

Deterioration of Omeprazole Suspension Due to Inappropriate Storage Practice

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Abstract

Background: Good storage practice is fundamental to prevent the deterioration of medications and to ensure their quality and safeties are maintained. This case study focuses on maintaining proper storage conditions without risking degradation. **Case Presentation:** An incident occurred in a paediatric pharmacy in Al-Sabah hospital, Al-Sabah medical area, Kuwait, in September 2021; an 11-year-old child diagnosed with weakness in the gastroesophageal valve and a physician prescribed omeprazole suspension preparation as an oral dosage form for daily based using. After dispensing 30 bottles from the pharmacy, the patient's parent stored all quantities dispensed at room temperature rather than refrigerated. However, the medication company stated that the patient or healthcare giver should refrigerate before and after opening the bottle. Due to this inappropriate storage practice, the suspension preparations deteriorated and spoiled. **Conclusion:** Inappropriate dosage practices are preventable by simple solutions. Preparing training and assessment programs for pharmacists is essential to focus on the importance of proper and complete patient counselling and to ensure that the patient or healthcare giver stores medications in special storage conditions. Moreover, creating a policy for dispensing drugs that require specific storage conditions, such as labelling medications with specific storage conditions with specific-coloured labels and dispensing cooling boxes for them.

Keywords: Storage practices, omeprazole suspension, temperature, deterioration, medications.

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BACKGROUND

The medication production procedure consists of restricted and regulated steps to ensure that a medication is safe, effective, and high-quality. One of the critical parameters in these production procedure steps is monitoring the storage condition of materials used during the procedure. These data are documented explicitly for each step and each drug supply chain in The Good Distribution Practice Guideline [1].

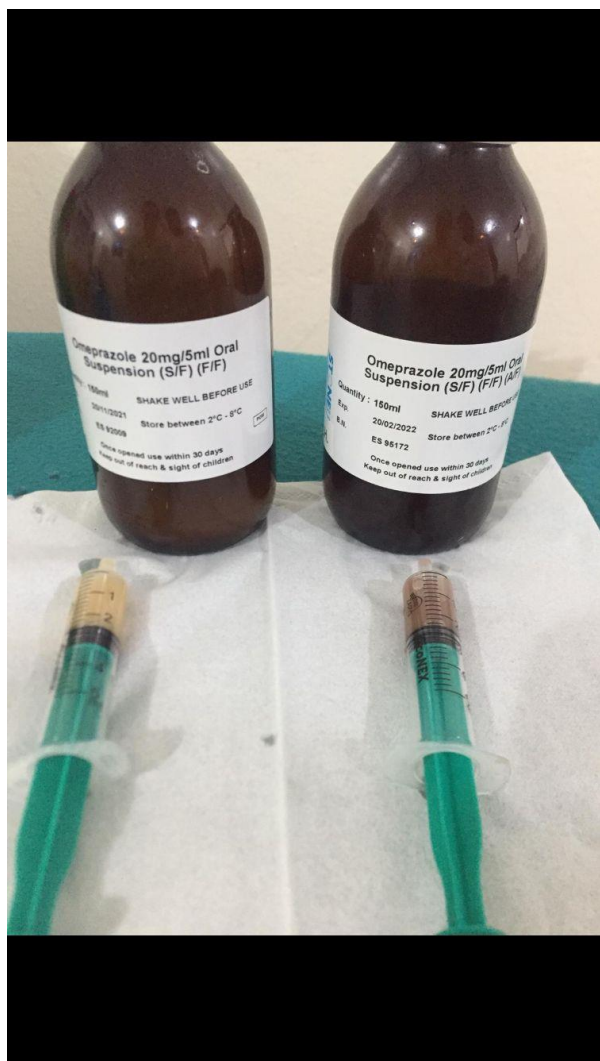
In the past years, it was observed that some patients or healthcare providers neglected medication storage practices. For example, one of the studies stated that only 7% of patients using biological drugs stored their drugs at temperatures specified on the product label [2]. This case study reports improper storage of omeprazole suspension, which caused deterioration of the preparation. The incident occurred in a paediatric pharmacy in Al-Sabah hospital, Al-Sabah medical area, Kuwait, in September 2021. This study aims to emphasize the importance of proper storage

recommunication practices by patients or health care providers to ensure the safety and efficacy of medication treatment. In addition, it illustrates the importance of patient counselling about medication storage practices.

CASE PRESENTATION

An 11-year-old child was diagnosed with weakness in the gastroesophageal valve, thus repeating the occurrence of reflux quickly, which caused him a chronic cough and hoarseness. A pediatric physician prescribed omeprazole suspension preparation as an oral dosage form for daily-based use. After reaching the prescription to a pediatric pharmacy, a pharmacist calculated the correct dose for the patient and supplied 30 bottles of the omeprazole suspension to the patient's father as enough quantity for two months. After 11 days, the father returned to the pharmacy complaining about changing the medication preparation's colour (pic 1). The pharmacist asked the father about storage practices at home, and he found that the mother did not

store the medicine inside the refrigerator, which spoiled the medication. She kept the bottles at room temperature. Due to that, all medication bottles were disposed of by the pharmacy.



