Role of Stocktaking Application using Barcode Scanning in Improving Stock Conformity in Hospital Pharmacy Installation

Peran Aplikasi Stock Opname Dengan Barcode Scanning dalam Meningkatkan Kesesuaian Stok pada Instalasi Farmasi Rumah Sakit

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ABSTRACT

One of the most important managerial activities for hospitals is an internal control activity for drug supplies, including during the Covid-19 pandemic. A preliminary study at Graha Sehat Medika hospital (GSM hospital) showed that the inaccuracy of stocktaking results in the last six months was 40% -70%. The solution taken is the use of “SO PINTAR RS” application with barcode scanning. The purpose of this study was to determine the effectiveness of “SO PINTAR RS” application with barcode scanning in improving the accuracy of the stocktaking results at GSM hospital. The method used in this research is quasi-experimental. The data used is primary data from stocktaking activities in July-November 2020. A total of 162 drug items were used as research samples taken from the purposive sampling technique. The discrepancy between drug items in the hospital management information system (HIS) and the physical count results before and after using the application was measured in this study. The analysis of the results was carried out through nonparametric statistical tests with the Wilcoxon test. The results showed a significant difference in the results of stocktaking activities before and after using “SO PINTAR RS” application (p <0.001). The difference between the calculation results of the stocktaking with the data in the HIS decreased significantly. In addition, using this application can reduce the number of staff involved and reduce the loss of uncounted medicine items. This application is still not linked to HIS, so it is necessary to manually merge the results into HIS.

Keywords: Accurate, pandemic, stocktaking

ABSTRAK


Kata Kunci: Stock opname, akurat, pandemic

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INTRODUCTION

One of the medical support units in the hospital, hospital pharmacy installation has a large financial contribution to the hospital services (1). The large composition of pharmaceutical financing in hospitals indicates the importance of internal control of pharmaceutical supplies (2,3). The internal control activities for pharmaceutical supplies are stocktaking and stock-card filling in the pharmacy (4).

Stocktaking activity at the pharmacy installation of Graha Sehat Medika (GSM) hospital is an activity to carefully and accurately calculate the physical number of drugs and medical supplies in the pharmacy installation. The results of this calculation are adjusted to the data in the Hospital Information System (HIS) (5). Since the early establishment of GSM Hospital, this hospital has used HIS in drug logistics management. The implementation of stocktaking activities at GSM Hospital is carried out monthly, like in other hospitals (6). This mechanism, which requires some staff and their skills, is a challenge for hospitals. Staff availability increasingly becomes a major challenge for hospitals during the Covid-19 pandemic due to the implementation of social restrictions, health protocols, and periodic checks carried out by all companies, including hospitals (7,8). The increasing number of patients and changes in the standard of therapy that occur during the Covid-19 pandemic also necessitate the promptness of drug availability. Therefore, the frequency and accuracy of stocktaking results became increasingly important.

During this pandemic, the stocktaking activities at GSM Hospital faced several problems, the inaccuracy of stocktaking results and a large quantity of personnel involved. Based on a preliminary study, the gap between the results of the physical calculation in the period of November 2019 - June 2020 compared to the data on HIS is 40%-70% of drug items. The problem of discrepancy in stocktaking results is not only experienced by GSM hospital, but this problem also occurs in other companies other than hospitals (9).

Several factors cause discrepancies in the stocktaking results carried out in GSM hospital. One of the factors that cause this inaccuracy is the manual method of stocktaking. The use of manual methods using drug list instruments printed on several sheets of paper can cause problems when combining the written results. The main problem is writing that cannot be read or overwritten. Another factor is fatigue due to long shifts (during duty hours, especially the night shift and continued stocktaking in the next day) of staff at the pharmacy installation. It can affect the quality of the physical calculations of drugs in the pharmacy.

The demands for speed and accuracy of drug stocktaking results encourage the digital technology development in stocktaking mechanisms. Several companies remotely carry out stocktaking activities using drones, remote video, or other digital technologies (10). The use of digital technology in the stocktaking process is currently being established. At present, the Association of Pharmacists in America is developing a stock control system using barcodes (11). Furthermore, research by Asri also developed a stocktaking method using a Quick Response Code Based on Android (12,13). GSM Hospital changed the stocktaking method using an application called "SO PINTAR RS" by barcode scanning. This application is expected to provide several advantages regarding the efficiency of resources, faster recording process, and more accurate stock suitability. Since the application is being developed, it is necessary to conduct a study to determine the effectiveness of the "SO PINTAR RS" application using barcode scanning in increasing the accuracy of stocktaking results at GSM hospital.

METHOD

This study was conducted using a quasi-experimental method (14) at the Pharmacy Installation of Graha Sehat Medika Hospital from July to November 2020. The population of the study was all lists of drugs meting the inclusion and exclusion criteria. The inclusion criteria of this study were all lists of medications classified as oral preparations, ointments, eye drops and ear drops, and mouthwashes in the Pharmacy Installation of GSM hospital. The classification of these drugs in the GSM RS stocktaking system is as oral drugs. The exclusion criteria for this study are drugs that expired in July 2020, drugs classified as injection preparations and infusion fluids, as well as medical devices. The sample obtained in this research is 616 oral drug items in GSM Hospital.

