Chemotherapy medication errors nursing education and review of literatures.

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Abstract

Objective: Chemotherapy drugs prescription requires many precautions. The aims of this study were identification of ways to decrease prescribing chemotherapy errors, in order to determine how to prevent them. We examined two separate methods in Oncology wards.

Material and Methods: We designed standard chemotherapy order sheet and well educational magazines for oncology ward nurses. Qualitative assessment was done for decreasing chemotherapy medication errors.

Results: According to the nurses' presumption, the methods of training were effective to reducing chemotherapy medication errors.

Keywords: chemotherapy, medication error.

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Introduction

Cancer chemotherapy has a narrow therapeutic window, and patients with cancer often cannot physically tolerate mistakes. Errors in treating patients also have been associated with damages and legal problems such as loss of reputation and confidence in the doctor and hospital, financial loss in law courts, and most importantly risks for patients. Prevention of error is a matter of remaining vigilant, having systems in place to expose mistakes, and having a culture among coworkers that error prevention is a priority.

There are some sample reports about Medication errors in chemotherapy. We explained some chemotherapy medication errors that our hospital nurses awarded them and trained.

Thienprayoon R showed that in intratechal cytosine arabinoside overdose, measures such as CSF exchange are not uniformly required [1]. In another study, Qweider M reported in intrathecal wrong injection of vincristin, immediate cerebrospinal fluid (CSF) aspiration, external ventricular and lumbar drains placement for CSF irrigation for few days was effective for reducing neurotoxicity of vincristine. They also used combination of intrathecal administration of fresh-frozen plasma to bind the vincristine and an intravenous anti neurotoxic therapy involving pyridoxine, folic acid, and glutamic acid. In their case, sensorimotor deficits occurred after 2 days, led to an incomplete sensorimotor dysfunction below T-9 within the next 17 days, but progressed no further. Supported by the scarce data culled from the reviewed literature, the authors hypothesize that prolonged CSF irrigation combined with antineurotoxic therapy contributed to the patient's satisfactory outcome. In conclusion, accidental intrathecal vincristine injection requires emergency and adequate neurosurgical therapy [2].

Büyükçelik A et al. also showed that lomustine overdose may be fatal due to excessive bone marrow suppression effect [3].

O'Marcaigh AS reported that over dose of intra the cal metothrexate can cause rapid severe acute neurotoxicity. In these cases, Lumbar puncture and CSF drainage resulted in partially removal of the administered drug. Therefore, Ventriculolumbar perfusion with warmed isotonic saline through ventricular and lumbar catheters and intrathecal administration of carboxypeptidase G2 (CPDG2), an enzyme that inactivates MTX, resulted in a further 150-fold reduction in cerebrospinal fluid MTX concentration. This procedure may be cause complete recovery [4].

Conversely other study demonstrated that administration of high-dose intrathecal methotrexate may lead to fewer symptoms. This may be related to individual variations in cerebrospinal fluid dynamics and drug metabolism [5].

Vincristine overdose can results peripheral neuropathy, bone marrow toxicity, gastrointestinal toxicity, and hypertension sequentially. Treatment included double-volume exchange transfusion, prophylactic Phenobarbital administration, and folinic acid rescue may be life saving [6].

Massive dose of cisplatin without intravenous hydration as a result of an accidental substitution of cisplatin for carboplatin also was reported, who survived with no clinically significant deficit except for deafness [7].

Incidental intrathecal using of tranexamic acid attempted spinal anesthesia, demonstrated severe pain in the back and gluteal region upon injection in association with systemic hypertension and tachycardia followed by generalized myoclonic seizures and ventricular fibrillation [8].

Uner A et al. recommended that, only experienced clinicians should administer chemotherapy, and thorough records must be kept to document the chemotherapy administered, dosages, dates of administration, the procedure used, and the schedule of

cycles [9]. What are potential sources of vulnerability and how can we build a system that prevents errors?

Method and Material

This is a descriptive – cross sectional study and a quasi-experimental one without pre test – post test. In Oncology Hospital affiliated to Shiraz University of Medical Sciences, from September 2013 till January 2014, 50 nurses were enrolled in order to decrease chemotherapy medication errors. We designed two separate methods including weekly magazines on chemotherapy errors as training courses, as well as the papers containing chemotherapy instructions to evaluate the satisfaction degree of the oncology nurses.

