IHI Global Trigger Tool Guide

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This IHI Global Trigger Tool Guide is designed to provide comprehensive information on the tool, background on the methodology and approach, and step-by-step instructions for using the tool to measure adverse events in a hospital.

I. BACKGROUND

A. History

Conventional attempts to quantify adverse events have included incident reports, retrospective or concurrent record reviews, and observational data. The concept of a "trigger" or sentinel word to identify adverse events in the medical record was introduced by Jick in 1974.[1] Classen refined and automated the approach by using electronic triggers with an integrated hospital information system to isolate adverse events.[2] The use of triggers with manual record reviews was initially developed by the Institute for Healthcare Improvement (IHI) in 1999 to identify adverse medication events and application to other areas of the hospital, such as intensive care, followed. Recent publications describe the use and development of the Trigger Tool.[2-6] Subsequently, IHI developed the **IHI Global Trigger Tool**, to identify adverse events, with some exclusions, throughout the hospital.

B. Harm versus Error

The overall goal of improved safety in health care is to reduce patient injury or harm, which underscores the importance of distinguishing between errors and harm. Medical errors are failures in processes of care and while they have the potential to be harmful, numerous reports have shown they are often not linked to the injury of the patient.[7] There are two distinct advantages in attempting to quantify harm instead of errors. First, errors are commonly focused on process and often examine an individual's role in a real or potential mishap. Alternatively, a focus on harm targets the system rather than the individual, and focuses on approaches to improve or enhance clinical outcomes. This has the practical effect of reducing punitive concerns and fosters greater cooperation with patient safety efforts. Second, since a harm-centered process examines all unintended results, the definition of harm is more comprehensive and based on what the patient experiences. Using these concepts, the IHI Global Trigger Tool focuses on the identification of harm or injury to the patient.

C. Definition of an Adverse Event

Any effort to identify harm requires a clear definition of an adverse event. The World Health Organization (WHO) Collaborating Centers for International Drug Monitoring defines an adverse drug event as follows:

> *"Noxious and unintended and occurs at doses used in man for prophylaxis, diagnosis, therapy, or modification of physiologic functions."*[8]

The IHI Global Trigger Toll includes these types of events, but goes beyond medications to include any noxious or unintended event occurring in association with medical care. The WHO definition of "adverse events" includes events caused by errors. Some errors are harmless, some cause injury, and some are "near

misses," that is, they do not cause injury to the patient, either by chance or because they are intercepted before the medication is administered.

In the IHI Global Trigger Tool, the definition used for harm is as follows: an adverse event where there is an injury or harm related to or from the delivery of care.

D. Commission versus Omission

The IHI Global Trigger Tool focuses on and includes only those adverse events related to the active delivery of care (commission) and excludes, as much as possible, events related to error or substandard care (omission). For example, a patient not treated for hypertension and who subsequently experienced a stroke would not be considered to have suffered an adverse event using the IHI Global Trigger Tool definition. However, a patient to whom anticoagulants were administered and suffered an intra-cerebral bleed would be considered to have suffered an adverse event.

E. Preventability

The IHI Global Trigger Tool includes all events whether preventable or not. There should be no attempt by the reviewers to determine preventability unless it is done outside of the IHI Global Trigger Tool. If an adverse event occurred it is, by definition, harm. The tool is meant to measure harm or injury to patients. Preventability is not considered in defining the event. One could argue that unpreventable events today are only an innovation away from being preventable. The IHI Global Trigger Tool is designed to be a method for measuring harm over time. If the definition of included events constantly changed depending on what was preventable, the measure over time would become meaningless.

F. Severity Ratings

The IHI Global Trigger Tool adapts the National Coordinating Council for Medication Error Reporting and Prevention (NCC MERP) Index for Categorizing Errors.[9] NCC MERP brings together leading health care organizations to meet, collaborate, and cooperate to address the interdisciplinary causes of errors and to promote the safe use of medications. Although originally develop for categorizing medication errors, these definitions can be easily applied to any type of error or adverse event.

The IHI Global Trigger Tool counts only adverse events: harm to the patient, whether or not the result of an error. Harm is defined as "temporary or permanent impairment of physical or physiologic body function or structure." Accordingly, the tool excludes the following categories in the NCC MERP Index because these categories describe medication errors that do not cause harm:

Category A: Circumstances or events that have the capacity to cause error

Category B: An error that did not reach the patient

Category C: An error that reached the patient but did not cause harm

Category D: An error that reached the patient and required monitoring or intervention to confirm that it resulted in no harm to the patient

This tool includes categories E, F, G, H, and I of the NCC MERP Index because these categories describe errors that do cause harm. (Note that NCC MERP's "An error that contributed to or resulted in…" has been deleted, because this tool is designed to find harm, whether or not it was the result of an error.)

Category E: Temporary harm to the patient and required intervention

Category F: Temporary harm to the patient and required initial or prolonged hospitalization

Category G: Permanent patient harm

Category H: Intervention required to sustain life

Category I: Patient death

G. Trigger Selection

The triggers used in the IHI Global Trigger Tool were developed by reviewing the literature on adverse events in various areas of the hospital. These prioritized triggers were then tested in hundreds of hospitals using the various antecedents (Adverse Drug Event, Surgery, Perinatal, Intensive Care Unit) of the IHI Global Trigger Tool. The IHI Global Trigger Tool was then divided into modules to represent these antecedent tools. Triggers have been added and adjusted over time to reflect changes in treatments and types of adverse events being identified.

II. RULES AND METHODS

The IHI Global Trigger Tool requires manual review of closed patient records (records with completed discharge summaries and coding). This section of the tool explains the processes for selecting and reviewing records and determining whether adverse events have occurred.

