

WHITEPAPER: BYTES NOT BOOKS

The assessment of the benefits of active versus passive decision support within medication management



Profile: Infant (150 Days)

Search Test: pheny

- Phenytoin IV
- Phenytoin Oral Suspension
- Phenytoin IV Oral Suspension**
- Phenytoin Suspension via G-tube
- Carbinoxamine-Phenyleph-Hydrocodone Oral Liquid 2 mg
- Carbinoxamine-Phenyleph-Hydrocodone Liquid 2 mg-6 m

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Adverse drug events are the fourth leading cause of death in the U.S. after heart disease, cancer and strokes ⁽¹⁾

OVERVIEW

Global initiatives from government and industry are driving a revolution in healthcare quality and safety. Healthcare providers are looking to clinicians and health information managers to develop the systems and processes needed to support their patient safety and care quality aims. Clinical Decision Support (CDS) is being adopted by many healthcare providers to improve healthcare outcomes.

INTRODUCTION

CDS is already an accepted part of the healthcare environment in the U.S., U.K. and Europe. Reducing the risk and associated cost from Adverse Drug Events (ADE) is a primary concern for healthcare providers.

CDS is broadly defined as **“providing clinicians or patients with clinical knowledge and patient-related information, intelligently filtered or presented at appropriate times, to enhance patient care.”** (2) There are many different forms of CDS from online reference information to evidence based guidance that is used to determine the most effective treatment therapy.

Medication management is one such area where CDS has had a positive impact on prescribing behaviour, patient safety and return on investment. This paper provides an assessment of the effectiveness of active versus passive or referential CDS within medication management. It provides a broad analysis of CDS and important features that significantly improve clinical practice. It draws upon independent, published research to compare the effectiveness of these solutions in reducing the incidents of ADE's.

Active versus Passive Clinical Decision Support

Reducing the number of fatalities and harm from avoidable ADE's is an area of prime concern for healthcare providers. CDS provides an important step forward in the support offered to clinicians at the point of care in helping to reduce the occurrence of ADE's.

Passive CDS is presented in a textual format with individual chapters or sections highlighted for ease of navigation. The information tends to be delivered in lengthy paragraphs that need to be reviewed by the clinician to find the relevant text. It relies on the reader to fully understand the technicalities and perceived meaning of the text. It may also require some action to be taken to access the information as the clinician may not be prompted to review the information.

There are four key features of active CDS in medication management. These are:

- Data is embedded within the electronic health record to provide specific patient information. Drug data can be embedded into the patient record via a series of technical and clinically authored algorithms. This provides active CDS to support the clinician in their decision-making process.
- Data is intelligently inserted into the clinical workflow. Information is delivered via the clinical applications and is integrated into the workflow at the point where a decision is required. Providing information at the point of care, rather than before or after the patient encounter, aids continuity and produces cost efficiencies.
- Data is intelligently filtered to clinicians. Setting agreed thresholds for alerting protocols allow clinicians to receive only the most essential, relevant messages.
- Data can be recorded via an audit trail. Most Electronic Medical Records or Hospital Information Systems provide a facility for tracking and reporting upon all actions regarding patient's records. These facilities mean that insight can be gained around problem areas, gaps or anomalies that may occur in the prescribing and dispensing service.

A recent study comparing active and passive CDS found **“The usage of CDSS (Clinical Decision Support Systems) significantly increased the percentage of patient screened and treated from dyslipidaemia; in addition using an alerting system increased the screening rate significantly than the on-demand group.”** (3)

The important difference between active and passive CDS relates to the type of messages provided to the clinician. Active CDS messages are dynamic alerts which interact with the patient's record. With passive CDS the onus lies with the clinician to search for further reference or electronically prompted “drug in view” information. This can have a negative influence by removing the clinician from their natural workflow, adding extra steps to their work and more importantly without actionable links from or back into the patient record.

ACTIVE ALERTS

Prescribing medications is a huge responsibility for any clinician, who must also consider many other factors related to the patient's care to determine the best course of treatment to provide. In many instances the clinician may not have the necessary information to hand or may forget to check it, in time pressured situations. It is in these circumstances that active alerts can provide life-saving prompts.

Examples include:

- Alert that appropriate cancer screening is due
- Drug allergy alert
- Drug interaction alert
- Under dose/overdose alerts based on renal, liver function or age.