1. We published a weekly magazine for 10 weeks, on investigating the reported patients of chemotherapy medication errors in other places of the world. The nursing personnel as well as the pediatric and adult oncology head nurses also were informed through those magazines.
2. In addition, we prepared and issued some papers on which the chemotherapy instructions had been written and wrote down the chemotherapy instructions on the papers separate from other medication instructions. We also wrote that the instructions had to be checked twice by oncology department specialists (attending physicians, fellowships, residents) and twice by oncology department nurses in every working shift (the responsible shift nurse and each patient's direct nurse) (4 times, totally) while the hospital pharmacists checked the chemotherapy drugs in two ways before they were injected to the patients (checking the vials with regard to the weight and dosage of the drugs before transferring them from the pharmacy and before injecting the drugs to the patients in the oncology department).

Finally, the efficiency of the intended methods was assessed.

The effectiveness and content of the training courses were measured by the qualitative method of distributing questionnaires among the cases, and their opinions were asked for through content survey questionnaires. Since getting correct and meaningful responses from the participants in this stage was crucial, the questionnaires were designed with closed-ended questions in order to bring about accurate, unambiguous responses by the participants. The respondents got ensured that they would remain unknown and their information would be kept as private (It was not necessary to mention their names and family names when completing the questionnaires). The evaluation was done on the followings: the content of the presented subjects, the increase of the nurses' knowledge and skills relating to the training course title, and attracting their satisfaction with regard to the subjects we presented in chemotherapy errors weekly magazines. The 5-point Likert scale (excellent=5, very good=4, good=3, fair=2, and poor=1) was used for investigating the participants' opinions. In this survey, the following items were measured: the effect of the training course on the nurses' performance improvement, the effect of that course on their knowledge promotion, and the effect of the course by using the Likert scale.

The face validity as well as the content validity of the questionnaires was investigated by education authorities and experts. The questionnaires' reliability was also investigated while its Cronbach's alpha was 0.82 and acceptable. The Cronbach's coefficient alpha was used to determine the reliability of the questionnaires, focusing on inner correlation of the method we applied.

Results

The average scores given by the nurses for the presentation method, applicability of the subjects, quality and content of the pamphlets and their relationship with the presented subjects, novelty of the subjects we presented, the increase of their knowledge and skills relating to the training course subject, their specialized knowledge promotion were 5, 5, 5,5, 4, and 4.5, respectively. Besides, the average score given by the nurses for the course objectives with the allocated time was 4.2 and they gave the scores 5 and 4.5 to the course objectives and the applicability of educational subjects, respectively.

In general, the average score given by the nurses for their satisfaction with our method in this training course was 4.5875 and the quality was evaluated as very high.

Discussion

The combination of medication error reviews and morbidity and mortality conferences appears to be an efficient means of improving cancer patient safety and personnel proficiency [10]. To reduce the risk of prescribing errors, a number of strategies addressing individual, team, task, and environmental factors such as enforcing good practice in prescription writing, supervision, training of junior doctors, and reviewing the workload of junior doctors must be established [11]. Sometimes misread labels may be considered as a cause of medication errors [10-12], therefore lockable, computerized medication administration carts help hospitals avoid medication errors and reduce expenses [13,14]. Staff education and training play an important role in decreasing the rate of medication errors.

Findings of the present study suggest that the learners participated in this training course have totally evaluated the effectiveness of the course as very good. Although the effectiveness of the training courses that were held was not 100%, according to the statistical calculations it can be claimed that the nurses' presumption of our training course effectiveness with regard to chemotherapy errors in our Oncology departments, has been significantly high (very good to excellent that equal 80% to 100% efficiency). Since the level of the previous knowledge about the subjects we were training was much more challenging and sensitive than the learning level, Kirk Patrick states three cases: first, the participants have to find an opportunity to change their behavior. Second, the time of behavior change cannot be predicted in reality. Third, the nurses' general conditions can affect the (lack of) change in their behavior while learning; therefore, it is suggested that some evaluation be done at a proper time in order to get ensured of the existence of permanent behavioral changes.

It is also suggested that the concrete evaluation of the staff in working environments be done by the educational supervisor and the person responsible for clinical governance in Amir Hospital and some checklists (real patients and educational samples) get prepared for this purpose. If possible, the control

group should be used in order to eliminate the bothering factors that might affect the results of learning as well as answering the questions.

Although, even with using electronic prescribing chemotherapy, medical errors may arise and periodic audits may be useful to detect common errors and guide corrective actions [13,14].

Conclusion

According to the nurses' presumption, the methods of training by weekly magazines on chemotherapy errors and using the papers containing chemotherapy instructions are two effective, applicable methods for teaching the nurses in our Oncology wards in order to prevent chemotherapy errors. Hence, by doing concrete educational interferences, we can cause significant changes in the nurses' knowledge and performance in the oncology department.

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