

Informatics Pearls 2017

Arturo Aguirre, Pharm.D.
Michelle Geurink, R.Ph.
Sarah Seward, Pharm.D.

The speakers have no conflicts of interest to disclose

Learning Objectives

- Describe the qualities of effective trigger tools to optimize adverse drug event detection rates.
- Explain the required parameters of a titration order.
- Recognize the requirements for identity proofing and dual factor authentication for electronic prescribing of controlled substances (EPCS).
- Discuss the benefits of proper use of clinical decision support (CDS) systems to help reduce alert fatigue.

Optimizing Trigger Tools for the Detection of Adverse Drug Events

Speaker: Arturo R Aguirre, PharmD
Clinical Pharmacist at Northwestern Medicine Lake Forest Hospital

What are trigger tools?

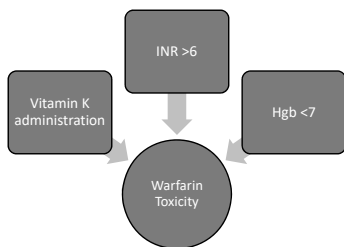
Definition: A trigger tool is a marker which can identify potential adverse drug events because of a correlation between the marker and the event.

In 2004, the Institute for Healthcare Improvement (IHI) developed Global Trigger Tools, which are tools used to identify adverse drug events (ADEs).

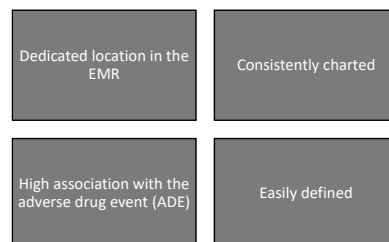
Trigger Tools Examples:

- Lab values
- Antidote administration
- Vital signs
- Prescriber orders
- Positive microbiology cultures
- ICD-10 codes
- Operation records
- Discharge dates
- Readmission dates

Trigger Tool Examples



What are the qualities of a good trigger tool?



Why is it important?

The Joint Commission - Standards Interpretation and Elements of Performance

The organization collects data to monitor its performance (PI.01.01.01)

- The organization collects data on the following: Adverse events related to using moderate or deep sedation or anesthesia.

The hospital responds to actual or potential adverse drug events, significant adverse drug reactions, and medication errors. (MM.07.01.03)

- The hospital has a written process to respond to actual or potential adverse drug events, significant adverse drug reactions, and medication errors.
- The hospital complies with internal and external reporting requirements for actual or potential adverse events, significant adverse drug reactions, and medication errors.

ADE reports to meet TJC standards

- Hypoglycemia as a result of antidiabetic agents
- Bleeding as a result of anticoagulants
- Acute kidney injury as a result of nephrotoxic medications
- Anaphylactic reactions from the administration of any medication
- Respiratory depression as a result of the use of sedatives

Examples from experience

Detection of Opioid Related Adverse Events

Trigger Tool: Naloxone administration

Layered Rules:

1. Naloxone given in the emergency department
 2. Oral buprenorphine/naloxone
 3. Naloxone infusions
 4. Respiratory rate >12 within 90 minutes of naloxone
- or
5. Oxygen saturation <90% within 90 minutes of naloxone

Results

PPV = 72%

Naloxone alone

- Inclusion
 - Patients who received naloxone
- Exclusion
 - Patients who received naloxone in the emergency department

PPV = 89%

Naloxone plus

- Inclusion
 - Patients who received naloxone within 24 hours of receiving an opioid
- Exclusion
 - Naloxone given in the emergency department
 - Oral buprenorphine/naloxone
 - Naloxone infusions
 - RR >12 within 90 minutes of naloxone

Detecting Inpatient Hypoglycemic Events

Trigger Tool 1: PPV = 46%

- Two consecutive blood glucose \leq 65mg/dL

Trigger Tool 2: PPV = 61%

- Single blood glucose \leq 50mg/dL

Layered Rules:

1. Antidiabetic administration within preceding 24 hours
2. Flag if subsequent BG reading >100mg/dL within 5 minutes

Conclusions

- Trigger tools can be useful for identifying adverse drug events
- Layering trigger tools with restricting criteria can potentially increase in the PPV
- Once refined, the tool could be used to track rates of adverse events over set periods of time with little to no chart review

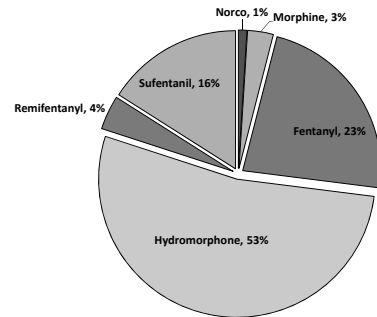
Which of the following is NOT an example of describable qualities for a trigger tool?

