Q2 Thank you for taking our survey. We are researching perceptions and awareness of High-Alert Medications at the University of Michigan Health System (UMHS) within and among professions for quality improvement purposes. A fully completed survey will give you the option of being entered into a drawing for one of two $50 iTunes gift cards. Responses will be kept anonymous and participation is voluntary. Please remember there is no right or wrong answer and we are interested in your experiences and thoughts.

Q3 Of the following choices, which best describes your profession?
A. Attending physician
B. Fellow
C. Chief Resident
D. Resident Physician
E. Medical Student
F. Physician Assistant
G. Nurse Practitioner
H. Registered Nurse (RN)
I. Licensed Practical Nurse (LPN)
J. Nursing Student
K. Pharmacist
L. Pharmacy Technician
M. Pharmacy Student
N. Other ____________________

Q4 How many years have you worked in your profession?
A. Less than 1 year
B. 1-5 years
C. 6-10 years
D. 11-15 years
E. 16-20 years
F. Greater than 20 years

Q5 Have you ever worked at another hospital besides UMHS for more than a year? (Do not count UMHS)
A. 1
B. 2
C. 3
D. 4
E. Greater than 5

Q7 How long have you been employed at UMHS?
A. Less than 1 year
B. 1-5 years
C. 6-10 years
D. 11-15 years
E. 16-20 years
F. Greater than 20 years

Q9 How many hospitals have you worked at besides UMHS for more than a year? (Do not count UMHS)
A. 1
B. 2
C. 3
D. 4
E. Greater than 5

Q10 Please select High-Alert Medications at UMHS from the following list (select all that apply):
A. IV adrenergic agents (epinephrine, phenylephrine, norepinephrine)
B. Concentrated electrolyes (potassium chloride, potassium phosphates, calcium chloride, concentrated sodium chloride >0.9%)
C. IV adrenergic antagonists (propranolol, metoprolol, labetolol)
D. Anesthetic agents (propofol, ketamine)
E. IV antiarrhythmics (lidocaine, amiodarone)
F. Neuromuscular blocking agents (atracurium, pancuronium, cisatracurium, rocuronium, succinylcholine, vecuronium)
G. Chemotherapy agents
H. IV inotropic agents (digoxin, milrinone)
I. Insulin
J. IV opiates (fentanyl, morphine, hydromorphone)

Survey note: The ordering of questions is based on how the survey was built, and the listed order is how the respondent sees the survey online. The respondent does not see the question numbers.

(This supplementary appendix accompanies article doi: 10.1310/hpj5004-287)
K. IV promethazine
L. IV oxytocin
M. Magnesium sulfate injection
N. Epidural opiates (fentanyl)
O. IV sedation agents (dexmedetomidine, midazolam)
P. Intrathecal medications (amphotericin B, clonidine, baclofen, fentanyl, morphine, hydromorphone, chemotherapy)
Q. Dialysis solutions
R. Oral opiates (morphine, oxycodone, hydrocodone)
S. Anticoagulants (warfarin, dabigatran, bivalirudin, lepirudin, argatroban, apixaban, heparin, rivaroxaban, enoxaparin, fondaparinux)
T. Parenteral prostacyclins (epoprostenol, thermostable epoprostenol, treprostinil)
U. Nitropusside sodium injection

Q11 What consequence is most likely to occur if an error involving an overdose or administration to a wrong patient occurs with insulin?
A. Diabetic coma
B. Hyperglycemia
C. Paralysis
D. Heart arrhythmia

Q12 What consequence is most likely to occur if an error involving an overdose or administration to a wrong patient occurs with opiates?
A. Bleeding
B. Hyperglycemia

Q13 What consequence is most likely to occur if an error involving an overdose or administration to a wrong patient occurs with anticoagulants?
A. Bleeding
B. Paralysis
C. Hypoglycemia
D. Heart arrhythmia

Q14 What consequence is most likely to occur if an error involving an overdose or administration to a wrong patient occurs with chemotherapy?
A. Bleeding
B. Paralysis
C. Hypoglycemia
D. Bone marrow suppression

