

## Letter

## Preparation of COVID-19 vaccines in hospital pharmacies: a half-year report from Slovakia

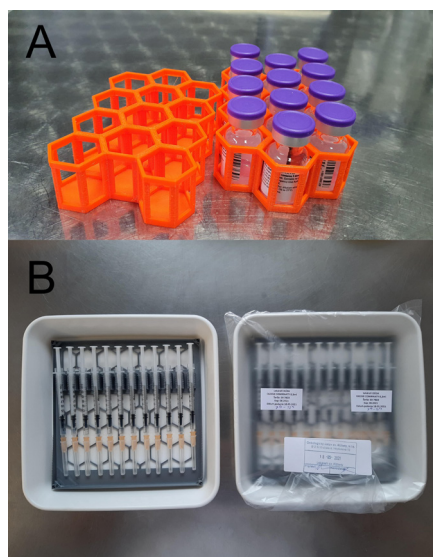
On 21 December 2020 the European Medicines Agency recommended the registration of the first vaccine for the prophylaxis of COVID-19 from Pfizer-BioNTech under the trade name Comirnaty.<sup>1</sup> On 26 December the first person was vaccinated in Slovakia, and since that date vaccination has continued throughout the country. As this vaccine requires special handling and dilution before administration, it is beneficial to prepare it in sterile compounding units of hospital pharmacies.

In Europe, aseptic preparation of parenterals is considered a crucial process as errors in preparation may lead to microbial contamination of the product which poses a risk of harming the patient.<sup>2</sup> Results from many studies indicate that pharmacists prepare syringes with less contamination than nurses thanks to their aseptic skills and environmental aspects in pharmacies.<sup>3</sup>

In this letter we summarise the number of prepared doses of vaccines and report vaccine preparation errors in hospital pharmacies of five hospitals in Slovakia: St Elisabeth Cancer Institute in Bratislava, University Hospital Bratislava, Hospital of L Derer and Saints Cyril and Methodius Hospital and AGEL Hospitals in Komárno and Zvolen.

The Institute for Safe Medication Practices listed potential medication errors associated with COVID-19 vaccines. Errors related to the preparation of Pfizer-BioNTech vaccine may occur during dilution. Most common incidents include using the wrong volume of diluent, using the wrong diluent (eg, sterile water instead of saline solution) or not diluting the vaccine at all, leading to the administration of a higher dose than recommended.<sup>4,5</sup>

In total, 180 793 doses of the vaccine were supposed to be prepared in hospital pharmacies in the time period from 28 December 2020 to 2 July 2021. Forty-eight doses were wasted due to preparation errors, four vials broke and four vials were diluted using the wrong volume. One more dose was wasted as the pre-filled syringe was lost during transportation to the vaccination centre. In reality, 180 745 doses were prepared, which means errors occurred in 0.027% of doses. From the




**Figure 1** (A) Three-dimensional printed stands for vials. (B) Three-dimensional printed stands for 12 syringes prefilled with the vaccine sealed in a plastic bag.

site of the pharmacy, no significant medication errors occurred resulting in harm to the patient.

The most common error documented was wastage of the vaccine caused by the vial or syringe falling over. These errors were resolved by implementing the use of customised three-dimensional printed stands for vials (figure 1A) and syringes (figure 1B), which secured them in place and reduced the potential of falling or moving, resulting in a lower potential of wasting the vaccine. In other cases the vaccine was diluted with the wrong volume of diluent. These incidents occurred only in the first weeks of vaccine preparation and were resolved as the staff gained more skills with the preparation.

After more than half a year of experience, we conclude that the preparation of vaccines in hospital pharmacies is effective as it releases the burden of preparation from nurses and therefore leads to a faster vaccination process. However, most importantly, it has been shown to be safe as only minor medication errors occurred with no harm to the patient. Preparing COVID-19 vaccines in hospital pharmacies has turned out to be the right choice.

**Boris Dudík** <sup>1,2</sup>, **Lubica Slimáková**,<sup>3</sup> **Hajnalka Komjáthy**,<sup>4</sup> **Melisa Švecová**,<sup>5</sup> **Andrea Bundzelová**,<sup>6</sup> **Bianka Oboňová**,<sup>2,7</sup> **Adriána Šusterová**,<sup>3</sup> **Katarína Tóthová**<sup>4</sup>

<sup>1</sup>Department of Cell and Molecular Biology of Drugs, Comenius University in Bratislava, Bratislava, Slovakia

<sup>2</sup>Pharmacy of St Elisabeth, St Elisabeth Cancer Institute, Bratislava, Slovakia

<sup>3</sup>Hospital pharmacy, Hospital of L. Derer, University Hospital Bratislava, Bratislava, Slovakia

<sup>4</sup>Hospital Pharmacy, AGEL General Hospital, Komárno, Slovakia

<sup>5</sup>Hospital Pharmacy, AGEL General Hospital, Zvolen, Slovakia

<sup>6</sup>Hospital Pharmacy, Hospital of Saints Cyril and Methodius, University Hospital Bratislava, Bratislava, Slovakia

<sup>7</sup>Department of Chemical Theory of Drugs, Comenius University in Bratislava, Bratislava, Slovakia

**Correspondence to** Dr Boris Dudík, Department of Cell and Molecular Biology of Drugs, Comenius University in Bratislava, Bratislava, Slovakia; dudik8@uniba.sk

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### ORCID iD

Boris Dudík <http://orcid.org/0000-0003-0442-8656>

### REFERENCES

- European Medicines Agency. EMA recommends first COVID-19 vaccine for authorisation in the EU. Available: <https://www.ema.europa.eu/en/news/ema-recommends-first-covid-19-vaccine-authorisation-eu> [Accessed 23 July 2021].
- Scheepers H, Beaney AM, Le Brun P, et al. Aseptic preparation of parenteral medicinal products in healthcare establishments in Europe. *Eur J Hosp Pharm* 2016;**23**:50–3.
- Suvikas-Peltonen E, Hakoinen S, Celikkayalar E, et al. Incorrect aseptic techniques in medicine preparation and recommendations for safer practices: a systematic review. *Eur J Hosp Pharm* 2017;**24**:175–81.
- Institute for Safe Medication Practices. Any new process poses a risk for errors: learning from 4 months of coronavirus disease 2019 (COVID-19) vaccinations. Available: <https://www.ismp.org/resources/any-new-process-poses-risk-errors-learning-4-months-coronavirus-disease-2019-covid-19> [Accessed 23 July 2021].
- Distraction nurse gives woman 6 doses of COVID vaccine in a single shot. Available: <https://www.cbsnews.com/news/covid-vaccine-six-doses-distraction-nurse/> [Accessed 23 July 2021].