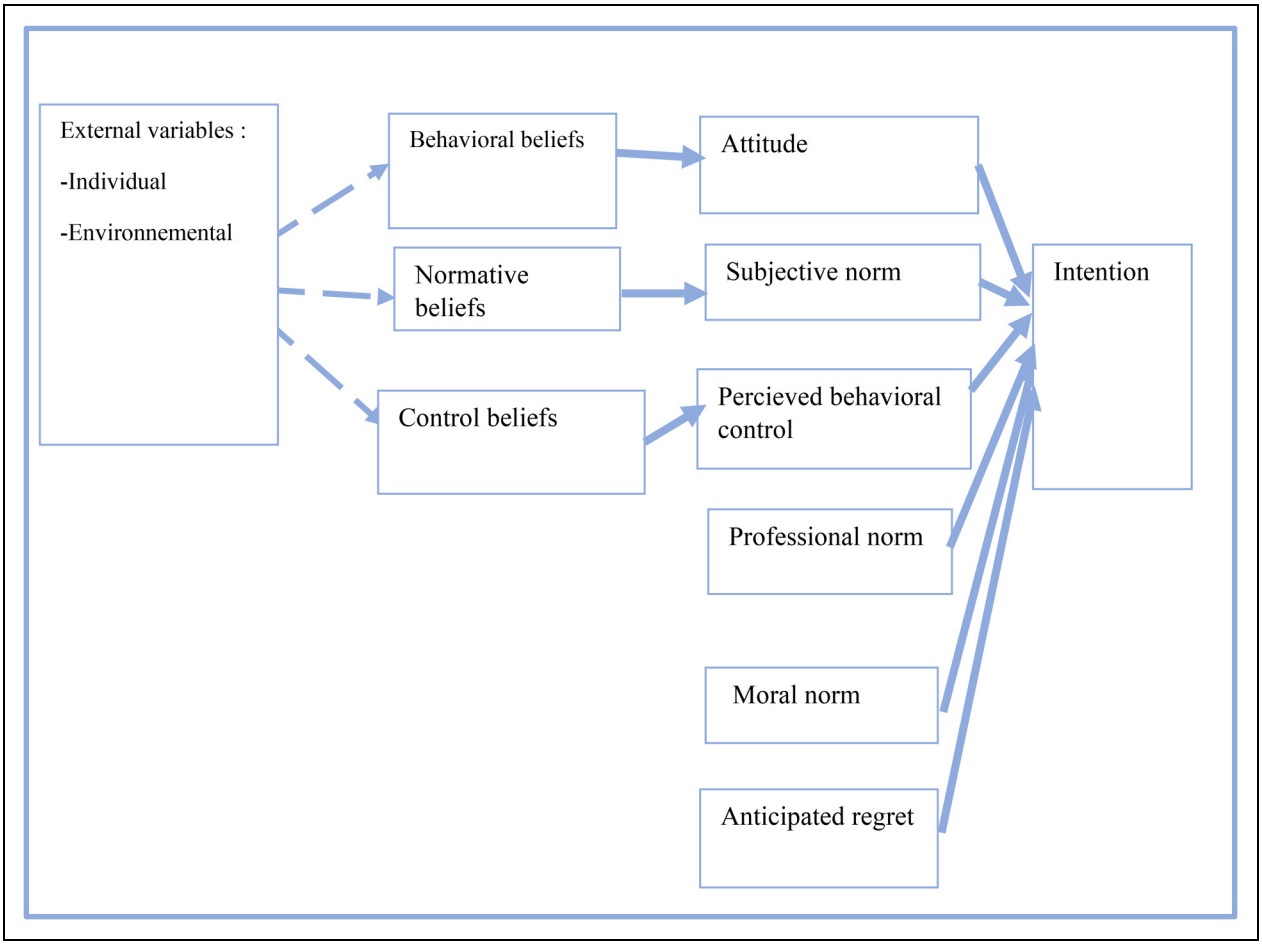

Figure 1. The adapted Theory of Planned Behavior.

this study aims to explore factors influencing the intention of novice and beginner nurses to report medication errors and near misses. Consistent with the TPB, we hypothesize that intention to report medication errors and near misses is influenced directly by novice and beginner nurses' attitude, subjective norm and percieved behavioral control, and indirectly through behavioral beliefs, normative behavior, control beliefs and external variables (individual and environmental). Also, as suggested by Godin (2012) anticipated regret, moral norm, and professional norm were hypothesized to be directly linked to novice and beginner nurses' intention to report medication errors and near misses.