A. Review Team

The review team should consist of, at a minimum, three people:

1) Two record reviewers who have clinical backgrounds and knowledge about the contents and layout of the hospitals record, as well as about how care is generally provided in the hospital. Hospitals now using the IHI Global Trigger Tool have typically used nurses, pharmacists, and respiratory therapists on their review teams. Experienced nurses have been the best reviewers, but other combinations of team composition can be used since each person brings unique expertise.

2) A physician who does not review the records, but authenticates the consensus of the two record reviewers. The physician authenticates the findings of the adverse events, the rating of severity, and provides answers to questions the record reviewers have about findings in a specific record.

If more than two reviewers are used in a hospital the problem of consistency between the reviewers arises. The best solution is to conduct routine (monthly) meetings to review all the adverse events identified for that month. The meeting should focus on discussions between the reviewers on the events and the severity. This will minimize variation between the reviewers in adverse event identification and severity rating.

The review team should remain consistent over time whenever possible. A one year assignment with overlapping team members seems to be a good compromise. If reviewers and physicians assigned to the team rotate too frequently without overlap training, there may be lack of consistency in identification of events and severity ratings.

B. Sampling Patient Records

The IHI Global Trigger Tool is designed for use with a sampling methodology that utilizes small samples over time.

The recommendation is to sample 10 patient records every two weeks. Data from these small samples will show wide variation from sample to sample. However, when 12 or more sample points have been collected (six months with this approach), the mean number of adverse events will vary by only 4% or less compared to a much larger sample.

Records selected should all be obtained from the same larger population such as all patients discharged between the 1st and 15th calendar date of a month. Because readmission within 30 days is a trigger, select patients who were discharged more than 30 days previously; this also ensures completed records are selected. For example, if conducting a review in December, select patient records from those discharged in October.

Use the following guidelines when selecting the records:

- Select each group of 10 records independently; do not select 20 records for the month and divide into two samples.
- Include a few extra records with each sample in case a record is discovered to not meet criteria at the time of review. In such cases, do not use that record and select one of the “extras.” Only 10 records are reviewed, so the extra ones are not used unless this occurs.

Because the review is based on sampling to discover adverse events, it is critical to use a truly random process for selecting the records. Use any selection method, as

long as it is random (i.e., every patient record has an equal opportunity of being chosen). Some example methods are:

- Generate random numbers between 1 and 9 and select 10 records with record numbers ending in the random number.
- Print out all admissions or discharges (as long as deaths are included) and select every 10th record for review.

In small rural hospitals that have less than 20 inpatients per month, all records for the month should be reviewed. The review can be done monthly since the total records are being reviewed.

In summary, records selected for review should meet the following criteria:

- Closed and completed record (discharge summary and all coding is finished)
- Length of stay at least 24 hours and formally admitted to the hospital
- Patient age 18 years or older

If possible, records of hospital visits before and after the index record (i.e., the record selected for review) should be made available. These will be used to determine cause for admissions or readmission. A review using the IHI Global Trigger Tool should not be done on these records. They will primarily be used to investigate the trigger associated with readmissions.

C. Review Process

The two record reviewers should each review all records separately. During the review, the physician should be available to answer questions that may arise.

Use the following process for the review:
1) The IHI Global Trigger Tool contains six "modules." Four of the groupings of triggers are designed to reflect adverse events which commonly occur in a particular unit; the Cares and Medication groupings are designed to reflect adverse events that can occur anywhere in the hospital. The six modules are:

- Cares
- Medication
- Surgical
- Intensive Care
- Perinatal
- Emergency Department

All patient records should be reviewed for the triggers in the Cares and Medication modules. The other modules should only be used if applicable; for example, the Intensive Care module should be used when reviewing a record for a patient who spent any part of the hospital stay in an intensive care unit.

2) The record should only be reviewed to look for the presence of triggers, not to read the record from front page to back page. Experienced reviewers have found these key portions of the record most useful when reviewed in this order:

- Discharge codes (particularly infections, complications, or certain diagnoses); E-codes, which are used by trained coders to note the presence of certain events and complications can be found here
- Discharge summary (look for the specifics of assessment and treatment during the hospital stay)
- Medications ordered from prescriber orders and the medication administration record
- Laboratory results
- Operative record
- Nursing notes
- Physician progress notes
- If time permits, any other areas of the record (such as History & Physical, Consult notes, or Emergency Department notes)

3) Set a 20-minute limit for review of each patient record, once the training period for reviewers has been completed. The "20-minute rule" applies to any record regardless of its size. The 20-minute rule was developed in the initial tests of the Trigger Tool because there was a propensity to review the smaller, "easier" patient records (i.e., those with shorter lengths of stay). However, if only shorter stay patient records are reviewed, the sample is no longer random. Each adverse event in the larger records will have the same likelihood of being identified, although it is unlikely all the events in the larger record will be identified since 20 minutes will not be sufficient time to adequately review the entire record using the Trigger Tool technique. Tests have shown that reviewing records for longer than 20 minutes may yield additional events, but these events are usually of severity category E while those of greater severity will rarely be missed. The 20-minute rule will maintain the validity of the sampling technique. It is important to note that the IHI Global Trigger Tool is not meant to identify every single adverse event in a record. The time limitation and random selection of records are designed to produce a reliable sampling approach sufficient for the design of safety work in the hospital.

4) If a trigger is identified in a record, the "positive trigger" only indicates the presence of trigger and not necessarily an adverse event. When a positive trigger is found, review only the pertinent portions of the record. The focused review will determine whether an adverse event has occurred (refer to section II-D regarding the determination of adverse event). If no adverse event is found, the reviewer should then move on and look for other triggers. Many positive triggers will be found, but many fewer adverse events will be identified. Occasionally adverse events will be found with no antecedent trigger. These events are to be included. Some triggers (nosocomial infections, for example) are adverse events by definition.

D. Determination of an Adverse Event

A positive trigger is generally not an adverse event in and of itself, rather it is just a clue that one may have occurred; there are a few triggers that are sometimes both a trigger and an adverse event (3rd or 4th degree laceration in the Perinatal module, for example).