Q15 What consequence is most likely to occur if an error involving an overdose or administration to a wrong patient occurs with IV electrolytes?
A. Bone marrow suppression
B. Diabetic coma
C. Bleeding
D. Heart arrhythmias

Q16 What consequence is most likely to occur if an error involving an overdose or administration to a wrong patient occurs with IV prostacyclins?
A. Bleeding
B. Paralysis
C. Bone marrow depression
D. Cardiovascular collapse

Q17 Match the following items (rescue medications) with the associated High-Alert Medication. Complete this task by clicking the rescue agent in the left hand column and then drag and drop the item to a column on the right. *Note: All the items (rescue agents) may not be utilized.

<table>
<thead>
<tr>
<th>Insulin</th>
<th>Opiates</th>
<th>Anticoagulants</th>
<th>Neuromuscular Blocking Agents</th>
<th>Chemotherapy</th>
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<tbody>
<tr>
<td>__ _</td>
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<td>_ phytonadione (vitamin K)</td>
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<td>_ flumazenil</td>
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<td>_ diphenhydramine</td>
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</tbody>
</table>
Q18 How effective are the following risk-reduction strategies for High-Alert Medications?

<table>
<thead>
<tr>
<th>Strategy</th>
<th>Ineffective</th>
<th>Somewhat Ineffective</th>
<th>Neither Effective nor Ineffective</th>
<th>Somewhat Effective</th>
<th>Effective</th>
</tr>
</thead>
<tbody>
<tr>
<td>Formulary restrictions/attending only ordering/approved by consult service</td>
<td></td>
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<tr>
<td>Storage restrictions (Omnicell secure drawer/pharmacy only)</td>
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<td>Standard concentrations across health system</td>
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<td>Independent double check or verification</td>
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<td>Smart pump infusion technology</td>
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<td>Bar code medication administration (BCMA)</td>
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<td>Labeling</td>
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<td>Patient-specific doses compounded by pharmacy</td>
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<td>Computerized physician order entry (CPOE)</td>
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<tr>
<td>Forcing functions</td>
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<tr>
<td>Time out</td>
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<tr>
<td>Checklist</td>
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</tbody>
</table>

Q19 When was the last time you utilized a High-Alert Medication?
A. Last 24 hours  
B. Last week  
C. Last month  
D. Last 3 months  
E. Last 6 months  
F. Last 12 months  
G. Never

Q20 Have you been involved in an error (including a near-miss) with a High-Alert Medication in the last 12 months?
A. Yes  
B. No

Q22 What was the outcome for the patient as a result of the error?
A. Near miss - did not reach patient  
B. No harm - reached patient  
C. No harm - required monitoring  
D. Temporary harm - transfer level of care, initial or prolonged hospitalization  
E. Permanent harm  
F. Death

Q23 Where in the medication process did the error occur? (Select all that apply)
A. Procurement  
B. Ordering  
C. Storage  
D. Monitoring  
E. Preparing  
F. Dispensing  
G. Administration

Q24 Since the error occurred, how have you changed your practice with High-Alert Medications? (Select all that apply)
A. Review orders more carefully  
B. Slow down/concentrate more  
C. Follow five rights, concentrating on each step rather than going through the motions  
D. Seek assistance from another colleague  
E. Look-up drug information  
F. Seek clarification/ask someone if unclear  
G. Consult pharmacy
H. Consult prescriber
I. Have not changed practice
J. Perform time out
K. Created a checklist that I utilize
L. Other ____________________

Q27 Where were you first educated on High-Alert Medications?
A. School (didactic)
B. Journal
C. During orientation at UMHS
D. Previous hospital
E. Work experience (on the job)
F. Made an error involving a High-Alert medication
G. Patient rounds
H. Email communication
I. Newsletter
J. Unit meeting/education
K. Nursing blitz
L. Continuing education/presentation
M. Poster
N. School (clinical/experimental)
O. Other ____________________

Q29 In your didactic or clinical courses was medication safety (specifically High-Alert Medications) part of your curriculum? (May select more than one answer)
A. Yes - didactic portion
B. No
C. Yes - clinical portion