In the current study, we tested the following hypotheses:

- Novice and beginner nurses' intention to report medication errors and near misses is associated with attitude.
- Novice and beginner nurses' intention to report medication errors and near misses is associated with subjective norm.
- Novice and beginner nurses' intention to report medication errors and near misses is associated with perceived behavioral control.
- Novice and beginner nurses' intention to report medication errors and near misses is associated with behavioral beliefs.
- Novice and beginner nurses' intention to report medication errors and near misses is associated with normative beliefs.
- Novice and beginner nurses' intention to report medication errors and near misses is associated with control beliefs.
- External variables (Individual and Environmental).
- Novice and beginner nurses' intention to report medication errors and near misses is associated with anticipated regret.
- Novice and beginner nurses' intention to report medication errors and near misses is associated with moral norm.
- Novice and beginner nurses' intention to report medication errors and near misses is associated with professional norm.

Methods

Study design

Based on the adapted TPB, a predictive correlational cross-sectional study was initially planned. However, a convergence problem of the model was detected due to the perfect separation of moral norm and intention, so an exploratory cross-sectional study was conducted. Two

methodological phases have preceded the study: the development of the questionnaire and the verification of its psychometric qualities. These phases are reported in a separate paper.

Study population and sample

Study population. The study was conducted in Fall 2019 in a university in Quebec City, Canada. The study population consisted of a cohort of third-year nursing students enrolled in the critical care practicum. Indeed, in Quebec, nursing faculties offer two programs of baccalaureate in nursing: 1) Initial training for students who did not complete any college nursing training program; and 2) DEC-Bac program which aims to improve the skills and knowledge of nurses who have completed college nursing training program and who are already practicing. A cohort of nursing students in this university is generally made up of 150 students. Participants in the study included baccalaureate nursing students (registered in initial training) who correspond to the novice nurses, according to Benner's (2005) definition; and students registered in an upgrade baccalaureate program (DEC-Bac), who represent beginner nurses (Benner, 2005) because they are already practicing at least since three years. The convenience sample consisted of all students registered in the critical care course during the semester (Fall-2019). We have chosen the context of critical care units because these units are the most well-known care units for medication errors and under-reporting among novice et beginner nurses compared to other care units (Vrbnjak et al., 2016).

The inclusion criteria are as follows: be a third-year nursing student; be enrolled in the nursing upgrade baccalaureate program or in the nursing initial baccalaureate program; be enrolled in the critical care course; and have less than three years of experience in critical care units (if applicable). According to Benner (2005), novice or beginner nurses are those having less than three years of experience in critical care units (emergency and intensive care units).

Sample. The sample size was calculated a posteriori. To ensure a sufficient statistical power to perform contingency analyses with the chi-2 test, we used the G * Power software (Faul et al., 2009). A sample of 88 student is targeted, considering chi-2 analysis with a mean effect size of 0.03, a two-tailed alpha error threshold of 0.05, a statistical power of 0.80, degree of freedom of 1 and critical chi-2 of 3.84. To ensure enough participants, all 150 students per cohort/semester were invited to participate in this study.

Ethical consideration. The study received the approval of the research ethics committee of the Laval University where the study took place (#2018-218). The principles of implicit and informed consent and confidentiality of information have been respected.

Data collection. In this study, the students were consulted with the agreement of the professor responsible for the course. After reading an information sheet summarizing the research project, the students were invited to complete a questionnaire during a class period.

