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The Effect of Clinical Decision Support System on the Success of Respirative Syncytial Virus (RSV) Prophylaxis

Klinik Karar Destek Sisteminin Respiratuvar Sinsityal Virüs (RSV) Profilaksi Başarısı Üzerindeki Etkisi

© Gizem Karkin Tozlu¹, © İpek Bozkurt², © Serdar Kula¹

¹Department of Pediatric Cardiology, Gazi University Faculty of Medicine, Ankara, Türkiye

²Gazi University Faculty of Medicine, Ankara, Türkiye

ABSTRACT

Objective: The aim was to examine the increase in the rate of respiratory syncytial virus (RSV) prophylaxis through a clinical decision support system (CDSS) added to the hospital information management system (HIS) and to determine the rate of increase before and after CDSS.

Methods: In October 2023, a CDSS was defined in HIS following the RSV prophylaxis indication protocol. To measure the effect of CDSS, and to determine the patients who need to receive RSV prophylaxis between 2021 and 2024, the drug reports registered on HIS were analyzed retrospectively with the code "B97.4- RSV, the causative agent of diseases classified in other sections," while the number of patients who started prophylaxis was recorded throughout three consecutive seasons.

Results: Thirty-one patients between 2021-2022, 42 patients between 2022-2023 and 68 patients between 2023-2024 were immunized by issuing a report for RSV prophylaxis. According to these data, while there was a 35% increase in the prophylaxis rate before CDSS compared to the previous season, after CDSS, there was an increase to 61%.

Conclusion: Systemic alerts added to hospital systems create significant differences in the treatment and follow-up of patients, considering the busy workload of healthcare professionals.

Keywords: RSV prophylaxis, palivizumab, clinical decision support system

ÖZ

Amaç: Hastane bilgi yönetim sistemine (HBYS) eklenen bir klinik karar destek sistemi (KKDS) aracılığıyla respiratuvar sinsityal virüs (RSV) profilaksisi oranındaki artışa bakılması ve KKDS öncesi ve sonrası artış oranının belirlenmesi amaçlanmıştır.

Yöntemler: Ekim 2023'te HBYS'ye RSV profilaksisi endikasyon protokolüne uygun olarak bir KKDS tanımlanmıştır. KKDS'nin etkisini ölçmek için 2021-2024 yılları arasında RSV profilaksisi alması gerekli hastaları belirlemek amacıyla HBYS üzerinde kayıtlı ilaç raporları "B97.4- RSV, diğer bölümlerde sınıflanmış hastalıkların etkeni" kodu ile retrospektif olarak belirlenip profilaksi başlanan hasta sayıları ardışık üç sezon boyunca kaydedilmiştir.

Bulgular: 2021-2022 yılları arasında 31 hasta, 2022-2023 yılları arasında 42 hasta, 2023-2024 yılları arasında 68 hastaya RSV profilaksisi için rapor çıkarılarak bağışıklanmıştır. Bu verilere göre KKDS öncesi profilaksi oranında bir önceki sezona göre %35'lik bir artış görülürken, KKDS sonrası bu artış oranı %61 olarak bulunmuştur.

Sonuç: Hastane sistemlerine eklenen sistemsel uyarılar sağlık profesyonellerinin yoğun iş temposu göz önüne alındığında hastaların tedavisi ve takibinde önemli farklar ortaya çıkarır.

Anahtar Sözcükler: RSV profilaksisi, palivizumab, klinik karar destek sistemi

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Address for Correspondence/Yazışma Adresi: Gizem Karkin Tozlu, Department of Pediatric Cardiology, Gazi University Faculty of Medicine, Ankara, Türkiye
E-mail / E-posta: gizemkarkin@gmail.com
ORCID ID: orcid.org/0000-0002-5786-9087

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INTRODUCTION

Respiratory syncytial virus (RSV) is the most common viral cause of acute lower respiratory tract infection in infants (1,2). RSV causes a seasonal epidemic every year, and this epidemic lasts 5-6 months (October-March) (3).

RSV infection causes a significant increase in the mortality and morbidity of congenital heart diseases (CHD) (4). There is no specific treatment for RSV infection. Furthermore, RSV infection does not provide protection because it does not create permanent immunity. Therefore, identifying patients who need prophylaxis and immunizing them with the RSV monoclonal antibody palivizumab during the season reduces the mortality and morbidity of these patients (5). Immunization is administered at a dose of 15 mg/kg/dose once a month during the RSV season (6). In addition, immunization makes a significant contribution to the country's economy as it reduces the frequency and duration of hospitalizations and intensive care stays for patients.