When a positive trigger is identified, the reviewer should check other relevant portions of the record such as progress notes and orders that were documented in close proximity to the occurrence of the trigger. Documentation that the patient experienced harm from medical care should be present for an adverse event. For example, an INR level greater than 6 would be a positive trigger. The reviewer should look for documentation of bleeding or decreased hemoglobin with need for transfusion and other adverse events that can result from over-anticoagulation.

In determining whether an adverse event has occurred, consider that an adverse event is harm to a patient *from the viewpoint of the patient*. There are several important aspects:

- Would you be happy if the event happened to you? If the answer is no, then there was harm.
- The next test is whether the event is a part of the natural progression of the disease process or a complication of the treatment related to the disease process. Insofar as it is practical, the harm identified should be the result of some medical treatment (review section I-D on Commission versus Omission). The decision is subjective at times and physician input will be critical.
- Was the event an *intended* result of the care (e.g., a permanent scar from surgery)?
- Psychological harm by definition has been excluded as an adverse event.

Reviewers may occasionally discover an adverse event without a trigger while looking for triggers or other details. These events should be included when recording findings, regardless of whether a trigger led the reviewer to the adverse event.

Once it has been determined that an adverse event has occurred, assign a category of harm (as defined previously in section I-F on Severity Ratings) as follows:

Category E:	Temporary harm to the patient and required intervention
Category F:	Temporary harm to the patient and required initial or prolonged hospitalization
Category G:	Permanent patient harm
Category H:	Intervention required to sustain life
Category I:	Patient death

These categories are not progressive (i.e., an event does not have to first meet the definition of E and F before it can be categorized as G). For category E some intervention is required. The simplest intervention could be observation. For category H, experienced reviewers have found it helpful to define "lifesaving intervention" as that which must be provided in one hour or less in order to prevent death. For example, a patient with a surgical site infection requires antibiotic treatment and one could argue that failure to provide it could lead to sepsis and death. While this may be true, it is unlikely that the antibiotic would need to be provided within one hour to prevent death. However, a patient who develops respiratory depression and arrest from a narcotic requires immediate intervention, such as non-invasive or invasive ventilation; this would be an intervention required to sustain life, even if it was only needed for a few hours. For category I the event needs only to be contributory to the death.

Reviewers should record information on findings while reviewing the patient records. The IHI Global Trigger Tool Worksheet (Appendix B) lists all triggers, categorized into their modules, and can be used during the review. When a trigger is identified, a check is placed in the column next to it (the column with +). If an adverse event is then identified, note a description and category of harm in the appropriate column. The reverse side of the Worksheet is blank and reviewers often use this space to make notes for discussion with other members of the review team or to capture questions that need to be reviewed with the physician.

The two record reviewers should meet after completing their separate reviews to compare findings and come to consensus, which should be recorded in the IHI Global Trigger Tool Review Summary Sheet (Appendix C).

The physician should review the consensus with the two record reviewers and reach a final agreement on the type, number, and severity of events. The physician does not review the patient record, only the Summary Sheet (Appendix C). Individual Worksheets, notes, and the patient records should be available for reference and clarification, if necessary. Adjust the number of adverse events or harm categories, if needed, after review with the physician. The physician is the final arbitrator.

E. Data Collection

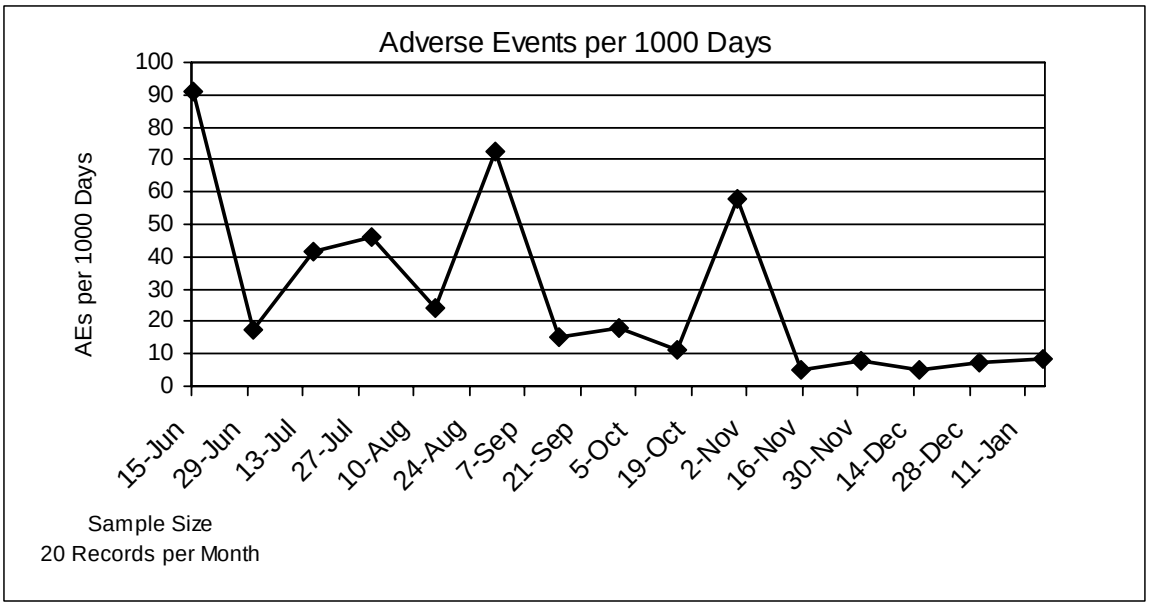
Two-week data collections initially should be presented in three ways:

- Adverse events/1,000 patient days (see example below)
- Adverse events/100 admissions
- Percent of admissions with an adverse event.