Data from the results of stocktaking activities from July to October 2020 (before the intervention) and November 2020 (after the intervention) were collected. The differences between the results and those in HIS were investigated. The initial HIS data were using the data on the number of oral drugs in the HIS on the stocktaking date. The data that have been input in excel form were printed as an instrument in the physical calculation of drugs during manual stocktaking. On the stocktaking using an application equipped with barcode scanning, the data from the stocktaking were switched to using data from the stock card fitted with a barcode. This application stores all drug items that have been provided with barcodes (Table 1).

The comparison of the results before and after the intervention was obtained from stocktaking data for October and November 2020. The accuracy differences after using the application were tested using the nonparametric 2 related samples through the Wilcoxon test using the Statistical Package for the Social Sciences (SPSS) program (13). The indicators used to assess the effectiveness of using this application are the number of staff involved, the completeness of the drug items, and the degree of the differences in the stocktaking results (real amount per drug item calculated) with the number of drugs on HIS.

RESULT

This study was conducted to determine the application effectiveness of barcode scanning. The study results showed a reduction in the number of human resources involved in stocktaking activities and a smaller difference in the physical calculation of the amount per drug item resulting from stocktaking and the number of drugs in HIS. Human Resources Participated in Stocktaking

Human resources (HR) involved in stocktaking activities when using the application with barcode scanning is greatly reduced. Before implementing this application, 18 people were involved in the stocktaking process, while
Role of Stocktaking Application using Barcode....

Table 1. Differences in stocktaking procedures before and after using the application

<table>
<thead>
<tr>
<th>Function</th>
<th>Manual method</th>
<th>“SO PINTAR” Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stocktaking duration</td>
<td>Held simultaneously in one day</td>
<td>Can be done in a few days</td>
</tr>
<tr>
<td>Instrument</td>
<td>The lists of drug names typed in excel form are printed, and the columns for the number of drugs are left blank and filled in during the physical count. Paper is printed in triplicate for warehouse locations, services, and floor stock.</td>
<td>Stocktaking application completed with barcode code, drug name, name of storage warehouse with number of drugs resulted from stocktaking, number of drugs in HIS, differences of the amount, input date.</td>
</tr>
<tr>
<td>Data filling and recording of stocktaking results</td>
<td>Physical count results from several locations are collected, accumulated, and then inputted into excel form.</td>
<td>The physical count data are directly adjusted to the stock cards equipped with a barcode. If they match, the stock cards are given to the recording team and inputted in the application. Drug searching is done instantly using barcode scanning. The results can also display the current date of input results on the application.</td>
</tr>
<tr>
<td>Data from HIS</td>
<td>All drug data in the HIS are taken when the initial stocktaking (physical calculation) from HIS is entered in the excel form.</td>
<td>The data from the drug shelf where physical calculations are carried out is taken from HIS and transferred to the application. Only a few targeted drugs are finished in the stocktaking on that particular day. While the physical count is going on and only on some drug items. If drugs are removed during the physical count process, corrections are made directly to the existing stock card. After the input process for each drug name item in the application is complete, all transactions for the drug item can run normally.</td>
</tr>
<tr>
<td>Service break duration</td>
<td>1 day (on holiday)</td>
<td></td>
</tr>
<tr>
<td>Conditions of recording drug transactions during emergency services</td>
<td>Recording is done on paper when drugs are removed. Then, the results of the physical count per drug item are reduced by the number of items removed.</td>
<td></td>
</tr>
</tbody>
</table>

Table 2. Comparison of the number of staff involved in stocktaking

<table>
<thead>
<tr>
<th>Job Description</th>
<th>Before Application Implementation</th>
<th>After Application Implementation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number</td>
<td>Working Unit</td>
</tr>
<tr>
<td>Physical Counting</td>
<td>12</td>
<td>Pharmacy</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>Head of Medical Support</td>
</tr>
<tr>
<td>Recording Team</td>
<td>2</td>
<td>Hospital IT Team</td>
</tr>
<tr>
<td>Control Team</td>
<td>3</td>
<td>Accounting</td>
</tr>
</tbody>
</table>

Differences in the Completeness of Oral Drug Items after Application Implementation

The results of manual stocktaking carried out in July and October 2020 obtained 574 oral drug items, while the stocktaking results using the application in November 2020, which were carried out twice, obtained 616 oral drug items. It means that as many as 42 oral drug items have not been calculated during the manual method because these drugs were not included in the stocktaking calculation lists.

Differences in the Number of Oral Drug Items Resulted from Stocktaking after Application Implementation

The stocktaking in July and October 2020 resulted in 574 oral drug items that were physically counted. There were as many as 31.8% of drug items that must be adjusted in HIS. Meanwhile, in October 2020, 54.2% of oral drug items required adjustment in HIS.