The questionnaire was distributed to student cohort in Fall 2019. This questionnaire contained 37 items (supplementary table 1). The original questionnaire was developed in French by the researcher teams and reported in a separate papier. Socio-demographic variables were measured by four questions: age, sex, educational program, and experience. Supplementary Table 1 shows theoretical constructs and items.

Data analysis

Descriptive analyses of the data were performed using the "Statistical Package for the Social Sciences" (SPSS) statistical software version 26 (IBM, 2019) in order to draw up the participants' socio-demographic and professional profile (mean, standard deviation, etc.). Simple descriptive statistics such as means, mode and median were calculated to determine the range of each category. To use contingency analysis via chi-square tests, variables were dichotomized. For continuous variables, dichotomisation was done by the median (high than or equal to the median = 1, less than the median = 0). For age, the dichotomisation was made by the mode. Variables were then recoded into these categories to proceed to statistical analyses. Finally, contingency analysis was conducted using Python version 3.10. The measures of association were performed via separate chi-square tests (Fisher exact test was used when one cell was smaller than 5) to identify which factors were associated with the intention of novice and beginner nurses (third-year nursing students) to report medication errors and near misses. To control the probability of committing Type I errors due to multiple tests, a Bonferroni correction was performed with alpha of 0.025.

Results

A total of 147 participants returned the final questionnaire. Four questionnaires were eliminated since they missed several information. The final sample includes 143 participants (response rate = 95.3%), of which 92,3% were female and 83.2% were between 21 and 23 years old. A majority (86%) were students enrolled in the nursing improvement baccalaureate program, and 77,6% had between one and two years of experience (Table 1).

Table 2 shows that there were a significant association ($p < 0.025$) between intention to report medication errors and near misses and all theoretical constructs (attitude, perceived behavioral control, subjective norm, control beliefs, behavioral beliefs, normative beliefs, professional norm, moral norm, and anticipated regret). Furthermore, intention to report medication errors and near misses was significantly

Table 1. Characteristics of participants.

Variables	Values	Frequencies (n)	Percentage (%)
Sex	Female	132	92.3
	Male	11	7.7
Age	21 years-23years	119	83.2
	>23years	24	16.8
Education program	DEC-bac	123	86
	Baccalaureate	20	14
Experience	No experience	20	14,0
	One year of experience	12	8.4
	Between one and two years of experience	111	77.6

associated with age ($p < 0.025$), education program ($p < 0.025$) and experience ($p < 0.025$). Novice and beginner nurses who were above twenty-three years old were more likely to report medication than the others. Beginner nurses (DEC-bac program) were more likely to report medication errors and near misses than novice nurses (baccalaureate). Beginner nurses with more than two years of experience were more likely to report medication errors and near misses than nurses with low experience.

Discussion

Based on the adapted TPB, this study explored factors influencing nursing students' intention to report medication errors and near misses. A total of 143 students completed the questionnaire and the majority were beginner nurses according to the Benner (2005) classification. The study reveals that 78% of the students expressed a high intention to report medication errors and near misses. Age, sex, education program, experience and all theoretical constructs from the adapted TPB were significantly associated with intention of nursing students to report medication errors and near misses. These findings are consistent with those of a systematic review by Braiki et al. (2023) who analysed and classified factors influencing nurses to report medication errors and near misses according to the adapted TPB. These authors found that theoretical construct from the adapted TPB and sociodemographic variables influenced reporting medication errors among nurses (Braiki et al., 2023). With respect to nursing students, our results are consistent with those of Ben Natan et al. (2017) who showed that perceived behavioral control, attitude, control beliefs, normative beliefs and subjective norm were significantly associated with students' intention to report medication errors. Similarly, Secginli et al. (2021) found that perceived behavioral control and attitude were the significant predictors of intention to report medication errors among nursing students. Lapkin et al. (2015) reported that perceived behavioral control, control beliefs, behavioral beliefs, normative beliefs and subjective norm were significantly associated to nursing students' intention to report medication errors.