- A. INR has a definite location in the EMR.
- B. Respiratory rate is inconsistently charted.
- C. Methylnaltrexone has a high association with opioid induced constipation.
- D. Quality literature exists which defines over anticoagulation with warfarin.

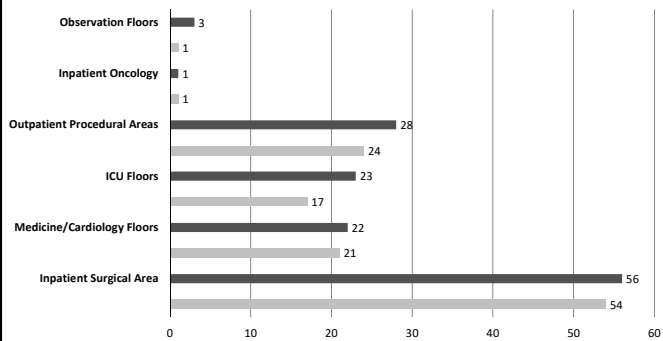
Which of the following is LEAST likely to be an example of an effective trigger tool?

- A. INR > 6
- B. The phrase "opioid overdose" in clinical notes
- C. Administration of the drug flumazenil
- D. Blood glucose levels < 65

Causative Opioid Agents: Naloxone Plus



Potential vs True Events: Naloxone Plus



Sources

1. Carnevall L, Krug B, Amant F, et al. Performance of the adverse drug event trigger tool and the global trigger tool for identifying adverse drug events: experience in a Belgian hospital. *Ann Pharmacother*. 2013;47(11):1414-9.
2. Clapper C, Crea K. Common cause analysis. *Patient Saf Qual Healthc*. 2010;7:30-35.
3. Eckstrand JA, Habib AS, Williamson A, et al. Computerized surveillance of opioid-related adverse drug events in perioperative care: a cross-sectional study. *Patient Saf Surg*. 2009;3(1):18.
4. Griffin FA, Resar RK. *HI Global Trigger Tool for Measuring Adverse Events* (Second Edition). IHI Innovation Series white paper; Cambridge, MA: Institute for Healthcare Improvement; 2009.
5. Lin D, Melucci J, Rizer MK, Prier BE, Weber RJ. Detection of adverse drug events using an electronic trigger tool. *Am J Health Syst Pharm*. 2016;73(17 Suppl 4):S112-20.
6. Maxwell LG, Kaufmann SC, Bitzer S, et al. The effects of a small-dose naloxone infusion on opioid-induced side effects and analgesia in children and adolescents treated with intravenous patient-controlled analgesia: a double-blind, prospective, randomized, controlled study. *Anesth Analg*. 2005;100(4):953-8.
7. Meisel S, Pheips P, Meisel M. Case study: Reducing narcotic oversaturation across an integrated health system. *IT Comm J Qual Patient Saf*. 2007;33(9):543-8.
8. Moore C, Li J, Hung CC, Downs J, Nebeker JR. Predictive value of alert triggers for identification of developing adverse drug events. *J Patient Saf*. 2009;5(4):223-8.
9. Nwulu U, Nirantharakumar K, Odesanya R, McDowell SE, Coleman JJ. Improvement in the detection of adverse drug events by the use of electronic health and prescription records: an evaluation of two trigger tools. *Eur J Clin Pharmacol*. 2013;69(2):255-9.
10. Safe use of opioids in hospitals. *Sentinel Event Alert*. 2012;(49):1-5.