Q28 What is the most effective method to educate on High-Alert Medications at UMHS?
A. School - didactic
B. School - clinical
C. During orientation at UMHS
D. Previous hospital
E. Work experience (on the job)
F. Made an error involving a High-Alert medication
G. Patient rounds
H. Email communication
I. Newsletter
J. Unit meeting/education
K. Nursing blitz
L. CE/presentation
M. Poster
N. Other ____________________
O. Other ____________________

Q31 How do members of your leadership team demonstrate behaviors that remind you to be aware of High-Alert Medications? (Select all that apply)
A. Discuss High-Alert Medications during rounds
B. Discuss risk versus benefit for the patient when considering High-Alert Medications
C. Reinforce risk-reduction strategies
D. Acknowledge risks associated with High-Alert Medications
E. Discuss errors or near misses that occurred with High-Alert Medications
F. Discuss potential impact to other health care members
G. Other ____________________

Q30 Do members of your leadership team demonstrate behaviors and lead by example when utilizing High-Alert Medications (discuss potential problems or pitfalls, past events or near misses, impact to other health care members and the patient and risk reduction strategies)?
A. Yes
B. No

Q32 Which members of your leadership team demonstrate behaviors that remind you to be aware of High-Alert Medications? (Select all that apply)
A. Supervisor
B. Manager
C. Charge nurse
D. Nurse Educator
E. Clinical Nurse Specialist
F. Preceptor/instructor
G. Other ____________________

Q33 Which members of your leadership team demonstrate behaviors that remind you to be aware of High-Alert Medications? (Select all that apply)
A. Attending Physician
B. Fellow
C. Chief Resident
D. Preceptor/instructor
E. Lead Physician Assistant or Nurse Practitioner
F. Other ____________________

Q34 Which members of your leadership team demonstrate behaviors that remind you to be aware of High-Alert Medications? (Select all that apply)
A. Manager/Supervisor
B. Technician Coordinator
C. Medication Safety Officer
D. Preceptor/instructor
E. Other ____________________

Q35 The following is a list of High-Alert Medications at UMHS: Anticoagulants (apixiban, argatroban, bivalirudin, dabigatran, enoxaparin, lepirudin, rivaroxaban, therapeutic heparin, warfarin); Chemotherapeutic agents; Concentrated electrolytes (calcium chloride, concentrated sodium chloride>0.9%), potassium chloride, potassium phosphates); Insulins; Intrathecal medications; Neuromuscular blocking agents (atracurium, cisatracurium, pancuronium, rocuronium, succinylcholine, vecuronium); Opiates (intravenous, epidural, intrathecal); Parenteral prostacyclins (epoprostenol, thermostable epoprostenol, treprostinil).

Do you believe any of the following medications should be added to UMHS High-Alert Medication list? (Select all that apply)
A. Vasoactives (epinephrine, phenylephrine, norepinephrine, vasopressin)
B. Anesthetic agents (propofol, ketamine)
C. Dialysis solutions (peritoneal, hemodialysis)
D. Parenteral solutions (TPN)
E. Sterile water
F. Magnesium sulfate in obstetrics
G. Oxytocin in obstetrics

Q43 Why do you believe those medications should be added to the High-Alert Medications list? (Select all that apply)
A. Errors have occurred resulting in patient harm
B. Near misses have occurred
C. Lack of control
D. Storage problems
E. Prescribing errors
F. Complex process
G. Potential for significant harm
H. Dispensing errors
I. Administration errors
J. Other ____________________

Q41 Why are the five rights not completed consistently? (Select all that apply)
A. Busy
B. Interruptions
C. Use different method
D. Not effective to prevent errors
E. Not enforced
F. Unaware you were supposed to
G. Doesn’t fit/slow into workflow
H. Haven’t experienced an error
I. I’m careful and know my patients
J. Other ____________________

Q40 Has completing the five rights become so routine that you are no longer conscious of each step or you no longer approach the five rights as a step-wise approach?
A. Yes
B. No
C. Not applicable

Q45 Thank you for completing the survey, your results will be anonymous and only used in aggregate. If you wish to be entered into the drawing for the iTunes gift card, please enter your email address below.