



Technique

Technique to open an ampoule with an "Ampoule Opener" tool

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ARTICLE INFORMATION

Received: August 25, 2020

Revised: December 16, 2020

Available online: December 30, 2020

KEYWORDS

Ampoule opening; Nurses; Drug compounding

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ABSTRACT

Background: The incidence of scratched by ampoule fragments while preparing medicine could harm the nurse. It needs specific tools and techniques that are effective to minimize scratches when opening an ampoule.

Technique: We compared a manual ampoule opening technique and another using a unique tool, the "ampoule opener" developed by research. The trial was carried out on 100 nurses in the health science faculty laboratory of the Muhammadiyah University of Purwokerto and at the Ajibarang Hospital. The safety and convenience variables were assessed to determine the effectiveness of the two techniques. The results showed that using the ampoule opener was proven to be more comfortable and safer from several techniques tested.

Conclusion: The technique of opening the ampoule using the ampoule opener proved to be more comfortable and safer for a nurse.

INTRODUCTION

The procedure to open an ampoule is a somewhat risky procedure that can cause injury to the hand¹. There have been quite a lot of cases of hand injury in the case. The result of interviews in the emergency room and the inpatient rooms in Ajibarang Hospital showed that almost all nurses there had experienced scratches as they were opening the ampoule-- especially in their initial period of working as a nurse. This fact supported previous studies where the incidence of scratching when opening the ampoule is very significant. The highest incidence rate reaches 90.3%, and 37.6% tend to be repeated, namely experiencing injuries more than once²⁻⁴.

Lack of skills, no specific training, and the absence of special tools to open ampoules are among factors that cause the accidents on the nurses⁵. There are various standard techniques to do, including using hands manually, a syringe cap, gauze, cotton balls, and even a plastic syringe⁶. Research on the innovation of ampoule bags as prevention of work accidents had been carried out. To this effort, most respondents considered the ampoule bag to be more effective in preventing injury compared to gauze. However, some respondents thought it was impractical⁷.

Some ampoule opener tools have been developed. One of them is shaped like a clamp/tweezers with a round hole inside⁴. Another study designed a tool using a rubber ring³. The results of these studies were equally positive. The use of these tools to open an ampoule reduced the arm's workload and the scratching injuries. The present research designed an opener called an "ampoule opener" in the shape of a tube with a hole at the outside, made in various sizes to break the ampoule head. This study aimed to compare the ampoule opening technique using the developed "ampoule opener" and other available techniques.

TECHNIQUE

Technique 1. How to Open Ampoule Manually/Without Any Tool

Steps to open the ampoule manually/without any tool is 1) Hold the ampoule tube in the left hand, and grasp its head in the right; 2) Break the head by turning it inward or outward, as shown in (Figure 1).

<https://doi.org/10.30595/medisains.v18i3.8371>

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Figure 1. How to Open Ampoule Manually

Technique 2. How to Open the Ampoule With Gauze

Steps to open the ampoule with gauze is 1) Hold the ampoule; 2) Take the gauze and fold it over the head of the ampoule; 3) Break the ampoule inward or outward, as shown in (Figure 4).



Figure 2. How to Open an Ampoule With a Gauze

Technique 3. How to Open the Ampoule With the Syringe Wrap

Steps to open the ampoule with the syringe wrap is 1) Hold the ampoule; 2) Take the wrapper and fold it over the head

of the ampoule; 3) Break the ampoule inward or outward, as shown in (Figure 5).



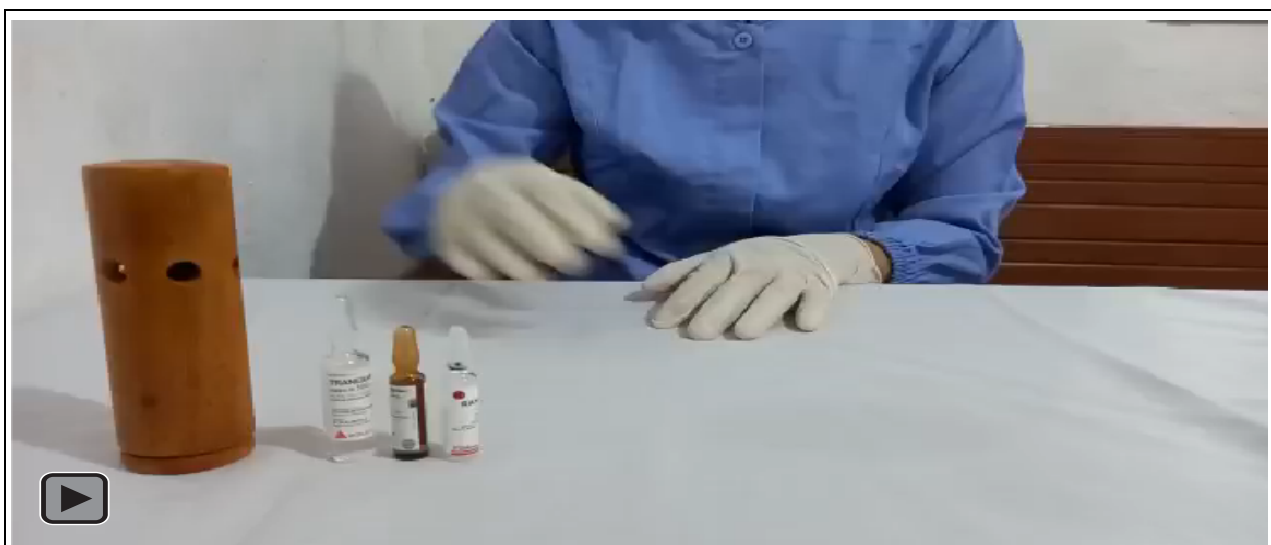
Figure 3. How to Open an Ampoule Using a Syringe Wrap

Technique 4. How to Open the Ampoule Using the "Ampoule Opener" Tool

Steps to open the ampoule using the developed ampoule opener is 1) Insert the ampoule head into one of the holes according to its size; 2) Break the ampoule by turning it forwards or backward; 3) Discard the broken head in the safety box, as shown in (Figure 4).