In our study, we aimed to evaluate the change in the number of patients receiving prophylaxis through a clinical decision support system (CDSS) added to the hospital information management system (HIS). This system was designed to prevent patients suitable for RSV prophylaxis from being overlooked, due to intense workload, and to make immunization more efficient.

MATERIALS AND METHODS

Our study is single-centre. A CDSS, which was added to the HIS and tested on model patient samples, was used before the RSV season in 2023. A warning is displayed on the user screen when there is a patient entry suitable for RSV prophylaxis throughout the RSV season, starting from October 1st, delivered via the CDSS (Picture 1). In this way, the goal is to make RSV prophylaxis more efficient and systematic.

RSV prophylaxis indication criteria were determined according to the Turkish Pediatric Cardiology and Heart Surgery Association, palivizumab use recommendations for RSV prophylaxis guide (6). When creating the CDSS, age (<2 years), season (1 October-31 March), and international classification of diseases (ICD) codes meeting the criteria in the guide were used following the palivizumab use protocol. In case users do not use the ICD code for heart failure, the condition "if your patient has heart failure" was added to the algorithm for some ICD codes (e.g., Q21.1: atrial septal defect, Q21.2: atrioventricular septal defect) to check whether there is heart failure, and another warning was created as shown in Picture 2.

When patients suitable for the indications were determined, the ICD diagnosis code "B97.4- RSV, the causative agent of diseases classified in other sections" was entered, and an annual RSV prophylaxis report was prepared. It was planned to immunize patients monthly at 15 mg/kg/dose throughout the season.



Picture 1. Warning indicating the suitability of prophylaxis.

For patients who needed to receive RSV prophylaxis between October and March from 2021 to 2024, the drug reports registered on HIS were retrospectively scanned with the code "B97.4- RSV, the causative agent of diseases classified in other sections," and the number of patients for whom prophylaxis was initiated was determined.

The reports covering the seasons of two consecutive years were issued annually and recorded as singular, based on the first season in which they were issued. In this way, duplicate registration of the same patient was prevented.

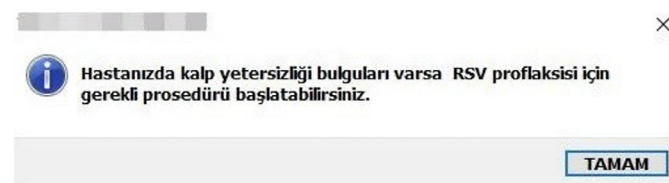
Approval has been obtained from the Ethics Committee of Gazi University (approval number: E-77082166-604;01-1055541, date: 02.10.2024).

Data Collection and Statistics

The data were obtained as a result of a retrospective RSV prophylaxis drug report query, (with the code B97.4- RSV, the causative agent of diseases classified in other sections) through HIS between 2021 and 2024. The report was received from the hospital administration, in Excel format, without personal data, and was classified, with the classification including the start and end dates. Data were evaluated with the chi-square test.

RESULTS

From 2021 to 2024, a drug report was written for a total of 141 patients in our hospital within the scope of RSV prophylaxis eligibility. Thirty-one patients were detected in the 2021-2022 RSV prophylaxis season, 42 patients in the 2022-2023 season, and 68 patients in the 2023-2024 season (Figure 1). While the annual increase rate was 35% before the algorithm was added to HIS, it was observed that the annual increase rate reached 61% with the algorithm ($p < 0.001$).



Picture 2. Warning that makes you question heart failure.

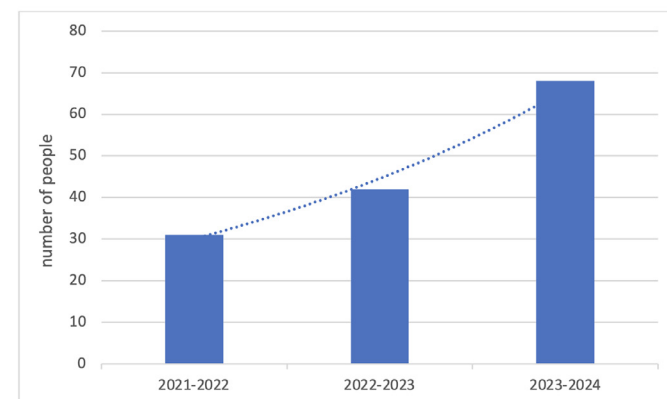


Figure 1. Number of people receiving RSV prophylaxis by year.

