

In order to examine the importance, relevance and appropriateness of the questionnaire and to understand the reactions when answering questions, face validity was applied. Then the questionnaire was distributed in printed or electronic form through the staff and head nurses.

Part 1

The first part of the questionnaire, which included 7 items, was focused on demographic and factual data about the respondents. This part of the questionnaire examined the age, sex, length of experience, the highest education level, finished school/ university, completed specialization course in intensive care nursing, current position at the ICU (registered nurse, staff nurse or head nurse) and the type of the ICU.

Part 2

The second part of questionnaire consisted of the didactic test including 16 questions, focused to information about the level of nurses' knowledge on high-alert medications frequently used in critical care. List of High-Alert Medications that created ISMP was used for constructing questions (10). Results were evaluated using a standardized four-point grading scale. For each question, the value of difficulty (Q) was calculated. This value indicates the percentage of respondents who answered the question incorrectly or missed it. The question of high difficulty is defined by the Q greater than eighty. On the contrary, questions are considered easy when the Q value is lower than twenty. Didactic test is shown in Table 1.

Part 3

The third part of questionnaire, consisting of 7 items, focused on nurses' experience with the medication errors and self-assessment of their knowledge in this field. University graduated respondents were asked whether pharmacology courses, which they completed during nursing undergraduate curriculum, have provided a benefit for their practice.

Ethical considerations

The study design provided autonomy, giving nurses the freedom to decide whether to participate and provide information. A cover letter attached to each questionnaire explained that participation was voluntary and returned questionnaire signified consent. Participants were asked

not to place individual identifiers on the questionnaire to secure confidentiality. This research was approved by the deputy or managers of nursing care of each participating hospital.

Data processing

Data obtained from the questionnaires was processed in Excel tables and then imported into SPSS statistical software version 20.0. The differences in the occurrence of observed phenomena in nominal variables were tested using the chi-square test. The difference in test results between different education levels was tested using the independent sample t-test with Levene's test for equality of variances. Pivot tables were used for testing of qualitative data. The strength of the dependence of those variables was also tested using the chi-square test.

Results

A total of 240 respondents participated in the research. Nearly half of respondents (49.17 %) were older than 36 years of age. Respondents were predominantly female (92.92 %). All respondents general nurses at ICUs. Respondents with the working experience of 11 or more years were the most represented (45.00 %) in the sample. According to the level of education, the secondary nursing school graduates were most prevalent (40.83 %). A total of 55 % of respondents passed the specialization course in intensive care nursing at the National Centre of Nursing and Non-medical Health Professions. More detailed demographic and factual data are shown in Table 2.

The second part of the questionnaire consisted of didactic test with 16 questions. Four-point grading scale was used to evaluate the test. Each level of this classification had set-point margin. Respondent was awarded 1 point for each correct answer always. A total of 23 % of respondents received the best classification level (grade 1). The largest group of respondents passed the test with the classification grade 2 (almost 63 %). Less than 14 % of respondents obtained a classification grade 3. Only one respondent failed. Results of the didactic test are shown in Figure 1.

We also focused on diversity of results by highest educational attainment in assessing the didactic test. It was found that the results of graduates of secondary or higher nursing schools differs from that of university educated nurses. University-educated nurses achieved an

Tab. 2. Background and characteristics of nurses

Characteristics	n	%
Age (years)		
≤ 25	26	10.83
26–30	62	25.83
31–35	34	14.17
≥ 36	118	49.17
Sex		
Female	223	7.08
Male	17	92.92
Intensive care nursing practice (years)		
≤ 2	32	13.33
3–5	49	20.42
6–10	51	21.25
≥ 11	108	45.00
Education		
Secondary	98	40.83
Higher	56	23.33
University	86	35.83
Specialized education (PSS ARIP)		
Yes	133	55.42
No	107	44.58
Position		
Registered nurse	224	93.33
Staff nurse	13	5.42
Head nurse	3	1.25
Department		
Anesthesiology and Resuscitation Department	102	42.50
Internal medicine IUCs*	74	30.83
Surgical IUCs**	64	26.67

*Internal IUCs included: Hematology IUCs, Internal IUCs, Cardiology IUCs, Metabolic IUCs, Neurological IUCs, Department of Intensive Medicine

**Surgical IUCs included: Surgical IUCs, Cardiac IUCs, Neurosurgical IUCs, Obstetric-Gynecological IUCs, Trauma IUCs

average grade of 1.86 while secondary-educated nurses achieved an average mark of 2.02 ($p < 0.05$). More detailed results from a comparison of respondent groups among them are shown in Table 3. On the contrary, undergoing of the specialization course in intensive care nursing didn't affect the results of this test (1.93 and 1.90 for those with and without the specialization course, respectively, non-significant).

The third part of the questionnaire was focused on medication errors and nurses attitude to the benefits and needs of education in pharmacology. Respondents were asked whether any medication error occurred at their ICU and whether they made such an error themselves during the last 3 months at their workplace. Less than 23 % of respondents experienced medication error at their workplace and 5 % of the respondents committed the error themselves. We also investigated the relationship