Clear Concise Titration Orders

Michelle Geurink, RPh
OSF Healthcare System

Pre-Test Question

- Which of the following orders would be considered a clear, concise titration order:
 - a) D5 ½ NS w/20 KCl at 125 mL/hr
 - b) Dopamine infusion titrate to keep MAP 60-65
 - c) Fentanyl infusion 25 mcg/hr
 - d) Propofol infusion 5-50 mcg/kg/min, titrate per MD new order only
 - e) Precedex infusion 0.2-0.7 mcg/kg/hr
Goal for Sedation: RASS Score of -2 to 0
Initiate at: 0.2 mcg/kg/hr
Titrate by: 0.1 mcg/kg/hr
Interval: Every 30 minutes
- Call physician if not at sedation goal at maximum of ordered dose range, for hypotension and for bradycardia
 - a) None of the above

Definitions

- Titration Order: orders in which the medication dose is either progressively increased or decreased in response to the patient's status
- Required Elements
 - Medication name
 - Medication route
 - Initial or starting rate of infusion (dose/min)
 - Incremental units the rate can be increased or decreased
 - Frequency for incremental doses (how often dose(rate) can be increased or decreased)
 - Maximum rate (dose) of infusion
 - Objective clinical endpoint (RASS score, CAM score, etc)

OSF Healthcare Medication Management:
Focused Accountability Plan for Complete Medication Orders

See IT Own It Solve It Do It

We are not meeting OSF expectations for clear and complete medication orders as outlined in the Medication Orders Policy. This places our individual nurses at risk for practice outside their licensed scope. We have an organizational obligation to be accountable to OSF standards.

Belief Biases:

- It is within nurses scope of practice to titrate based on clinical judgment
- Order sets contain clear & compliant

Current Performance

- 5000+ all-care orders with incomplete parameters
- 5000+ orders/month
- 5000+ with no direction at all
- 50% telephone orders documented by nursing; 50% provider originated
- Occurs at ALL OSF facilities
- Medication orders within order sets do not follow the OSF policy definitions for clear orders.

The OSF Healthcare Medication Orders Policy defines expectations for clear and complete

Ground Zero

- November 30th – Dec 30th: Close content gap for titrate orders in Epic
- Dec 22 – OSF Cabinet: Letter to CMOs/CNOs re: practice change & precedent commitment
- Epic build & implementation

Phase I – EHR Changes (Tools/scripts to provide clarity & expectation)

Dec/Jan/Feb

- Status updates to EPIC
- Current performance and gap
- CMOs/CNOs re: Performance management – accountability to ensure complete orders 100% of the time

Phase II – Soft Stop (Embracing Decisions and Leadership Accountability)

Mar

- Soft-stop for incomplete orders not meeting OSF policy expectations: nursing and pharmacy call for clarity, not

Workgroup Recommendations-EMR Build

Type of Drug	Proposed Actions to be Taken:
Non-titrable drug:	Remove range buttons if present AND add "Do Not Titrate – Call provider for dose adjustments" to administration instructions.
Titratable and single indication and has order set	Make Administration Instructions a "stop sign" - Implement ERX Smart Text for provider to choose "do not titrate" button OR "Titrate" button. Use Titrate instructions from acceptable order set.
Titratable with multiple indications and has multiple order sets	Hard-stop question: Titrate for.... "Do not Titrate" OR selection of indications that have administration instructions that match the order sets. OR Limit ordering to Order Set
Titratable with multiple indications and NO existing order set	Hard-stop question: Titrate for.... "Do not Titrate" OR selection of indications that have administration instructions that match the order sets. Follow for build of orders will be Medication Orders Policy.