Pic 1: (the difference between typical omeprazole suspension and deteriorated one)

DISCUSSION

To our knowledge, this is the first case report written for improper storage of omeprazole suspension. It showed the effect of inappropriate storage practices on the medication dosage form. World Health Organization (WHO) guided exemplary storage practice, which stated that the suitable storage condition is storing medication in a clean and dry place with limited acceptable temperature. In addition, it should be out of the reach of children [3]. Some medications are preferred to be stored at room temperature between 18 to 25 C°. However, some medications should be refrigerated at a temperature between 2 to 8 C°. Each medication company specified storage temperature for their products to ensure their physical and chemical stabilities.

Various factors contributed to inappropriate storage practices. Starting with age, older patients are usually suffering from different diseases, which could affect their lifestyle, behaviour, communication, and cognitive skills. For example, one study indicated that cognitive skills and knowledge about self-medication management are decreased in elderly patients [5]. In contrast, another study showed that more than half of elderly patients complained about storage recommendations [4]. This justifies that not only does ageing affect storage practice, but there is another group of factors. Several studies illustrate these factors: the level of education, gender, and the presence of chronic illness income. Other factors are social status (living alone or with family) and the existence of a healthcare worker in the household [4]. Other factors could be the complexity of medication regimens, medication compliance, and incomplete patient counselling about drug storage due to work pressure and less staff in the pharmacy.

The consequences of incorrect storage can divide into clinical and financial. Although, the clinical consequences of faulty storage conditions are mostly unknown. However, according to theory, it could lose the medication's effectiveness or become toxic [4]. An example of that is compromising the inhalation capsule due to low humidity conditions [6]. Regarding financial consequences, medicines costs will be huge due to repaying for them after disposing of detriment. The cost could reach millions; in this case, the cost of the damaged suspension was 1198.5\$, which is considered a high cost.

Since this situation occurred due to human error, simple solutions could help to prevent it. Firstly, preparing a training program to train and assist pharmacists in avoiding the recurrence of these errors. These programmes should focus on the importance of proper and complete patient counselling using interactional tools and guides and effectively using them during work. Secondly, creating a policy for dispensing drugs that require specific storage conditions ensures their stability after being dispensed to patients. For example, labelling these drugs with specific-coloured labels, which pharmacy members could quickly identify. Thirdly, dispensing cooling boxes for drugs with specific storage conditions alerts patients about their storage conditions. In addition, increasing awareness in public about the importance of good drug storage practices to certify the safety of drug treatment. This awareness is achievable by campaigns in hospitals, malls, and universities or by using social media to create videos in a different language to ensure that the message reaches all members of society.

CONCLUSION

Remarkably, some patients and healthcare providers neglect medication storage practices. The variability in labelling and dosage recommendations of

the pharmaceutical preparations requires attention to ensure the stability of medications after dispensing for patients. Some studies reported that several factors might affect storage practice; these factors include the level of education, gender, the presence of chronic illness income, and incomplete patient counselling about medication storage. Given these points, pharmacists can take simple steps and implement solutions to help eliminate the reoccurrence of errors and to help ensure appropriate storage practices.

REFERENCES

1. European Commission. (2013). Guidelines on good distribution practice of medicinal products for human use. http://ec.europa.eu/health/sites/health/files/files/eudralex/vol-1/2013_c343_01/2013_c343_01_en.pdf. Accessed 25 Sep 2022.
2. Vlieland, N. D., Gardarsdottir, H., Bouvy, M. L., Egberts, T. C., & van den Bemt, B. J. (2016). The majority of patients do not store their biological disease-modifying antirheumatic drugs within the recommended temperature range. *Rheumatology (Oxf)*, 55(4), 704–9.
3. Organization WH: Annex 9: a guide to good storage practices for pharmaceuticals. WHO Technical Report Series 2003. https://www.who.int/medicines/areas/quality_safety/quality_assurance/GuideGoodStoragePracticesTRS908Annex9.pdf?ua=1. Accessed 20 Sep 2022
4. Vlieland, N. D., van Den Bemt, B. J., Bekker, C. L., Bouvy, M. L., Egberts, T. C., & Gardarsdottir, H. (2018). Older patients' compliance with drug storage recommendations. *Drugs & aging*, 35(3), 233-241. <https://doi.org/10.1007/s40266-018-0524-8>
5. Sino, C. G., Sietzema, M., Egberts, T. C., & Schuurmans, M. J. (2014). Medication management capacity in relation to cognition and self-management skills in older people on polypharmacy. *J Nutr Health Aging*, 18(1), 44–9.
6. Renswouw, D. C., Laarhoven, A. C., Haren, M. J., Bouvy, M. L., & Weda, M. (2010). Storage instructions for inhalation capsules: consequences of incorrect storage and adherence in daily practice. *J Pharm Pract*, 23(6), 548–52.