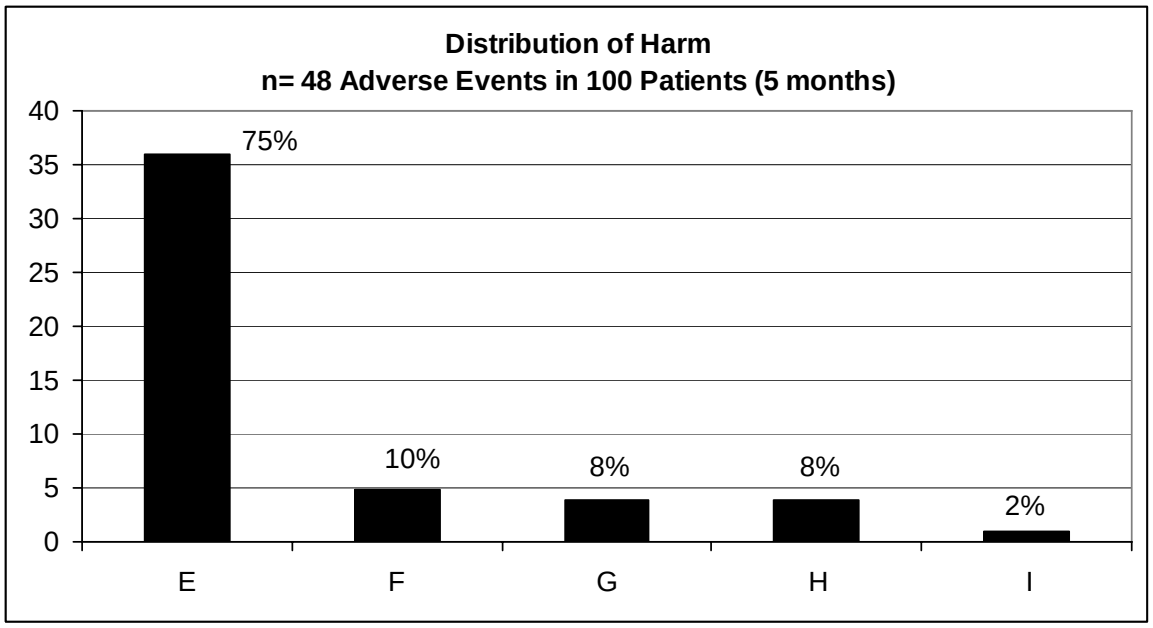
Each method has certain advantages. Adverse events/1,000 patient days is the traditional measure and should be mandatory. The data should be presented as a run chart with the events/1,000 patient days on the Y-axis and time in two-week increments on the X-axis.

Adverse events/100 admissions is a concession to previous Trigger Tool studies. It gives a more easily understood representation of harm for leadership. A similar run chart should be devised (note the conversion between events/1,000 days and events/100 admissions just includes the number of records reviewed instead of patient days).

Lastly the percent of admissions with adverse events is a convenient way to present the information to lay leadership, although it diminishes the number of events because some patients have more than one adverse event during a hospital stay.



Following the run chart representations, categories of harm should be presented in a bar chart where the volume of harm in each category (E through I) is depicted.



Lastly, adverse events can be categorized by type of events. The types of events have commonly been defined as cares (based on the Cares module), infections, medications, and procedural complications. Organizations have found this categorization to be useful in prioritizing areas for improvement work.

III. TRIGGERS AND DEFINTIONS

This section lists all of the triggers contained in the IHI Global Trigger Tool by module, with descriptions of what reviewers should look for in determining the presence of a positive trigger as well as an adverse event, if identified.

A. CARES MODULE TRIGGERS

Transfusion of Blood or Use of Blood Products
Procedures can require intra-operative transfusion of blood products for replacement of estimated blood lost, but this has become less common with "bloodless surgery." Any transfusion of packed red blood cells or whole blood should be investigated for causation, including excessive bleeding, unintentional trauma of a blood vessel, etc. Transfusion of many units within the first 24 hours of surgery, including intra-operatively and post-operatively, will commonly be related to a peri-operative adverse event. Exceptions would be where excessive blood loss occurred pre-operatively. Fresh frozen plasma and platelets can reflect events related to the use of anticoagulants.

Abrupt Drop in Hemoglobin (Hg) or Hematocrit of 25% or Greater
Any drop of 25% or greater in Hg grams or Hematocrit (Hct) requires an explanation. Bleeding events are commonly exposed by this trigger. The harm needs to be identified. Examples might be the use of anticoagulants or aspirin or even a surgical

misadventure. The drop in Hg or Hct in itself is not an adverse event unless it is related to some medical treatment. A drop associated with a disease process is not to be considered an adverse event.

In-Hospital Stroke
In-hospital strokes can be associated with a procedure or anticoagulation. Evaluate the cause of the stroke. Possible medical care-related complications could be a stroke subsequent to surgical procedures or treatments that may have contributed to the stroke such as conversion of atrial fibrillation.

Codes or Arrest
All codes need to be carefully reviewed as the end event of a flawed care process. Not all codes are adverse events. Cardiac or pulmonary arrest occurring intra-operatively or in the post anesthesia care unit should always be considered an adverse event. In the first 24 hours post-operatively, it is also very likely to be an adverse event. A sudden cardiac arrhythmia with a resulting code may well be associated with no adverse event. Failure to recognize signs and symptoms would be an example of an omission and would not be counted as an adverse event unless the changes were the result of a medical intervention of some kind.

Dialysis
New onset dialysis may be the course of a disease process or the result of an adverse event. Adverse events can cause the need for the dialysis. The adverse events could result from drug induced renal failure, prolonged hypotension, or administration of a dye for radiological procedures, for example.