Stoplight—Identify Medications

	Able to Progress to IT Build	Need Additional Expertise	Needs Consensus on How to Proceed	Not prioritized for initial December work
High Volume Medications	Norepinephrine Fentanyl	Dopamine – Cardiology/CVS	Oxytocin – OB Collaborative	
Medium Volume Medications	Phenylephrine Diltiazem Nicardipine Midazolam			
Low Volume Medications	Epinephrine Vasopressin Milrinone Amiodarone	Nitroglycerin – Cardiology/CVS Nitroprusside – Cardiology / CVS	Morphine Hydromorphone	
Very Low Volume Medications				Esmolol Procainamide Lidocaine Naloxone Furosemide Clevidipine

EMR Build

- Example at order entry (content based on SME workgroup):



EMR Build

- Rules
 - Pediatric
 - Adult
- Preference Lists (ala carte ordering)
- Order Sets

Accountability-Hard Stop CMO & CNO Support

- Patient List
 - Patient with titratable medication order
 - Display of order
- Report
 - Meets requirements (compliant)
 - Doesn't meet requirements (non-compliant)



ADMIN_INSTR

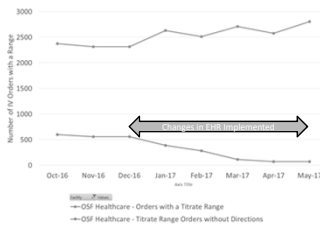
Initiate at 5 mcg/kg/min. Decreased to 3 mcg per APHDs not uprate. May down titrate by 1 mcg for SSP > Titrate per MD order only.
 Titrate per MD order only.
 Titration Parameters Start at 0.5 mcg/kg/min. Increase by 0.5 mcg/kg/min every 15 minutes to maximum 3.2x2

Goal SSP >90 or MAP >65
 Do not titrate - Call provider for dose adjustments. Call Provider if goal is not achieved. MAP of 65 or greater

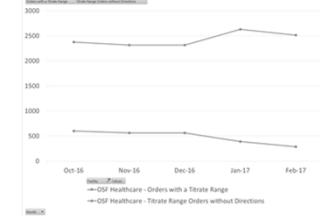
Phase I: EHR Changes (Tools/Scripts to do the right thing: provide clarity & meet expectation)

	EHR Build to implement Ala-carte Orders (January 8, 2017)	EHR Build to implement Ala-carte Orders (February 7, 2017)	EHR Build to Align Order Sets with OSF Standards (February 7, 2017)	EHR Build to be Complete April 4, 2017	EHR Build Complete May 2017
High Volume Medications	Norepinephrine Fentanyl Dexamethasone Propofol	Dopamine Oxytocin	Norepinephrine Fentanyl Dexamethasone Propofol Dopamine Oxytocin		
Medium Volume Medications	Phenytoin Diltiazem Nicardipine Midazolam		Phenytoin Diltiazem Nicardipine Midazolam Lorazepam	Pediatrics (not NICU)	Pediatric sedation/analgesia order set - new request
Low Volume Medications	Epinephrine Vasopressin Milrinone Amiodarone	Nitroglycerin Nitroprusside	Epinephrine Nitroglycerin Vasopressin Nitroprusside Milrinone Amiodarone		Organ Recovery/Gift of Hope Hypothermia order sets
Very Low Volume Medications	Esmolol Clevidipine Propofol Lidocaine Nitroprusside Furosemide		Esmolol Clevidipine Propofol Lidocaine Nitroprusside Furosemide		Morphine - for non-ventilated Hydromorphone - for non-ventilated

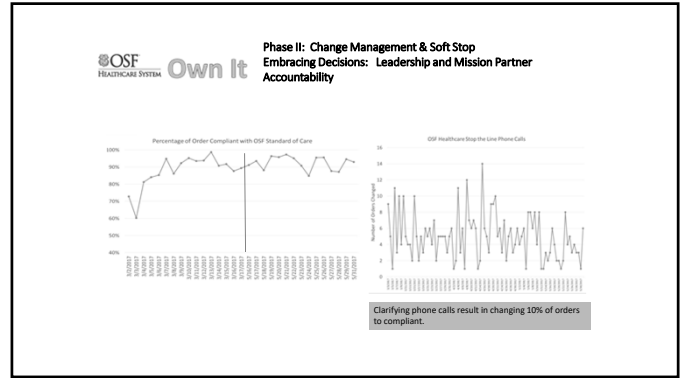
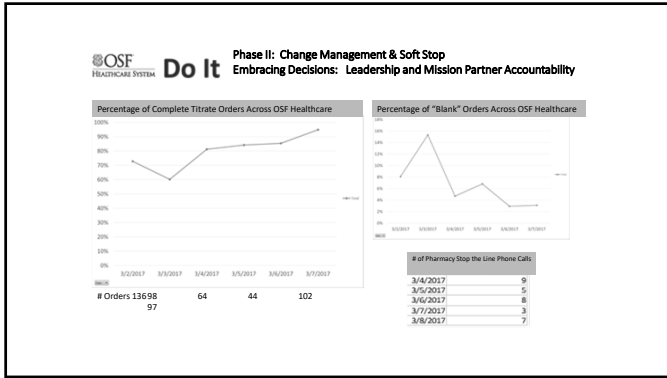
Phase II: Change Management & Soft Stop Embracing Decisions: Leadership and Mission Partner Accountability