In addition, Ben Natan et al. (2017) found that nursing students' intention to report medication errors was determined by pressure from colleagues and superior. According to

Table 2. Association between the intention to report medication errors and near misses and sociodemographic and adapted TPB constructs.

Variables	High intention	Low intention	χ^2	P value adjusted
Attitude[a]	4	17	42.47	4,3E-08*
(Low < 5.5)				
(High >= 5.5)	104	18		
Perceived behavioral control [a]			88.58	5,69E-18*
Low < 6.67	4	28		
High >=6.67	104	7		
Subjective norm[b]			81.85	1,44E-17*
Low < 7.0	7	29		
High >= 7.0	101	6		
Behavioral beliefs[a]			47.88	3,39E-09*
Low < 5.33	0	14		
High >= 5.33	108	21		
Normative beliefs[a]			28.21	2,39E-05*
Low < 6.0	4	13		
High >= 6.0	104	22		
Control beliefs[b]			33.55	3,43E-07*
Low < 5.875	13	21		
High >= 5.875	95	14		
Professional norm[a]			50.62	1,26E-09*
Low < 7.0	4	28		
High >= 7.0	104	7		
Moral norm[a]			55.59	8,63E-11*
Low < 7.0	0	16		
High >= 7.0	108	19		
Anticipated regret[a]			88.58	5,69E-18*
Low < 7.0	4	28		
High >= 7.0	104	7		
Sex[a]			15.01	0,007879*
0= Female	105	27		
1 = Male	3	8		
Age[b]			39.85	1,43E-08*
< 23	15	24		
>= 23	95	11		
Education program[b]			26.07	1,82E-05*
0= DEC-BAC	102	21		
1= Baccalaureate	6	14		
Experience[b]			52.63	2,67E-11*
< 2	11	25		
>= 2	97	10		

[a]Refers to variables tested by the Fisher exact test;
[b]Refers to variables tested by Chi-2 test; $p < 0.05$, $p^* < 0.025$ = p value of Fisher exact test adjusted by Bonferroni correction,

these authors, student' knowledge on reporting of medication errors was strongly associated with the intention of reporting medication errors (Ben Natan et al., 2017). Similarly, Secginli et al. (2021) suggested that it is very important to increase positive attitude toward reporting by implementing teaching strategies to encourage nursing students to report medication errors. Lapkin et al. (2015), Reid-Searl et al. (2010) and Pournamdar et al. (2016) showed that nursing students do not report medication errors because they fear that doing so could have negative impacts on annual evaluation scores and on their academic progress. In addition, they do not fear reporting medication errors only when they anticipate that such reporting will not lead to punishment (Lapkin et al., 2015). Lapkin et al. (2015) also reported that students who believed that nursing staff and clinical preceptors were supportive, and anticipated that errors would not lead to punishment, reported medication errors.

In the present study, sociodemographic variables (age, sex, experience, and educational program), anticipated regret, moral norm and professional norm were significantly associated with intention to report medication errors and near misses among novice and beginner nurses. However, to our knowledge, no studies investigated these associations in the context of intention to report medication errors and near misses among novice and beginner nurses. Previous meta-analyses showed that anticipated regret was a strong predictor of intention and behavior (Brewer, DeFrank & Gilkey, 2016; Sandberg & Conner, 2008). Thus, further studies are important to examine the association between anticipated regret, professional norm, moral norm, and sociodemographic variables and intention to report medication errors and near misses among novice and beginner nurses.

