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The Impact of Clinical Decision Support Systems (CDSS) on Physicians: A Scoping Review

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Abstract. Clinical Decision Support Systems (CDSSs) are used in a clinical setting to help physicians make decisions to improve clinical performance and patient care. There are many benefits to the implementation and adoption of CDSSs, such as reducing the rate of misdiagnosis, improving efficiency and patient care, and reducing the risk of medication errors. On the other hand, CDSSs can have several disadvantages. For example, physicians can see CDSSs as a threat to their clinical autonomy. CDSSs can also be very costly to adopt, maintain, and support. These advantages and disadvantages can have both positive and negative impacts on physicians. We conducted a scoping review to explore the impact of CDSSs on physicians. We searched the following electronic databases: CINAHL, PubMed, and Google Scholar. Two reviewers independently selected the retrieved studies and extracted data from the included studies. A narrative approach was used to synthesize the extracted data. We included 14 studies of the 300 retrieved studies. We identified the following positive impacts: work efficiency, providing more personalized care, improving care and knowledge, increasing confidence in making decisions, improving prescribing behavior, and reducing the number of ordered laboratory and medical imaging tests. Several negative impacts were also reported by the studies, namely: inefficient documentation, interruption in the patient-physician communication, and an increase in unnecessary referrals.

Keywords. Clinical Decision Support System (CDSS), impact, physicians

1. Introduction

Decision Support Systems (DSS) which were first used for business management, were later modified and implemented in hospitals to become a Clinical Decision Support System (CDSS) [1]. A CDSS has many different functionalities, such as producing alerts if a dangerous interaction between two drugs exists and reminders of preventative care [1]. There are many benefits to the implementation and adoption of CDSSs, such as reducing the rate of misdiagnosis, improving efficiency and patient care, obtaining access to relevant clinical information in one place, reducing the risk of medication errors, and providing access to a trusted, reliable source that would help make better decisions [2]. On the other hand, there are disadvantages as well, where CDSSs can be

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seen by physicians as a threat to their clinical autonomy [3]. Also, it is very costly to adopt, maintain, and support [3], and it is hard to make it align with the complex workflow of a healthcare organization [1]. In addition, some CDSSs are stand-alone software systems that lack interoperability, which means they cannot be integrated with electronic health records (EHRs) [1]. These advantages and disadvantages can have both positive and negative impacts on physicians. This review aims to explore the impact of the CDSS on physicians as reported through the literature.

2. Methods

This review was conducted using the Joanna Briggs Institute (JBI) guidelines [4]. For this review, the following bibliographic databases were searched: Google Scholar, PubMed, and CINAHL. Since Google Scholar showed millions of results, and both PubMed and CINAHL showed thousands of results, only the first 100 relevant studies from each database were scanned for this review. Therefore, only 300 studies were included in the study selection process. The search terms were selected based on population, intervention, and outcome. This review focused on physicians in all different specialties, including in-training physicians such as interns, residents, and fellows, excluding medical students. There were no age, ethnicity, or gender restrictions in our search. The study selection process included reading the title and abstracts of each study and then reading the full text to identify those that meet all eligibility criteria. An excel sheet was developed to extract data from the included studies. A narrative approach was then used to synthesize the data of this review.

3. Results

Out of the 300 studies retrieved, only 14 studies were included. All studies reported that CDSS had a positive impact on physicians (n=14, 100%), and eight studies reported negative impacts (57%). This shows that positive impacts were more reported than negative impacts by physicians using CDSSs.

Four studies reported that the CDSS helped physicians be more efficient and finish tasks faster [5-8]. One study reported that physicians were able to give patients more personalized information and education while using the CDSS [9]. Improved knowledge for physicians and improved care for patients were reported in four studies, where it helped physicians with diagnosis, and it even helped them ask patients important questions that they forgot to ask [9-12]. Three studies reported that physicians were more confident in making decisions when using the CDSS [9,13,14]. Improved prescribing behavior was also reported, where more appropriate prescribing was mentioned in three studies [13,15,16], and reminders for physicians to prescribe medicine to their patients was reported in one study [17]. Two studies reported a decrease in the number of ordered tests and medical imaging, which led to cost-saving [5,18].

As for the negative impacts, physicians reported in seven studies that it took them a long time to document using CDSS, which was inefficient [5,6,8,9,10,13,15]. Two studies reported on how physicians lacked communication with their patients, where they looked and talked to them less [6,14] as a result of using the CDSS. One study reported that CDSS use led to an increase in unnecessary referrals [14].

4. Discussion

4.1. Principal Findings

This scoping review aimed to explore the impacts of the CDSS on physicians as reported through the literature. From the 14 studies that we included, we found seven main positive impacts and three negative impacts. The two most common positive impacts were the improvement of the physician's knowledge and care for patients and efficiency. The most common negative impact was that it took too much time for physicians, where they spent more time using the CDSS compared to when they were doing the same tasks without it, which was inefficient.

A few of the included studies reported that CDSS helps improve clinical practice overall by improving physician performance which was reported in previous work [19-23]. The practitioner performance was improved using many categories such as diagnostic systems, reminder systems, disease management systems, and prescribing systems [20]. The improved practitioner performance was linked to the automation of prompting users instead of requiring users to activate the system [20]. Also, CDSSs can specifically help improve the provider's performance with preventative care reminders and medication orders [21]. CDSSs can also help in conducting clinical studies [23].

5. Conclusion

In this study, we identified a number of positive and negative impacts of CDSS on physicians from the 14 studies reviewed. The need for ongoing adjustments to CDSSs and successful user training during the adoption of CDSSs is very important. We would advise future researchers to study other healthcare providers' interactions with CDSS.

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