In November 2020, stocktaking was carried out through “SO PINTAR RS” application using barcode scanning. The stocktaking was carried out twice, at the beginning and the end of November 2020. Based on the stocktaking results at the beginning of the month, there was an additional of 42 drug items from the previous list of oral drugs. After adjusting the data in HIS at the beginning of the month, the stocktaking was repeated at the end of November 2020. The results showed a difference or adjustment of only seven oral medicine items (Table 2). The Wilcoxon test results showed a significant difference (p<0.001) in the percentage of adjustments made in November (after application use) compared to July and October (before application use).

Table 3. Stocktaking results of oral medicine for July - November 2020

<table>
<thead>
<tr>
<th>Result</th>
<th>Before Application</th>
<th>After Application</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>July 2020</td>
<td>October 2020</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>%</td>
</tr>
<tr>
<td>Without adjustment</td>
<td>349</td>
<td>56.2</td>
</tr>
<tr>
<td>Negative Adjustment</td>
<td>120</td>
<td>22.5</td>
</tr>
<tr>
<td>Positive Adjustment</td>
<td>128</td>
<td>20.6</td>
</tr>
</tbody>
</table>

Note: Without adjustment = physical count stock = stock in HIS
Negative adjustment = physical count stock < stock in HIS
Positive adjustment = physical count stock > stock in HIS

DISCUSSION

The stocktaking activity is one of the logistics managerial
activities in the hospital pharmacy installation. This activity aims to obtain the actual physical stock of all item drugs in the pharmacy (10,15,16). The inaccurate results of the stocktaking at GSM hospital are minimized by the stocktaking application using barcode scanning. In addition to increasing the accuracy of stocktaking results, the application also reduces the need for implementing staff.

Benefits of Stocktaking Application on the Human Resource Required

The implementation of stocktaking using the application with barcode scanning requires smaller human resources, only six people, compared to manual stocktaking, which requires 18 people. Stocktaking activities using the application can be carried out during working hours, within a few days, and only involve the management team without involving pharmacy unit staff; thus, it also minimize employee costs. In the manual stocktaking method, the process is carried out in one day, so it extends the working hours and results in fatigue, result inaccuracy, and employee costs (17). The low number of staff involved and a faster operating time make the stocktaking system using the application suitable to be applied during a pandemic that faces the challenges of staff limitations and restrictions (8,18). It is in line with previous research that utilized information technology in logistics management in pharmaceutical installations during the Covid-19 pandemic (11,19,20).

Completeness of Oral Drug Items Before and After Application Implementation

Stocktaking by using the application is proven to completely identify drugs that were not previously identified through manual methods. Stocktaking activities using this application found 42 items of oral medications that were not stock taken before. The stocktaking application allows drug calculations to be carried out directly at the warehouse of the drug preparation, which is then directly adjusted to the stock card equipped with a barcode. The stock card becomes data for recording the results in the application. This process can be done in a few days because the application can save the date and time of recording so that the drug calculation process can be carried out less rushed and more accurately (11).

Stocktaking before using stocktaking applications with barcode scanning was carried out by physical calculations of drugs in accordance with the list of drug names printed by the accounting department. The drug name list follows the results of the previous period stocktaking in excel format. Due to the large number of drug lists that must be physically counted at each drug storage post, the physical count team only counts the drugs whose names are listed. Therefore, several drug items are not calculated during stocktaking because they are not itemized in the list. Inaccuracies that affect the accuracy of stocktaking results in manual methods were also found in previous studies (1,4).

The Conformity of Drug Items after Stocktaking Application Implementation

The results showed a significant decrease in the discrepancy in the number per drug item from the physical count with the data in HIS. This application with barcode scanning is proven to reduce the adjustment process in recording results on HIS. The searching process for drug names using the application can be done quickly and precisely. In addition, the recording is also more rapidly and structured. The results of physical calculations are also more accurate because the aim is not being fast but precise. Adjustments that must be made during manual stocktaking are greater than using the application. It can be influenced by the number of drug items that must be physically counted for one day using a drug list instrument printed in papers. This method is prone to errors caused by unreadable writing (bad writing and overwriting), difficulty collecting the recording results of the physical count of one drug item carried out in several pharmacy storages, and some lost instrument paper during the physical count process. Similar problems were found in several studies that evaluate the manual stocktaking process (1,4,17).

Because the data used in this study are data on existing stock cards, the pharmacy staff must fill in the stock cards according to standard operating procedures for filling existing stock cards. Due to the recalculation and control during the implementation of stocktaking using this application, improper stock cards can be immediately corrected, and feedback can be directly provided to the existing pharmacy staff.

The use of stocktaking application with barcode scanning during stocktaking activities effectively increases the stock data accuracy in the recording system and real stock (11). The effect of the implementation is not only on accuracy; it also reduces the number of staff, increases the completeness of the drugs identified, and the suitability of the stock. These results can be the basis for management to expand the implementation of the system by bridging between the application and HIS because the end result of the stocktaking using this application must be transferred manually to HIS.

REFERENCES