Phase I: EHR Changes (Tools/Scripts to do the right thing: provide clarity & meet expectation)



October 2016 = 25% blank
 February 2016 = 11% blank



Post-Test Question

- Which of the following orders would be considered a clear, concise titration order:
 - D5 ½ NS w/20 KCl at 125 mL/hr
 - Dopamine infusion titrate to keep MAP 60-65
 - Fentanyl infusion 25 mcg/hr
 - Propofol infusion 5-50 mcg/kg/min, titrate per MD new order only
 - Precedex infusion 0.2-0.7 mcg/kg/hr

Goal for Sedation: RASS Score of -2 to 0
Initiate at: 0.2 mcg/kg/hr
Titrate by: 0.1 mcg/kg/hr
Interval: Every 30 minutes
Call physician if not at sedation goal at maximum of ordered dose range, for hypotension and for bradycardia

- None of the above

Basics of EPCS

Michelle Geurink, RPh
OSF Healthcare System

Pre-Test Question

- Which of the following can be used for identity proofing:
 - Fingerprint
 - Single Sign on Badge
 - Password
 - Retinal Scan
 - None of the above

Definitions- Interim Final Rule

- EPCS: Electronic Prescribing of Controlled Substances
- Individual Practitioner: May work either at an institutional or smaller practice that lacks dedicated department for medical credentialing and managing access to EPCS in computer system
- Institutional Practitioner: may perform certain security functions for EPCS (e.g. identity proofing and issuing two-factor authentication)
- Credential/Token: Something user possesses or controls that must be demonstrated to gain access to specific function

Definitions

- **Identity Proofing:** process of validating identity of potential user before he/she is granted an account or issued security to access account
- **Two Factor Authentication**
 - Something you know (Password)
 - Something you have (Hard Token)
 - Something you are (Biometric)
- **Hard Token:** cryptographic key stored on a hardware device (e.g., a PDA, cell phone, smart card, USB drive, one-time password device) rather than on a general purpose computer. A hard token is a tangible, physical object possessed by an individual practitioner

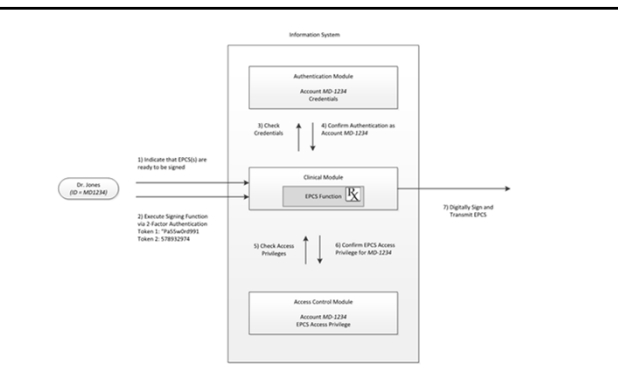
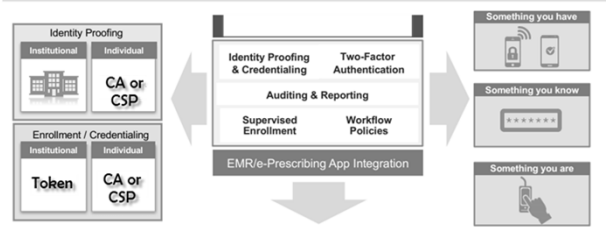
Identity Proofing