With passive or reference CDS many of these features do not exist. Data is presented as textual information or as hyperlinks leading the end user to read, understand and act on the information given. Whilst much of the essential clinical information is provided, its passive form means that clinicians have to disseminate the information they are presented with and decide which elements are relevant to their patient, prior to making a medication decision.

“Nearly 50% of medication errors have been found to result from the fact that clinicians have insufficient information about the patient and the drug readily accessible at the time it is needed.”(4)

Innovative healthcare providers are investing in this proven technology to realise the benefits of active CDS in medication management over traditional passive or reference CDS.

Demonstrating Effectiveness: The Case for Active Decision Support

A 2005 systematic review by Garg et al. of 100 studies concluded that CDSS improved practitioner performance in 64% of the studies. The CDSS improved patient outcomes in 13% of the studies. (5)

This is supported by other research that considered seventy randomised, controlled trials. It found that **“Decision support systems significantly improved clinical practice in 68% of trials.”** (6)

The study also found that there were four specific features strongly linked to a CDS system’s ability to improve clinical practice. These were that CDS should be provided as part of the clinical workflow, delivered at the time and location of decision-making, should provide actionable recommendations and also be computer based.

It concluded that **“Among 32 clinical decision support systems incorporating all four features 94% significantly improved clinical practice. In contrast, clinical decision support systems lacking any of the four features improved clinical practice in only 18 of 39 cases or 46%.”**(6)

The overall recommendation was made that **“Clinicians and other stakeholders should implement clinical decision support systems that incorporate these features whenever feasible and appropriate.”** (6)

A separate study considered the use of computerised alerts and prompts found **“Most alerts and prompts (23 out of 27) demonstrated benefit in improving prescribing behaviour and/or reducing error rates.”** (7)

Put simply, incorporating active CDS capabilities within the workflow is 100x more effective when compared to applications that only use passive or reference CDS.

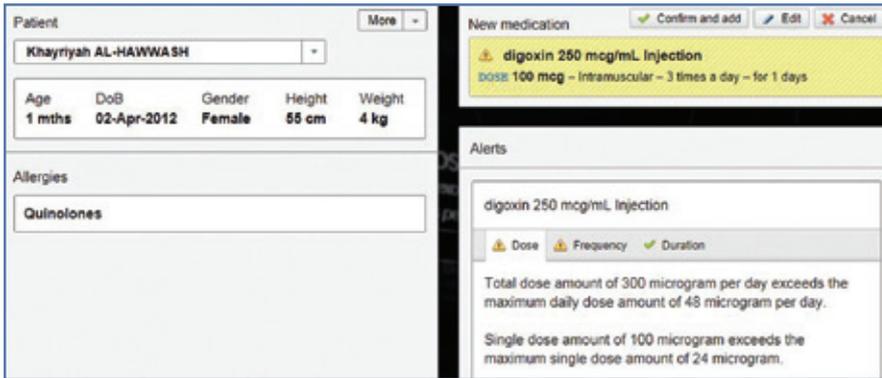
For the majority of clinicians who prescribe, and patients who receive medication every day, active CDS provides an essential tool in driving down the occurrence of ADE’s all over the world.

The Benefits of Active Decision Support over Passive Decision Support

There are many benefits associated with using active CDS for medication management:

- Better clinical decision-making leads to better practices
- Reduced medication errors
- Promote preventive screening and use of evidence based recommendations
- Improved cost-effectiveness
- Increased patient convenience
- Improved quality of healthcare delivery
- Improved healthcare outcomes for patients and patient populations.

Active Decision Support



CDS provided within the patient record means that the clinician receives medication recommendations based on the individual patient medical record. The screen shot shown on the left shows a typical active message highlighting a Dose Range Check alert.

Information provided by active CDS is easy to read, highlighting relevant alerts in bite-sized amounts.

Passive Decision Support

Usual Pediatric Dose for Atrial Fibrillation

Do not give full total digitalizing dose at once. Administer loading doses in several portions, give roughly half the total as the first dose. Give additional fractions of the total dose at 6 to 8 hour intervals (oral) or 4 to 8 hour intervals (parenteral). Divided daily dosing is recommended for infants and young children under 10 years of age.

Parenteral administration should be used only when the need for rapid digitalization is urgent or when the drug cannot be taken orally. Intravenous administration is preferred over intramuscular injection as it can lead to severe pain at the injection site. If it is necessary to administer the drug by the intramuscular route, it should be injected deep into the muscle followed by massage. No more than 500 mcg should be injected into a single site.