RSV: Respiratory syncytial virus.

DISCUSSION

The information systems used by hospitals play an important role in the follow-up, treatment of patients. CDSS installed on these information systems assist healthcare professionals in addressing these issues, providing warnings and alerts. We detected a significant increase in the rate of RSV prophylaxis with a simple algorithm that we defined in the HIS.

In the study conducted by Leone et al. (7), patients who needed to receive palivizumab were determined by looking at the diagnosis codes, oxygen needs, and medications taken from the patient files, and this immunization program was subsequently followed by an established team. The study observed that immunization increased by 78.4% in 2 years, and the importance of the correct entry of diagnosis codes, as well as a multidisciplinary approach, was emphasized. In our study, it is crucial to enter the diagnosis codes correctly. When the diagnoses in the CDSS algorithm are entered, warnings appear on the user screen. However, the diagnosis of heart failure often overlooked in the system. For this reason, another warning is added to the algorithm to remind the user that the diagnosis of heart failure is an indication of RSV prophylaxis. Thus, the referral of patients for prophylaxis has increased.

In a quality study conducted at the Children's Hospital of Philadelphia, palivizumab eligibility was determined when newborns were discharged from the ward. To determine this suitability, regular training was provided to the teams and the hospital pharmacist was also included in these training. A system was defined in the hospital software, and the patients identified by this team were directed, with a warning, for immunization when they returned to the hospital. The aim is to ensure that there is no deficiency in the patients' immunization doses (8). The patients we report for RSV prophylaxis include both outpatient and ward patients. Since the defined CDSS is available all users, a warning appears on the screens of all users (medical secretary, nurse, doctor) when registering patients suitable for prophylaxis. In this way, patient guidance is carried out in a versatile way.

In a study conducted by Lundeen et al. (9), automatic dosing for patients who meet palivizumab criteria has been approved through a program defined in the hospital system. Approval of consecutive doses has been accelerated in patients for whom medical evaluation was not performed each time, with the indication determined. Those with missing information were sent for medical examination, and the palivizumab dose was then decided. In addition, since current weights are recorded in this program, the appropriate dose is administered completely and immunization is carried out without wasting medication. Since our reports are issued annually, the patient does not need to be re-evaluated for RSV prophylaxis during the season. Immunization was ensured by measuring the weight of our patients at each visit and updating the dose.

Study Limitations

It is conceivable that the number of patients may be low during the coronavirus-19 (COVID-19) pandemic. However, during the COVID-19 pandemic, follow-up and treatment of serious diseases such as CHD continued without interruption.

The fact that a report is issued to the patients does not prove that prophylaxis was applied every month throughout the season.

While designing the algorithm, we used the CHD diagnoses that were most frequently entered during patient registration in HIS. We could not use ICD codes in the algorithm that were included in the guide, but could not be registered as a diagnosis in HIS. For this reason, the number of suitable patients we captured is less than our total number of patients. In addition, due to the incomplete entry of ICD codes, all conditions required for prophylaxis could not be queried using CDSS.

Conclusion

Systemic alerts added to hospital systems create significant differences in the treatment and follow-up of patients, considering the busy workload of healthcare professionals. We have developed this algorithm as an easy-to-understand, cost-free, and constantly usable application. With similar CDSS algorithms, healthcare workers can be reminded of the factors of chronic diseases that need to be monitored regularly, medical interventions or procedures that need to be performed annually, and drug doses that need to be repeated. We can make healthcare easier and more beneficial to our patients with simple measures.

Ethics

Ethics Committee Approval: Approval has been obtained from the Ethics Committee of Gazi University (approval number: E-77082166-604;01-1055541, date: 02.10.2024).

Informed Consent: Retrospective study.

Footnotes

Authorship Contributions

Concept: S.K., Design: S.K., Data Collection or Processing: G.K.T., Analysis or Interpretation: G.K.T., Literature Search: G.K.T., İ.B., Writing: G.K.T., İ.B., Critical Review: S.K.

Conflict of Interest: No conflict of interest was declared by the authors.

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