- **Individual**
 - Federally approved credential service providers (CSPs) or certification authorities (CAs)
 - The CSP or CA will be required to conduct identity proofing that meets **National Institute of Standards and Technology Special Publication 800-63-1 Assurance Level 3.**
 - Both in person and remote identity proofing acceptable.
- **Institutional**
 - DEA registrants
 - Credentialing offices
 - Must be in person
 - Not required to meet the requirements of National Institute of Standards and Technology Special Publication 800-63-1 for identity proofing.
 - A person designated by the institutional practitioner must check the individual

Issuance of Credentials

- **Individual Practitioner**
 - Issued after identity proofing by CA or CSP
- **Institutional Practitioner**
 - Must retain record of issuance of credential
 - Who issued
 - When issued
 - How delivered
 - Must be delivered by two methods (e.g. email and phone call)
 - How and by whom configured

EPCS



EPCS for IT—Disk Space and Reports

- **Disk Space**
 - Interface message retention and auditing
 - Event logging for auditing of access to interface messages
- **Reports**
 - **EPCS report**
 - DEA requires that prescribers review their controlled substance prescriptions monthly and that reports of controlled substances are also available to prescribers on demand.
 - **EPCS Daily Incident report**
 - Daily review of incidents
 - Failed Logins
 - Failed authentications
 - Interface stops and starts
 - Security changes
 - Event logging stops and starts
 - Deletions or attempted deletions of EPCS orders

EPCS for IT--Access

- The action of granting practitioner access control to sign electronic prescriptions must be performed by two separate persons
 - Both must be designated to manage access
 - One must grant access
 - Other approves granting of access
- Access revoked promptly if
 - Two factor authentication lost/stolen/compromised
 - DEA registration expires
 - DEA registration revoked
 - No longer authorized to use EPCS application

EPCS Transmitting and Printing

- Electronic prescription must be transmitted from the practitioner to the pharmacy in its electronic form
- Intermediary (e.g. Surescripts) can NOT convert to fax if transmission fails
 - Intermediary must notify prescriber
 - III, IV or V can then be printed, signed manually and faxed
 - This prescription must indicate that it was originally transmitted to, and provide the name of, a specific pharmacy, the date and time of transmission, and the fact that the electronic transmission failed.
- May print copies of the transmitted prescription(s) if they are clearly labeled: "Copy only – not valid for dispensing."
- Data on the prescription may be electronically transferred to medical records, and a list of prescriptions transmitted may be printed for patients if the list indicates that it is for informational purposes only

Post-Test Question

- Which of the following can **NOT** be used for Two Factor Authentication
 - a) Fingerprint
 - b) Single Sign on Badge
 - c) Password
 - d) Retinal Scan
 - e) All of the above can be used

A Genuine Intrigue with Alert Fatigue

Sarah Seward, Pharm.D.
 PGY-2 Pharmacy Informatics Resident
 Hospital Sisters Health System – St. Elizabeth's Hospital
 Belleville, IL

Reflective Question

- Pharmacists:
 - Can you confidently say you have always read every alert that fires?
- Technicians:
 - Can you think of an instance where you bypassed a safety scan because "that's just what I'm supposed to do"?

Background

- Many Electronic Medical Records (EMRs) implemented due to American Recovery and Reinvestment Act (2009)
 - Requires demonstration of "meaningful use" of EMRs by January 1st 2014
- Key components of EMRs are clinical decision support (CDS) systems
 - Generate interaction alerts and therapy warnings



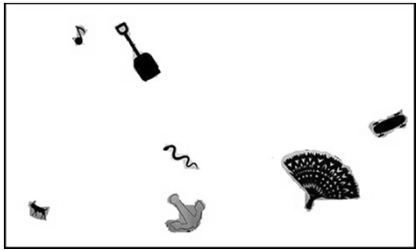
I spy with my little eye... an anchor, a musical note, a snake and a small billy goat

Seward S, Sabol K. Epic Alert Reductions at Ascension Wisconsin and the Dangers of Alert Fatigue. Presented at: Great Lakes Pharmacy Residency Conference, April 27, 2017, Lafayette, IN.