Our findings are consistent with previous studies which examined general factors influencing the reporting of medication errors among nurses (Dirik et al., 2019; Fathi et al., 2017; Hammoudi et al., 2018; Kim & Kim, 2019; Lee, 2017). Factors associated to perceived behavioral control and control beliefs were identified in many studies. For example, lack of feedback, lack of training for nurses about medication error reporting; lack of a clear definition of medication errors and a lack of awareness of the importance of reporting were the main factors determining underreporting of medication errors (Dirik et al., 2019; Hammoudi et al., 2018; Kim & Kim, 2019). Also, overtime work was one of the most important barriers to reporting (Hung et al., 2016). Numerous studies associated medication errors reporting to factors related to subjective norm and normative beliefs. For example, nurses' fear of the negative reaction of superiors, colleagues, patients, and their families hindered their reporting of medication errors (Abdalla et al., 2020; Hammoudi et al., 2018; Lee, 2017). Similar to our results, several studies found that factors associated to attitude and behavioral beliefs strongly influenced reporting of medication errors among nurses. Fear of the negative consequences of reporting, such as criticism, disciplinary punishment and loss of job influenced reporting among nurses (Abdalla et al., 2020; AbuAlRub et al., 2015; Hartnell et al., 2012). Consistent with our findings, previous studies determined that professional accountability is one of the most important factors that influence the reporting of medication errors among nurses (Hartnell et al., 2012; Hewitt et al., 2017; Stewart et al., 2018). Similarly, Ajri-Khameslou et al. (2018) reported that nurse's personal values are facilitators of reporting medication errors. In the study by Bayazidi et al. (2012), medication errors reporting was associated with the ethical and moral principles of non-malfeasance and beneficence. Nurses might report medication errors when they perceived reporting as a strategy to prevent harm and benefit patients (Bayazidi et al., 2012). Few studies examined the association between age and sex and reporting medication errors (Blegen et al., 2004; Rishoej et al., 2018). Results of these studies were consistent with our findings. In the study by Rishoej et al. (2018), older nurses were more likely to report medication errors than younger nurses. In the study by Jember et al. (2018), female nurses were more likely to report medication errors than male nurses. Our findings thus align with the premisses of Benner's theory (2005) which stipulates that experienced nurses are more capable of intervening and better acting in various care situations. Similarly, previous studies reported that nurses with more experience were more likely to report than less experienced nurses (Hung et al., 2016; Mayo & Duncan 2004). Reporting barriers have less influence on nurses with more work experience (Blegen et al., 2004).

Study strengths and limitations. This study has several strengths that should be acknowledged, including the use of a well-established psychosocial theory, and the development of a questionnaire according to rigorous methods. In addition, the present study was the first to investigate factors influencing intention to report medication errors and near misses among novice and beginner nurses in the Quebec context. Further, it was one of the few studies focused on novice and beginner nurses in the context of reporting medication errors and near misses.

However, this study presents some limitations. First, it was carried out among a small convenience sample of nursing students. It would be important to replicate this study with a larger sample of novice and beginner nurses who are already working in a hospital. Another limitation relates to the impossibility of performing regression analyses due to a problem in the model. Non-parametric contingency tests were performed to explore the associations between intention and the theoretical and sociodemographic variables, but it is not possible to have an estimation of the strength of these associations. Despite good psychometric qualities of our questionnaire, the measure of the dependent variable (intention) could be improved. The fact that reporting medication errors and near misses

is a highly desirable behavior, a social desirability bias might be in cause (Paulhus, 1984). Future studies should explore other ways to capture novice and beginner nurses' perceptions and actual behaviors regarding medication errors reporting.

Conclusion

This study used the adapted TPB to explore the factors that influence novice and beginner nurses' intention to report medication errors and near misses. The main findings of the study show that all theoretical constructs of the adapted TPB and the sociodemographic variables influence intention to report medication errors and near misses among novice and beginner nurses. Given the lack of studies that have investigated the topic among this category of nurses, other studies are needed to further support these findings. In addition, to develop interventions, further research should be performed to identify the key determinants of the intention to report medication errors and near misses among novice and beginner nurses. Finally, findings from this study might guide healthcare organization managers and directions of nursing education to pay more attention to novice and beginner nurses and to the factors that influence reporting medication errors among this category of nurses.

Authors' contributions

Raouaa Braiki contributed to data collection, data analysis and writing of the article. Marie-Pierre and Frédéric Douville contributed to the paper revision.

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Supplemental material

Supplemental material for this article is available online.

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