

InsightRX – Vancomycin Pilot

an OSF Partnerships Case Study

THE OPPORTUNITY

There are a number of medical drugs that are difficult to dose for hospital systems around the world, causing adverse consequences if not given properly. The antibiotic, vancomycin, is particularly challenging as improper dosage can lead to kidney damage in both adults and children. Conventional methods for calculating patient dosages rely on offline tables and formulas fashioned with an average adult patient in mind.

THE SOLUTION

Understanding this need, OSF Innovation found and introduced clinicians to InsightRX, a clinical decision support tool integrated into the electronic medical record (EMR) that helps care teams accurately dose medications based on a variety of patient data, PK/PD models and Bayesian forecasting. With input from medical providers, OSF HealthCare piloted the cloud-based application for the precision dosing of vancomycin in pediatric patients.

THE IMPACT

Clinical pharmacists and providers working with pediatric and neonatal patients used InsightRX to dose vancomycin at the point of care over a nearly year-long period. The performance of the software was compared to a time period in which the application was not being used. The result was an increase in the number of patients with no risk of acute kidney injury (AKI) and a decrease in failure for those who experienced AKI. Based on recent research that outlines the cost of AKI in adults, it's estimated that the number of injury events that were prevented translates to a cost avoidance of \$1.6 million dollars.



OSF PARTNERSHIPS

OSF Innovation Partnerships works to find solutions that will improve patient outcomes, enhance patient experience and reduce the cost of health care. We seek to discover technology, products and services that can transform health care.

OSF INNOVATION

Launched in 2016, OSF Innovation is the overall umbrella initiative for the planning, structure, goals and services OSF HealthCare uses to innovate for the improvement and transformation of health care.

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PILOTING INSIGHTRX TO SAFELY DOSE VANCOMYCIN IN PEDIATRIC PATIENTS

Administering the right, therapeutic amount of vital medications has a drastic effect on patient outcomes. Prescribing too much of a highly specialized drug can result in toxicity and adverse side effects. Receiving too little of a medication will not be beneficial for the patient and could result in ineffective care and prolonged hospital stays.

Such is the case of the highly effective but high-risk antibiotic drug, vancomycin. Vancomycin is widely used to treat complicated infections such as methicillin-resistant *Staphylococcus aureus* (MRSA), sepsis or pneumonia. However, dosing the drug in adults and children is challenging due to a large variation in pharmacokinetics, or the movement of the medication into, through and out of the body. Improper dosage could lead to acute kidney injury (AKI), among a number of other side effects.

Historically, pharmacists have calculated prescription measures working offline with tables or formulas created based on the 'average' patient. Many conventional dosing formulas determine the therapeutic range for medication based primarily off patient age and weight alone — leaving out factors like lifestyle, genetics and other data relevant to high-risk medicine. Generalized data is effective for dosing low-risk drugs, but when dealing with high-risk medications a greater degree of precision is necessary to yield greater patient outcomes.

PRECISELY DOSING MEDICATIONS

OSF Innovation recognized an opportunity and sought solutions to improve care and outcomes for the most sensitive patients. As a result, clinicians were introduced to InsightRx, a clinical decision support tool (EMR) that helps care teams accurately dose medications based on a variety of patient data, PK/PD models and Bayesian forecasting. Created to serve the most specialized cases like pediatric oncology and leukemia, the software draws from data gathered from similar medical cases around the world to help fill the gap in precise patient care.

Integrated with the patient EMR, the platform's algorithms continuously update dosing levels based on incoming patient vitals. InsightRX uses adaptive learning to streamline patients into the therapeutic range for their medicine, a process that would normally take follow-up appointments from the clinical team.

With input from medical providers, OSF HealthCare chose to pilot the cloud-based application for the precision dosing of vancomycin in pediatric patients. Clinical pharmacists and providers working with pediatric and neonatal patients used InsightRX to dose vancomycin at the point of care for nearly a year. The performance of the tool was compared to a three-year time period when the software was not being used for evaluation toward further implementation.

RESULTS

A little over 105 patients were treated with vancomycin using the InsightRX tool at OSF HealthCare Children's Hospital of Illinois from April 2018 to February 2019 with about eight doses per individual. Compared to a three-year period where patients were not treated with the antibiotic using InsightRX, the facility was able to avoid seven AKI events.

These outcomes are based on pRIFLE (risk, injury, failure, loss and end-stage renal disease), a classification system that categorizes different stages of nephrotoxicity for pediatric patients according to measurements in serum creatinine. Four failure events were avoided and there was also an increase in the number of patients with *no risk* of AKI.

Based on recent research that outlines the cost of AKI in adults, the estimated cost of an injury or failure event is about \$145,000 per patient. Comparing that to the results of InsightRX in pediatric patients at OSF Children's Hospital, there is a potential cost avoidance of \$1.6 million dollars based on any costs associated with an extended length of stay in inpatient care.

With the ability to improve patient care and experience, OSF HealthCare is not only working with InsightRX to develop new modules for medication treatment, it also plans to deploy the vancomycin portion of the platform to adults.

"There is a lot of subjectivity that comes along with hand-based calculations when dosing a drug such as vancomycin. InsightRX allows us to be more precise in our calculations and eliminates any room for errors."

— AARON HARTHAN, PEDIATRIC CLINICAL PHARMACIST

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