I spy with my little eye... an anchor, a musical note, a snake and a small billy goat

Seward S, Sabol K. Epic Alert Reductions at Ascension Wisconsin and the Dangers of Alert Fatigue. Presented at: Great Lakes Pharmacy Residency Conference, April 27, 2017, Lafayette, IN.



I spy with my little eye... an anchor, a musical note, a snake and a small billy goat

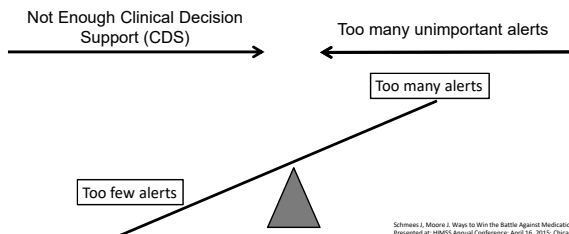
Seward S, Sabol K. Epic Alert Reductions at Ascension Wisconsin and the Dangers of Alert Fatigue. Presented at: Great Lakes Pharmacy Residency Conference, April 27, 2017, Lafayette, IN.

Alert Fatigue

- “The mental state that is the result of too many alerts consuming time and energy, which can cause important alerts to be ignored along with clinically unimportant ones.”
-Van Der Sijs *et al*
- Alert fatigue is very common
- CDS systems are meant to decrease prescribing errors
 - Only works if alerts are clinically meaningful

Van Der Sijs H, et al. Overriding of Drug Safety Alerts in Computerized Physician Order Entry. J Am Med Inform Assoc. 2006;13:139-147.

Balancing Alerts



Schuessl, Moore J. Ways to Win the Battle Against Medication Alert Fatigue. Presented at: HIMSS Annual Conference, April 16, 2015, Chicago, IL.

Van der Sijs Review

- Review of 17 publications on overriding safety alerts in CPOE systems
 - Alert override rates varied from 49%-96%
 - Adverse Drug Events (ADE) from overridden alerts varied 2.3%-6%

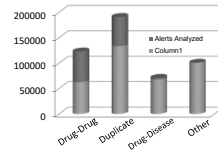
Van Der Sijs H, et al. Overriding of Drug Safety Alerts in Computerized Physician Order Entry. J Am Med Inform Assoc. 2006;13:139-147.

PGY-1 Experience With Alerts

- PGY-1 residency project at Wheaton Franciscan
- 485,652 alerts in August 2016
 - 86.5% override rate

Primary Target Categories

Drug-Drug	Duplicate Therapy	Drug-Disease
• 122,873 alerts • Top 19 = 49.1% of category	• 190,939 alerts • Top 21 = 30.2% of category	• 71,012 alerts • Top 36 = 4.9% of category • Severe = 59,102 (83.2%)



Drug-Drug Alerts

Table 2: Top Drug-Drug alert categories identified from August 2016

Top 19 Drug-Drug	Number
NARCOTICS / PHENOTHIAZINES	12267
METOCLOPRAMIDE / PROCHLORPERAZINE	10553
ONDANSETRON / QT PROLONGING AGENTS	6759
ORAL IRON SUPPLEMENTS / ANTACIDS	4274
ONDANSETRON / POSSIBLE QT PROLONGING AGENTS	3746
ORAL IRON SUPPLEMENTS / SELECTED MINERALS	2901
SELECTED ANTICOAGULANTS / ACETAMINOPHEN	2862
ACE INHIBITORS, ARBS, ALISKIREN / POTASSIUM PREPARATIONS	1952
EPINEPHRINE / BETA-BLOCKERS	1752
ANTIDIABETICS / NON-CARDIOSELECTIVE BETA-BLOCKERS	1561
METOCLOPRAMIDE / SSRIS, SNRIS	1485
VARICELLA - LIVE VACCINES / LIVE VACCINES	1480
SELECTED ANTICOAGULANTS / SSRIS, SNRIS	1462
BETA-2 AGONISTS / NON-CARDIOSELECTIVE BETA-BLOCKERS	1455
ANTICOAGULANTS / THYROID	1341
KETOROLAC (INJECTABLE) / NSAIDS, ASPIRIN (> 81 MG)	1285
TARAPIDOL, TRAMADOL / TRICYCLIC COMPOUNDS, CARBAMAZEPINE	1276
HEPARINS / SELECTED ANTICOAGULANTS	1029
SSRIS, SNRIS / NSAIDS, ASPIRIN	942