Positive Blood Culture
A positive blood culture at any time during the hospitalization must be investigated as an indicator of an adverse event. Unless the source for infection is clearly outside the hospital, by definition this would indicate an adverse event from the hospitalization itself. Examples of adverse events might be surgical site infections, sepsis, blood stream line infections, or any other hospital-acquired infection.

X-Ray or Doppler Studies for Emboli or Deep Vein Thrombosis (DVT)
Development of a DVT or pulmonary embolism (PE) during a hospital stay should be considered an adverse event. Even if all appropriate preventive measures appear to have been taken, from a patient's perspective this is a harmful event. If the hospitalization occurs due to a DVT or emboli, look for causation outside of the hospital that could be attributed to medial care. The lack of prophylaxis is not an adverse event as this would be an omission rather than commission.

Falls
A fall in a care setting represents a failure of care. A fall may be the result of medications, equipment failure, or failure of adequate staffing. A fall without harm is not considered an adverse event. Any fall in the care setting that causes harm, regardless of cause, is an adverse event by definition. Review the physician progress

notes, nursing or multidisciplinary notes for evidence of over-sedation, lethargy, or other conditions that may have contributed to a fall. Falls resulting in admission to the hospital should be reviewed for causation and attributed as an adverse event even if they occurred outside the hospital, such as a fall resulting from medications.

Decubiti
Decubitus ulcers are adverse events. Chronic decubiti are adverse events if they occurred during a hospitalization. If they occurred in the outpatient setting, consider the etiology (over-sedation, etc.) to assess if an adverse event occurred.

Readmission within 30 Days
Any readmission, particularly within 30 days, could be an indication of an event. An adverse event may not manifest itself until after the patient has been discharged from the hospital, especially if the length of stay is minimal. Examples of adverse events may include surgical site infection, deep vein thrombosis, or pulmonary embolism.

Restraint Use
Restraint use requires documentation. Whenever restraints are used, review the reasons. Consider the relationship between the use of restraints as a possible result of confusion from drugs, etc. which would indicate an adverse event.

Infection of Any Kind
Review for any nosocomial infections: central line infection, surgical site infection, or urinary tract infection. Any infection occurring in the hospital is an adverse event. Any infection which causes an admission to the hospital needs to be reviewed for a possible adverse event versus naturally occurring disease. Infections identified in the outpatient arena and associated with medical intervention are to be considered adverse events.

Transfer to Higher Level of Care
Transfers to a higher level of care within the institution, to another institution, or to your institution from another must be reviewed. All transfers have a likelihood of being the result of an adverse event. Admission to the intensive care unit may have occurred when a patient's clinical condition deteriorated secondary to an adverse event. When reviewing this trigger, look for the reasons for the transfer. For example, in the case of admission to intensive care following respiratory arrest and intubation, if the respiratory arrest was a natural progression of an exacerbation of chronic obstructive pulmonary disease (COPD) then it would not be an adverse event; if it was caused by a pulmonary embolism that developed post-operatively or over-sedation of a patient with COPD, it would be an adverse event.

Procedure
Evaluate the reason for the procedure. The procedure itself may be required due to an adverse event. Look for complications from any procedures. Procedure notes frequently do not note the complications, especially if they occur hours or days after the procedure note has been dictated.

Other
Frequently when the record is reviewed, an event is uncovered that does not fit a trigger. Any event can be placed under this "Other" trigger. An event does not require a listed trigger to be counted as an event.

B. MEDICATION MODULE TRIGGERS

***Clostridium Difficile* Positive Stool**
If a patient is on or has been on multiple antibiotics, this adverse event can be observed. A positive *C. difficile* assay is an adverse event if a history of antibiotic use is present.

Partial Thromboplastin Time (PTT) Greater Than 100 Seconds
Elevated PTT measurements occur when patients are on heparin. Look for evidence of bleeding to determine if an adverse event has occurred. An elevated PTT in itself is not an adverse event. An actual event needs to occur and the manifestation is usually evidence of bleeding.

International Normalized Ratio (INR) Greater Than 6
Look for evidence of bleeding to determine if an adverse event has occurred. An elevated INR in itself is not an adverse event.

Glucose Less Than 50 mg/dl
Not all patients will by symptomatic; if the patient is not symptomatic, there is no adverse event. Review for symptoms such as lethargy and shakiness documented in nursing notes, and the administration of glucose. If symptoms are present, look for associated use of insulin or oral hypoglycemics.

Rising BUN or Serum Creatinine Two Times (2x) Over Baseline
Review laboratory records for rising levels of either BUN or serum creatinine. If a change of two times greater than baseline levels is found, review medication administration records for medications known to cause renal toxicity. Review physician progress notes and the history and physical for other causes of renal failure, such as pre-existing renal disease or diabetes that could have put the patient at greater risk for renal failure; this would not be an adverse event, but rather the progression of disease.

Vitamin K
If Vitamin K was used as a response to a prolonged INR, review the record for evidence of bleeding. The laboratory reports should indicate a drop in hematocrit or guiac-positive stools. Check the progress notes for evidence of excessive bruising, gastrointestinal (GI) bleed, hemorrhagic stroke, or large hematomas as examples of adverse events.

Diphenhydramine (Benadryl)

Diphenhydramine is frequently used for allergic reactions to drugs but can also be ordered as a sleep aid, a pre-op/pre-procedure medication, or for seasonal allergies. If the drug has been administered, review the record to determine if it was ordered for symptoms of an allergic reaction to a drug or blood transfusion administered either during the hospitalization or prior to admission.

Flumazenil (Romazicon)
Flumazenil reverses the effect of benzodiazepine drugs. Determine why the drug was used. Examples of adverse events are severe hypotension or marked, prolonged sedation.

Naloxone (Narcan)
Naloxone is a powerful narcotic antagonist. Usage may represent an adverse event.