Figure 4. How to Open an Ampoule With an "Ampoule Opener" Tool



Video 1. The technique to open ampoules using "Ampoule Opener" tool than the other techniques
(Use Adobe Flash Player to view videos)

DISCUSSION

Firstly, this research was done by designing an ampoule opening device, labeled as the "ampoule opener." it is a tube made of wood, with several holes with different diameters as the holder of various-sized ampoule heads. It was designed ergonomically for an easy-use. The way to use it is straightforward. We only need to insert an ampoule head into one of the fitting holes (holder), then turn the opener to the front or back-forth quickly, and then it is done. The broken head will fall into the tube for discarding, as shown in Figure 4.

The ampoule opening techniques were carried out in February-April 2020 with 100 nurses in the health science faculty laboratory, Muhammadiyah University of Purwokerto, and at the Ajibarang Hospital. All the nurses were asked to open the ampoule using techniques 1-4 alternately⁸. The ease and safety of opening the ampoule were observed and asked all respondents. The results showed that all the respondents considered opening an ampoule using the ampoule opener (Technique 4) was more comfortable and safer than the other techniques.

An ampoule is a cylindrical glass container for intravenous solutions; it consists of three parts - the head, neck, and body. The head is marked with a dot to identify the direction to press the nick for opening. The indentation in the neck just below the dot makes the ampoule easy to open. The neck must be broken by hand to access the intravenous solution contained therein; this operations sequence is referred to as ampoule opening¹. The process of opening the ampoule without a tool can be rough and shaky; the medicine inside can be spilled or even contaminated by small glass shards and can also injure the hand. This ampoule opener can help the ampoule open easily. It can guide the pressure in the correct direction, thereby reducing the chance of injury from broken glass. The technique to open ampoules using this tool is much easier than doing it manually (Video 1). All the respondents revealed that using this tool is easier to do than manually or only with the gauze and syringes. They also thought that it reduces the risk of being scratched.

CONCLUSIONS AND RECOMMENDATION

The technique of opening the ampoule using the "ampoule opener" is proven to be comfortable and safe compared to others. Nurses are expected to be more careful when they open an ampoule. Its solidity and sharpness can scratch their hand, and the debris of the broken glass of its head

may fall into the ampoule containing drugs, which can cause harm to the patient. We recommend that nurses use this "ampoule opener," statistically proven to be more comfortable and safer for their works.

REFERENCES

1. Hirano M, Ishii A, Ueda N, et al. Analysis of upper-limb movements to open glass ampoules and training methods in nursing education. *J Biomech Sci Eng.* 2019;14(2):19-37. doi:10.1299/jbse.19-00037
2. Parker MRJ. The use of protective gloves, the incidence of ampoule injury and the prevalence of hand laceration amongst anaesthetic personnel. *Anaesthesia.* 1995;50(8):726-729. doi:https://doi.org/10.1111/j.1365-2044.1995.tb06105.x
3. Liu B-S, Lee J-T, Lien C-W. Ergonomic evaluation of novel tool for snap-off the neck of ampoule. *Work.* 2012;41:1174-1177. doi:10.3233/WOR-2012-0300-1174
4. Lien C-W, Liu P-H. Ergonomic analysis and survey of sharp injuries on opening the glass ampoule. In: *4th International Conference on Industrial Engineering and Applications (ICIEA)*. Vol 10. New York: IEEE; 2017:26-30. doi:10.1109/IEA.2017.7939172
5. Puspitasari S, Supriyanto, Ginanjar R. Faktor-Faktor yang Berhubungan dengan Kecelakaan Kerja Tertusuk Jarum Suntik atau Benda Tajam Lainnya pada Perawat di RSUD Leuwiliang Kabupaten Bogor Tahun 2018. *Promot J Mhs Kesehat Masy.* 2019;2(2):163-171. doi:http://dx.doi.org/10.32832/pro.v2i2.1803
6. Chiannikulchai N, Kejkornkaew S. A Comparative Study of Ampoule Breaking and Resultant Injury among Registered Nurses. *Pacific Rim Int J Nurs Res.* 2020;24(1):89-101.
7. Olfah Y, Ghofur A, Bintari NA. Efektivitas Kantong Ampul Suatu Inovasi untuk Pencegahan Kecelakaan Kerja. In: *Proceeding of The 11th University Research Colloquium 2020: Bidang MIPA Dan Kesehatan*. Yogyakarta: Universitas 'Aisyiyah Yogyakarta; 2020:177-185.
8. Festing MFW. The "completely randomised" and the "randomised block" are the only experimental designs suitable for widespread use in pre-clinical research. *Sci Rep.* 2020;10(1):17577. doi:10.1038/s41598-020-74538-3