Duplicate Medication Alerts

Table 3: Top Duplicate Med alert categories identified from August 2016

Top 21 Duplicate Med	Number
NARCOTIC ANALGESICS- IR (WITH ALL ANTITUSSIVE OPiates)	8976
ANTIDEPRESSANTS	5725
POTASSIUM	4226
BETA-ADRENERGIC AGENTS SHORT-ACTING (INHALED)	4124
SELECTIVE SEROTONIN 5-HT3 ANTAGONISTS	3237
ANTIPLATELET AND ANTITHROMBOTIC DRUGS	3113
0.9 % SODIUM CHLORIDE, IV, NON-PRN ORDER	3048
PEPTIC ULCER AGENTS	3030
ANTIANKIETY AGENTS	2958
ANTICHOLINERGIC AGENTS, SYSTEMIC	2822
0.9 % SODIUM CHLORIDE, SODIUM CHLORIDE 0.9%, IV, NON-PRN ORDER	2188
NON-STEROIDAL ANTI-INFLAMMATORY (NSAID) & SALICYLATES	1855
ONDANSETRON HCL/PV, IV, PRN ORDER	1759
0.9 % SODIUM CHLORIDE, SODIUM CHLORIDE 0.9%, IV, PRN ORDER	1676
ALBUTEROL SULFATE, INH, PRN ORDER	1645
MORPHINE SULFATE, IV, PRN ORDER	1304
RINGER'S SOLUTION, LACTATED, IV, NON-PRN ORDER	1226
BENZODIAZEPINES	888
INSULIN LISPRO, SUBQ, NON-PRN ORDER	807
POTASSIUM CHLORIDE, ORAL, NON-PRN ORDER	683
DEXTOAMPHETAMINE/AMPHETAMINE, ORAL, NON-PRN ORDER	683

Drug-Disease Alerts

- Reduced by severity level



Reduction in Alert Categories

Table 4. Alerts by category for August 2016 and February 2017

Alert category	# of alerts August 2016	# of alerts February 2017
Duplicate therapy	190,939	138,839
Drug-drug	122,873	69,401
Drug-disease	71,012	11,613
Dose warning	42,887	29,897
Drug-allergy	30,740	28,932
Pregnancy	11,866	7,915
Lactation	10,768	6,008
Pediatrics	4,130	3,162
Geriatrics	423	319
"Error"	14	0
TPN	0	83
Total =	485,652	296,181

Reduction in Alert Categories

Table 4. Alerts by category for August 2016 and February 2017

Alert category	# of alerts August 2016	# of alerts February 2017	
Duplicate therapy	190,939	138,839	= 27.3%
Drug-drug	122,873	69,401	= 43.5%
Drug-disease	71,012	11,613	= 83.6%
Dose warning	42,887	29,897	
Drug-allergy	30,740	28,932	
Pregnancy	11,866	7,915	
Lactation	10,768	6,008	
Pediatrics	4,130	3,162	
Geriatrics	423	319	
"Error"	14	0	
TPN	0	83	
Total =	485,652	296,181	

Reductions in Alerts Overall

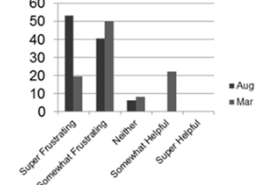
485,652 alerts



296,181 alerts

39%
reduction
overall

Figure 4. Pharmacist reported frustration levels



Seward S, Sabal K. Epic Alert Reductions at Ascension Wisconsin and The Dangers of Alert Fatigue. Presented at: Great Lakes Pharmacy Residency Conference, April 27, 2017; Lafayette, IN.

Conclusions

- Alert fatigue can lead to harmful patient outcomes
- CDS systems only useful if they provide meaningful alerts
- Correctly configured CDS system = reduce alert fatigue

Questions?

Sarah Seward, Pharm.D.
PGY-2 Pharmacy Informatics Resident
HSHS – St. Elizabeth's Hospital
Belleville, IL
Sarah.Seward@hshs.org
618-234-2120 x4819