Anti-Emetics
Nausea and vomiting commonly are the result of drug administrations both in surgery and non-surgical settings. Antiemetics are commonly administered. Nausea and vomiting that interferes with feeding, post-operative recovery, or delayed discharge suggests an adverse event. One or two episodes treated successful with anti-emetics would suggest no adverse event. Reviewer judgment is needed to determine whether harm occurred.

Oversedation/Hypotension
Review the physician progress, nursing or multidisciplinary notes for evidence of over-sedation and lethargy. Review vital signs records or graphics for episodes of hypotension related to the administration of a sedative, analgesic, or muscle relaxant. Intentional overdose is not considered an adverse event.

Abrupt Medication Stop
Although the discontinuation of medications is a common finding in the record, abruptly stopping many medications at once is a trigger requiring further investigation for cause. It can represent a sudden change in the patient condition requiring the readjustment of many medications. The sudden change is often related to an adverse event.

C. SURGICAL MODULE TRIGGERS

Return to Surgery
A return to the operating room can either be planed or unplanned. Both can be a result of an adverse event. A surgical procedure that is planned in stages needs to be evaluated from the viewpoint of an adverse event or the requirements of the procedure itself. An example of an adverse event would be a patient who had internal bleeding following the first surgery and required a second surgery to explore for the cause and to stop the bleeding. Even if the second surgery is exploratory but reveals no defect, this should be considered an adverse event.

Change in Procedure

An unexpected change in a surgical procedure as a result of unexpected findings versus a complication of the procedure itself needs to be studied. When the procedure on the post-operative note is different from the procedure planned in the pre-operative note or documented in the surgical consent, a reviewer should look for details as to why the change occurred. An unexpected change in procedure due to device or equipment failure should be considered an adverse event, particularly if length of stay increases or obvious injury has occurred.

Admission to Intensive Care Post-Operatively

Admission to an intensive care unit can be either a normal post-operative journey or it may be unexpected. The unexpected admissions frequently are related to operative adverse events. Admissions to the intensive care unit can occur either within the hospital or as transfers to outside institutions. For example, admission to intensive care following aortic aneurysm repair would be expected, but admission following knee replacement would be unusual. The reviewer would need to determine why the knee replacement surgery required intensive care admission.

Intubation or Reintubation or Use of BiPap in Post Anesthesia Care Unit (PACU)

Sedatives or pain medications can result in the use of BiPap or possibly reintubation post-operatively. The reviewer must decide between the reintubation or BiPap use related to sedative and pain medication use, and just poor planning. Poor planning could represent an omission problem rather than a commission problem. Reviewer judgment will be necessary. Pain medications administered in the PACU can lead to respiratory depression requiring intubation and would be classified as an adverse event.

X-Ray Intra-Operatively or in Post Anesthesia Care Unit

Imaging of any kind and not routine for the procedure requires investigation. An x-ray taken due to suspicion of retained items or incorrect instrument or sponge count would be a positive trigger. The identification of a retained item necessitating an additional procedure is an adverse event. If the retained item is identified and removed without any additional evidence of harm or re-operation to the patient, this is not considered an adverse event.

Intra- or Post-Operative Death

All deaths that occur intra-operatively should be considered adverse events unless death is clearly expected and the surgery might have been of a heroic nature. Post-operative deaths will require review of the record for specifics, but in general all post-op deaths will be adverse events. The learning will be in the events leading to the death.

Mechanical Ventilation Greater Than 24 Hours Post-Operatively

Short-term mechanical ventilation post-operatively for cardiac, major thoracic, and certain abdominal procedures is planned. If the patient requires mechanical ventilation beyond 24 hours, an intra-operative or post-operative adverse event should be considered. Patients with pre-existing pulmonary or muscular disease may experience

more difficulty in quickly weaning from a ventilator post-operatively, but this should not automatically exclude the possibility of an adverse event. Reviewers must use clinical judgment to determine whether the intra-operative and post-operative care was event free or part of the disease process.

Intraoperative Administration of: Epinephrine, nor Epinephrine, Naloxone, Flumazenil

These medications are not routinely administered intra-operatively. Review anesthesia and operative notes to determine the reason for administration. Hypotension caused by bleeding or over-sedation are examples of adverse events that might be treated with these medications.

Post-Operative Increase in Troponin Levels Greater Than 1.5 nanogram/ml

A post-operative increase in troponin levels may indicate a cardiac event. Reviewers will need to use clinical judgment as to whether a cardiac event has occurred.

Change of Anesthetic During Surgery

Review the anesthesia record for a change in the mode of anesthesia (general, regional block, etc.) during the surgery. If found, review notes to determine the reason for the change; exclude an adverse event driving the change of anesthesia. Problems with excessive bleeding and allergic reactions are possible associated adverse events.

Consult Requested in PACU

Consultations ordered post-operatively may indicate an adverse event during surgery, especially if the consultation must be conducted in the PACU. Review the consultation report for the reasons for the consult to determine if an adverse event necessitated the consultation.

Occurrence of Any Post-Operative Complication

This refers to any of a number of complications, including but not limited to PE, DVT, decubiti, MI, renal failure, etc.

Pathology Reports Normal or Identifying Specimen Unrelated to Initial Surgical Diagnosis

Normal pathology reports or unrelated specimens may indicate an adverse event. The aim is not to judge the validity of pre-operative diagnosis, but rather to assess whether unexpected pathology findings suggest something going wrong with the surgical procedure.

Insertion of Arterial or Central Line During the Surgery

Review anesthesia records, operating room nursing notes, and PACU notes for evidence that arterial or central lines were inserted intra-operatively. In most cases lines will be placed prior to surgery starting, but when lines are placed during the

actual surgical procedure it may indicate an adverse event intra-operatively, such as bleeding, medication induced hypotension, anaphylaxis, fluid management, etc.

Intra-Operative Time Greater Than 6 Hours

Patients placed in one position for an extended period of time are at greater risk for post-operative complications and adverse events. Examples may include atelectasis, skin breakdown, pressure sores, nerve damage, range of motion difficulties, or pain. Look carefully for evidence of these and other events that may arise from being in one position.