Calculated doses should be based on lean body weight.

Premature:
 Digitalizing (Loading) dose: Oral elixir: 20 to 30 mcg/kg; Intravenous: 15 to 25 mcg/kg
 Maintenance dose: oral 5 to 7.5 mcg/kg; intravenous 4 to 6 mcg/kg

Full Term:
 Digitalizing (Loading) dose: Oral elixir: 25 to 35 mcg/kg; Intravenous: 20 to 30 mcg/kg
 Maintenance dose: oral 6 to 10 mcg/kg; intravenous 5 to 8 mcg/kg

1-24 months:
 Digitalizing (Loading) dose: Oral elixir: 35 to 60 mcg/kg; Intravenous: 30 to 50 mcg/kg
 Maintenance dose: 10 to 15 mcg/kg oral; intravenous 7.5 to 12 mcg/kg

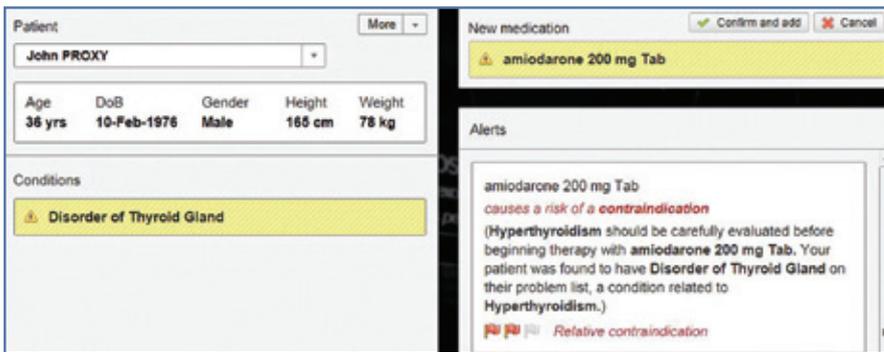
3 to 5 years:
 Digitalizing (Loading) dose: Oral elixir: 30 to 40 mcg/kg; Intravenous: 25 to 35 mcg/kg
 Maintenance dose: oral 7.5 to 10 mcg/kg; intravenous 6 to 9 mcg/kg

6 to 10 years:
 Digitalizing (Loading) dose: Oral elixir: 20 to 35 mcg/kg; Intravenous: 15 to 30 mcg/kg
 Maintenance dose: oral 5 to 10 mcg/kg; intravenous 4 to 8 mcg/kg

11 years and older:
 Digitalizing (Loading) dose: Oral elixir: 10 to 15 mcg/kg; Intravenous: 8 to 12 mcg/kg
 Maintenance dose: oral 2.5 to 5 mcg/kg; intravenous 2 to 3 mcg/kg

This by comparison is very different to typical passive CDS or reference information shown in the screen shot on the left.

Passive CDS is similar to information provided in books. It does not provide automatic alerting as it does not adequately integrate with the patient record.



The screen shot on the left shows active CDS within a patient record highlighting a contraindication.

Ideally CDS should be delivered at the point of care providing highly relevant, actionable recommendations to the clinician that can be fully audited.

Information which is delivered in small, manageable, bite-sized amounts can be assimilated quickly and easily when compared to reading lengthy paragraphs. For the clinician this means an increase in the quantity and quality of patient-facing time. Both clinicians and patients prefer this extra time together. Patient's perceptions of the value of the quality and care of the service being delivered also rise.

CONCLUSION

First do no harm.

Cited research demonstrates active CDS in medication management clearly drives many positive advantages and benefits when compared to using passive CDS. To reduce avoidable medication errors the use of CDS should be encouraged to improve patient safety and drive down the occurrence of ADE's.

Actionable, intelligently filtered, dynamic data delivered in real-time at the point of care, directly into the clinical workflow is of most benefit to clinicians, and provides a critical support mechanism to the busy healthcare professional. Timely recommendations from a trusted healthcare source provide potentially life-saving reminders at the point of prescribing.

Consigning ADE's to the past may one day become a reality as forward thinking governments and healthcare providers demonstrate a commitment to the adoption of active CDS in medication management.

The inclusion of active CDS for medication management should be seen as the de facto standard in helping to reduce the incidence of ADE's, improve patient safety and realise significant cost and time efficiencies for healthcare providers worldwide.

Clinical decision support. Save \$170 billion per year in health costs. Save more than 400,000 lives (8).

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