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Letter to the Editor

Ensuring safety: a reporting system for residual narcotics in intravenous fluids

TO THE EDITOR: Postoperative pain management is essential for recovery and patient satisfaction, and patient-controlled analgesia (PCA) is an effective tool for optimal pain relief. PCA involves the dilution of various opioid analgesics in an infusion solution. Opioid dilution allows precise dose titration to achieve effective pain control with minimal side effects, adhering to the minimal effective analgesic concentration concept and enabling tailored analgesia for individual patients [1,2]. Lower opioid concentrations reduce overdose risk and the associated side effects, such as respiratory depression. Opioids remain a crucial part of the journey of many patients from surgery to full recovery [3]. However, over the last few decades, unfettered opioid use has put patients and society at risk, necessitating caution to mitigate these dangers [3]. The recent increase in narcotic misuse and overdose deaths demonstrates the urgent need for effective narcotic monitoring systems. Therefore, international organizations, such as the International Narcotics Control Board, provide globally recognized guidelines that assist countries in developing effective narcotic control systems that consider factors such as resources, infrastructure, and regional challenges.

In South Korea, the Narcotics Information Management System (NIMS) (www.nims.or.kr) for medical narcotics has been established to ensure the proper handling and management of these substances through electronic reporting of all details related to the import, export, manufacture, use, sale, purchase, preparation, administration, transfer, receipt, and disposal of narcotics to the Ministry of Food and Drug Safety. All administration records and disposed of quantities of narcotics prescribed in institutions must be reported according to relevant regulations, ensuring close monitoring to prevent potential abuse and misuse. However, a notable gap exists in the management of narcotics diluted in intravenous (IV) fluids. The NIHS stipulates that if narcotics diluted in IV fluids are administered to a patient, and any solution remains, it should be classified as pharmaceutical waste because it has been transformed from its original form. Therefore, narcotics mixed with IV fluids are not included in post-use disposal reports in South Korea (Supplementary File 1). Current regulations classify diluted narcotics as simple waste, exempting them from the stringent management protocols applied to undiluted narcotics. Therefore, most institutions do not monitor residual narcotics in intravenous fluid.

Despite being classified as waste, diluted narcotics in IV fluids still pose a substantial risk of misuse and diversion owing to inadequate regulatory oversight under current guidelines. The remaining narcotics in the IV solution retain their pharmacological potency, making them viable targets for illicit use. Although drug misuse is commonly associated with personality problems and comorbid psychological disorders, social and environmental factors also play a crucial role. The ease of access to opioids and the high-stress work environment among healthcare professionals significantly increase the risk of opioid diversion and misuse [4]. A significant issue associated with the adverse effects of PCA is the unanticipated or unauthorized administration of IV bolus doses of analgesics by family, friends, or hospital staff [1].

Recently, our institution implemented a new Order Communication System (OCS) to handle residual narcotics in intravenous fluid (Fig. 1). The PCA device displays the patient's opioid usage in real-time. After PCA use is completed, the nursing staff can input the remaining volume of the infusion solution displayed on the PCA device into the OCS, which automatically calculates the residual narcotics; the controlled narcotics disposal record form generates an electronic medical record (EMR) entry for storage. Subsequently, the diluted narcotics are delivered to the pharmacy, and the remaining amount is verified before following the disposal procedure (Supplementary File 2). This system applies not only to medications used in PCA but also to all diluted narcotics prescribed throughout our institution, including in the operating rooms, intensive care units, and wards. Expanding the hospital-wide system could enhance safety by preventing narcotic misuse, improving protection for both patients and staff and enabling proactive compli-

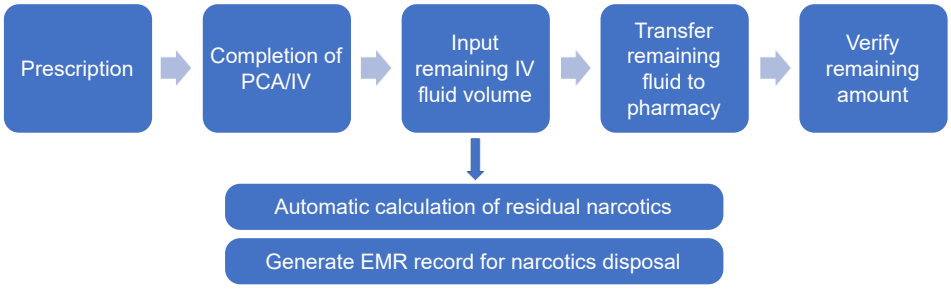

Fig. 1. Workflow of data repository for the narcotics diluted in intravenous fluids. PCA: patient-controlled analgesia, IV: intravenous, EMR: electronic medical record.

ance with potential future narcotic management regulations. However, this may increase the workload of healthcare staff, particularly in ICUs, where rapidly changing patient conditions require additional time and attention for narcotic management.

We anticipate that this reporting system will not only manage the remaining narcotics in IV fluid but also reduce the amount of narcotics disposed of, leading to healthcare cost savings. We analyzed the residual narcotic statistics recorded in the EMR over a specified period and categorized the disposal amounts according to surgery type. Thus, we identified surgical procedures in which more than half of the narcotics were disposed of. Subsequently, we reduced the amount of opioids prepared for PCA by half for these surgical procedures, successfully decreasing both prescribed opioid amounts and residual disposal volumes.

Oh et al. [5] introduced a method for extracting and managing data from PCA devices in order to store PCA usage information. This system minimizes human error by directly extracting and storing data from the device. However, this incurs initial costs for the system setup and maintenance, the use of PCA equipment capable of data storage, specialized software, and ongoing system management. In contrast, the system used at our institution allows manual entry of the remaining infusion volumes, which can then be stored in the EMR in residual narcotic amounts. Although this is prone to manual input errors and omissions, it is straightforward and does not require specialized technology or equipment. Despite this system does not include as much information as previously introduced, it provides a straightforward method for storing data in the EMR without a specific data management system.

The implementation of a system to monitor the residual amounts of diluted narcotics in PCA devices is essential to ensure the safe handling of narcotics and improve postoperative pain management. By leveraging this system, healthcare providers can enhance patient safety, optimize drug utilization, and develop predictive models for narcotic use in various surgical procedures. Additionally, this approach addresses the critical issues of narcotic abuse and overdose and contributes to broader efforts to mitigate public health concerns. I hope that this letter will encourage further discussion of loopholes in the narcotic reporting system and developments in this critical area of anesthesiology and pain management.

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SUPPLEMENTARY MATERIALS

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CONFLICTS OF INTEREST

No potential conflict of interest relevant to this article was reported.

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