Removal/Injury or Repair of Organ During Operative Procedure

Review operative notes and post-op notes for evidence that the procedure included repair or removal of any organ. The removal or repair must be part of the planned procedure and not as a result of surgical misadventure.

D. INTENSIVE CARE MODULE TRIGGERS

Pneumonia Onset

Any pneumonia diagnosed in the ICU needs to be looked at carefully. If the evidence suggests the pneumonia started prior to admission to the hospital, there is no adverse event; but if the review suggests initiation in the unit, it is an adverse event. In general, any infection starting in not only the intensive care unit but any hospital unit will be considered nosocomial. Readmissions either to the hospital or the intensive care unit could represent a nosocomial infection from a previous hospitalization. Any evidence of antibiotic resistance likely represents an adverse event.

Readmission to the Intensive Care Unit

Refer to section on Admission to Intensive Care Post-Operatively.

In-Unit Procedure

Any procedure occurring on a patient in the intensive care unit due to the high levels of events in the intensive care environment requires investigation. Look at all the bedside procedures and other procedures done while the patient was in the ICU. Complications will commonly not be on the dictated procedure note, but need to be reviewed in the context of the care required, which might indicate an event has occurred.

Intubation/Reintubation

Refer to section on Intubation or Reintubation or Use of BiPap in Post Anesthesia Care Unit.

E. PERINATAL MODULE TRIGGERS

Apgar Score Less Than 7 at 5 Minutes
Look for events, either maternal or with the newborn, with the birthing and monitoring process. Medications such as sedatives and anesthetics need to be reviewed. Only the maternal record is reviewed, but if the documentation indicates an adverse event to the infant, it should be counted since the medical treatment on the mother caused an adverse event to the child.

Maternal/Neonatal Transport or Transfer
Any transport or transfer to another institution or a higher level of care in your own institution needs to be reviewed for an adverse event.

Magnesium Sulfate or Terbutaline
Found in the orders or the medication administration record; could indicate hypertension or fetal distress. Look for complicating factors.

3rd or 4th Degree Lacerations
By definition a 3rd or 4th degree laceration is an adverse event. Also look for additional events to the mother or child associated with the laceration as part of a cascade so appropriate severity can be assessed.

Induction of Delivery
Look for infections and other complications related to the induction.

F. EMERGENCY DEPARTMENT (ED) MODULE TRIGGERS

Readmission to the ED within 48 Hours
Look for missed diagnoses, drug reactions, infections, or other reasons that events may have brought the patient back to the ED and then required admission.

Time in ED Greater Than 6 Hours
Long ED stays in some cases can represent less than optimal care. Look for complications arising from the ED such as falls, hypotension, or procedure related complications.

IV. TRAINING

Experienced reviewers should train new users of the IHI Global Trigger Tool whenever possible.

A. General Considerations

1) The two record reviewers and the physician should be trained as a team. Although the team could consist of more than three individuals to accomplish a little more depth, too many reviewers and physicians can

introduce variability in adverse event identification, particularly in the E category.

2) During training, all patient records should be double-reviewed (i.e., reviewed by both trainers and trainees). This will enable the trainer to answer questions and ensure that the process is standardized.

3) If there are more than two reviewers, it might be beneficial to stagger the assignments for individual reviewers, such as by alternating who reviews each month (but ensure that pairs of reviewers are not always together — mix the team). This ensures that the knowledge acquired in the organization is not lost in transitions if a reviewer leaves or new ones are brought in.

B. Phase 1: Training Records

IHI provides five sample patient records for training of reviewers. The first phase of training should be conducted using the training records. The sample records were purposely chosen to highlight key learning points. These are actual, but not complete patient records, from which all identifiers have been removed. Pages that are not necessary for identifying a positive trigger or adverse event have also been removed to make the file size easier to use, whether printed or viewed on screen. These training records can be accessed on IHI's website [http://www.ihi.org/IHI/Topics/PatientSafety/SafetyGeneral/Tools/TrainingRecordSetforIHIGlobalTriggerTool.htm].

1) All training records should be reviewed by each of the reviewers **and** the physician.

2) Trainers will have reviewed these records previously, but should refresh their knowledge of the content.

3) Trainees should not view the answer sheets (Appendix D: Answers to Training Records) prior to reviewing the training records.

4) The "20-minute rule" should not be applied during training so that reviewers can focus on learning the methodology without time pressure.

5) Schedule a session for all trainees and trainers to debrief on findings and discuss the answers provided in Appendix D, as well as to review the key points contained in each of the sample records.

   Every trigger and adverse event identified by each reviewer and the physician should be discussed, including the validity of the identification and the severity of the event. It may be necessary to reinforce the difference between a positive trigger and an adverse event.

If any adverse events were missed by all reviewers, these should be reviewed. It is helpful to have a copy of the training records available for reference.

During this debriefing session, the review team should agree on rules for reviewing individual events and making determinations of harm in that organization. Consider whether all events would be considered an adverse event and, if so, the severity. This is often a subjective process. For example, how much vomiting is considered an adverse event: one time or over four hours?

The team should decide on the local definition using the guidelines described in this Guide.

Review the entire IHI Global Trigger Tool Guide at the end of the session to ensure common understanding of the process and all definitions.

C. Phase 2: Practice Review

After the answers are reviewed and the specific training points understood, then a practice review should be completed using patient records from the organizations.

1) Select a set of patient records from the organization using the sampling process described in section II-B.

2) The record reviewers should each review all of the records selected. Just as in phase 1, the 20-minute rule should not be applied.

   The physician does not review the records, only the Summary Sheet (Appendix C). All aspects of the process described in sections II-A through II-C should be followed.

