Letter to the Editor
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Preventing Blood Transfusion Errors: How Personal Digital Assistants Can Improve Patient Safety

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Dear Editor,

Personal digital assistants (PDAs) can potentially improve patient safety, streamline processes, and enhance service efficiency in the healthcare industry. In the field of transfusion, PDAs can be used to perform various tasks, such as verifying patient identification, documenting transfusion reactions, recording transfusion information, and tracking blood inventory [1-3]. However, real-world data regarding the use of PDAs in transfusion practices in Korean clinical settings are scarce. Pusan National University Yangsan Hospital, Yangsan, Korea, personnel have used PDAs for pretransfusion bedside checks since 2018 [4]. We report the status of PDA use in transfusion practices at our hospital and the extent to which PDAs helped prevent ABO-incompatible (ABOi) transfusions. We expect that our findings will assist other hospitals when considering the introduction of PDAs into their transfusion practices.

Our study was a retrospective analysis of PDA data collected for transfusions performed at a single tertiary hospital from November 2021 to July 2022. Transfusions in operating rooms, anesthesia recovery rooms, delivery rooms, and outpatient clinics were excluded from the study as PDAs were not used due to Wi-Fi connection issues. Data were collected from the hospital's electronic database and included patient ABO and RhD blood group, ABO and RhD blood group of transfusion blood components, transfusion blood component type, transfusion blood component identification number, ward information, and date of PDA use. Medical staff used PDAs during bedside checks to scan patient wristband barcodes and blood component barcodes to ensure a match. When barcode scans did not match, an alert displayed on the PDA screen and further transfusion procedures using the PDA could not be performed, thereby avoiding incorrect blood transfusion events. We defined the PDA use rate as the number of units of blood components transfused using PDAs for bedside checks divided by the total number of units of blood components transfused. The PDA mismatch rate was defined as the number of mismatched units of blood components divided by the number of units of blood components transfused using PDAs for bedside checks. This study was approved by the Institutional Review Board of Pusan National University Yangsan Hospital (No. 05-2021-240).

Among 39,250 transfused blood components, PDA bedside checks were used for 37,271 of the cases, resulting in an overall PDA use rate of 95.0%. The PDA use rates differed among departments with the pediatric general ward having the lowest PDA use rate (Fig. 1). We assessed the extent to which PDAs helped prevent ABOi transfusion accidents. Sixty-three mis-

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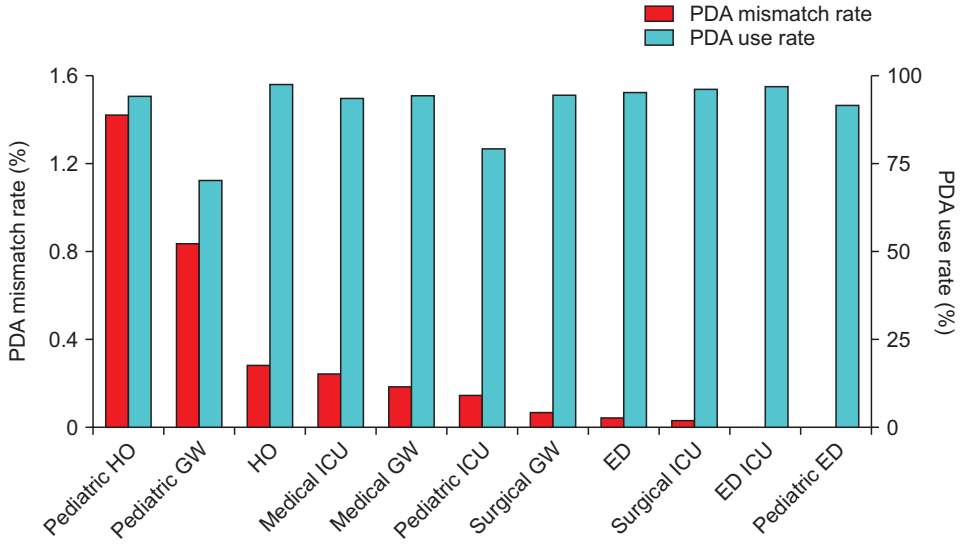

Fig. 1. PDA use and mismatch rates of each department. The results are ordered according to the PDA mismatch rate.
Abbreviations: PDA, personal digital assistant; HO, hematology and oncology; ED, emergency department; ICU, intensive care unit; GW, general ward.

Table 1. PDA-identified mismatch cases by ABO compatibility

ABO compatibility	Mismatch cases, N (%)	Number of mismatch cases/total number of transfusions that used PDAs for bedside checks (%)
ABO-incompatible	23 (36.5)	0.06
RBCs	13 (20.6)	0.03
PLTs	9 (14.3)	0.02
FFP	1 (1.6)	0.00
ABO-compatible	40 (63.5)	0.11
RBCs	19 (30.2)	0.05
PLTs	20 (31.8)	0.05
FFP	1 (1.6)	0.00
Total	63	0.17

Abbreviations: PDA, personal digital assistant; RBC, red blood cell; PLT, platelet; FFP, fresh frozen plasma.

matches were detected over a 9-month period, resulting in an overall PDA mismatch rate of 0.17%. The PDA mismatch rate was highest in the Pediatric Hematology and Oncology department. Among the 63 mismatches, 32 were blood component transfusion of red blood cells (RBCs), 29 were blood component transfusion of platelets (PLTs), and two were blood component transfusion of fresh frozen plasma (FFP). ABO incompatibility was identified in 23 (36.5%) of the mismatches, consisting of 13 (20.6%) RBC transfusions, nine (14.3%) PLT transfusions, and one (1.6%) FFP transfusion (Table 1). No RhD incompatibility mismatches were detected. The remaining 40 mismatches were blood components that were ABO-compatible with the patient but prescribed for another patient.

Serious Hazards of Transfusion (SHOT) defines near-miss events as "any error which if undetected, could result in the determination of a wrong blood group or transfusion of an incorrect component, but was recognized before the transfusion took place" [3]. The 63 mismatches identified in our study were near-miss events that could have led to the transfusion of incorrect blood component had the medical staff not use the PDAs, including 23 ABOi transfusions. Transfusion-related incidents at our hospital are manually reported to the transfusion management division by the medical staff on a voluntary basis [5]. The number of near-miss events reported to the transfusion management division during the study period was 0. The discrepancy between the number of near-miss events in the PDA data and the manual reporting system may be attributed to underreporting [6, 7]. While near-miss events occur more frequently than actual accidents, it can be challenging to identify them if no system is in place that can detect them at the time of occur-

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rence or that allows for subsequent review [3]. Analyzing near-misses can provide insights into factors related to transfusion errors.

In conclusion, the use of PDAs helped prevent 63 (0.17%) incorrect blood component transfusions during the 9-month period of the study, including 23 (0.06%) ABOi transfusions. The analysis of the PDA data helped identify underreported near-miss transfusion events, which will be beneficial in implementing corrective measures. By incorporating PDAs into transfusion practices, hospitals can improve the quality of care provided to patients and reduce the risk of transfusion-associated incidents.

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None.

AUTHOR CONTRIBUTIONS

Lee HJ supervised this study. Ji E, Koo KL, Min HK, Lee SM, and Oh SH collected the data. Ji E analyzed the data. Ji E and Lee HJ wrote and revised the manuscript. All authors approved the final version of the manuscript.

CONFLICTS OF INTEREST

None declared.

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