   Remember that the role of the physician is to be the final arbitrator and to provide the link between the adverse events identified and the collegial acceptance of these findings in the organization

3) The data collected during the practice review should not be used as a data point on the organization's subsequent run charts. Consider this as true "practice."

After these two review sessions, the team will have the needed experience to start real record review and data collection for the organization.

V. TIPS FOR LEADERSHIP

- When considering the selection of the record review team (mid-levels) and physician reviewer, identify individuals available to do the reviews on an

ongoing basis. At least a one-year assignment should be the goal, because having the same individuals undertake the process will assure as much as practical consistency and rigor in the reviews.

- Carve out dedicated time for these individuals to be trained and then actually do the cycles of record reviews. Total time for record review members should be at least 3 hours every 2 weeks. The physician reviewer should need about 30 minutes every two weeks. Using managers or quality resource persons with significant clinical experience has been successful in many other organizations.

- A process needs to be defined within the hospital to select randomly pulled records for the review process. The process should be well understood and use the same random process for each record pull.

- Identify a lead person responsible for each step in the process.

- Identify resource/time in the information or medical records department to "randomly" identify the required number of records from the discharged patients (making sure deaths are also included as possible record pulls).

- Identify an area where the review team can meet to carry out the record review. Make sure this area has somewhere where the records can be stored confidentially.

- Do not draw conclusions from the record review rates until at least 12 data points have been generated.

- After a number of appropriate data points are generated, have a described process by which the information is distributed.

VI. STORIES FROM EXPERIENCED ORGANIZATIONS

A. Mayo Clinic

The Mayo Clinic started using the IHI Global Trigger Tool in August of 2004 to measure baseline adverse event occurrence and determine whether safety in the organization actually improved over time. Although considerable resources and many safety improvement projects were ongoing or being initiated in the organization, there was no macro-level measurement of the effectiveness of those efforts. To provide this information, leadership was asked to provide the review team with resources for measurement. Each site (Rochester, Arizona, Jacksonville) selected the record reviewers and physician reviewers. The IHI Global Trigger Tool practice records were utilized to train the teams. The teams review 10 records every two weeks. Quarterly conference calls with all sites are held to compare notes between reviewers so difficult cases can be discussed and learning on the utilization of the tool continues. At the end of first year the data was presented to the Quality

Committee. At the end of two years improvement has been demonstrated. The Mayo contact for information is: escobar.ricardo@mayo.edu

B. OSF Healthcare System

OSF Healthcare System started using the IHI Global Trigger Tool in their six hospitals early in 2004. Every month, 20 records are chosen at random for review by designated nurses. During the first year, reviewers across the system met periodically to discuss how results were being interpreted in order to improve inter-rater reliability.

Value is found at two levels. First of all, this is one way to measure the progress of work on adverse events. Secondly, the results of the reviews using the IHI Global Trigger Tool are used to discover where to direct improvement activities. For example, one hospital analyzed its data and discovered a number of readmissions occurring with patients who had been discharged on warfarin. Because of this finding the hospital developed a warfarin clinic to improve care. Contact: John.whittingon@osfhealthcare.org

C. Tayside Healthcare System (Scotland)

Discovering harm within the Tayside Healthcare System was very reactive and based upon voluntary incident reporting. Introducing the IHI Global Trigger Tool was easy and brings a new proactive perspective to our work. The multidisciplinary review team meets monthly to identify actual and potential harmful events. Many, if not all, of these events would go undetected without this method. Post review, the team prepares an improvement feedback summary to share with all relevant departments. Discover what is really happening in your organization with this tool. Contact: pat.oconnor@nhs.net

VII. FREQUENTLY ASKED QUESTIONS

Q: Will I be able to use the data collected to compare my organization to other organizations within my system or to other hospitals in the country?

A: No. The tool was meant to be used as a mechanism to compare your organization's progress over time. Although efforts are made to maintain a standard of training and process for the IHI Global Trigger Tool, organizations will vary in the skill of reviewers and other aspects of the IHI Global Trigger Tool process. We assume this bias is relatively stable over time in a given organization. The stability over time will allow comparison to your own organization over time, but is not as useful in comparing between organizations. National data can be used to determine if your rates are in the general ballpark.

Q: There seems to be some argument about the validity of the IHI Global Trigger Tool. How do I defend our time investment in the tool?

A: There certainly is healthy discussion in the safety community regarding the IHI Global Trigger Tool. It is important to understand there is no gold standard for adverse event identification. As long as healthy discussions regarding errors versus harm and preventability and unpreventibility are occurring, is it reasonable to wait until safety experts agree or just to move forward and do some measurements? The time commitment is relatively small, requires no highly technical investment, and certainly has as much validity as voluntary reporting and other methods.

Q: If we use the IHI Global Trigger Tool how reasonable is it to expect we will identify all adverse events?

A: The IHI Global Trigger Tool was never intended to identify all adverse events. The concept of sampling and identifying those adverse events within 20 minutes should identify your organization's most common events over time. Preliminary measurements from our Primary Data Set suggest it is possible to find greater than 90% of adverse events with highly trained reviewers.

Q: I noticed in some of the references on previous Trigger Tool papers that there is a lack of measurement related to intra-reviewer reliability. Does this not indicate a weak link in the methodology?

A: The Trigger Tool does use a two-step methodology as used in many of the classic safety studies. Recent reviewer training measurements suggest reviewers can be trained in one session using training records to identify about 80% of the adverse events present in the records.

Q: How should the training records be used?

A: The training records should be reviewed by all members of the team — physicians and mid-level record reviewers. No 20-minute limit should be imposed during training. After the records are reviewed the whole team should then debrief using the answer sheets in Appendix D of the IHI Global Trigger Tool Guide.

Q: If a patient has an adverse event that occurred prior to coming to our institution does this count?

A: Yes, provided that it meets the definition of being harm related to or from medical care. All such adverse events are counted because the measure is what the patient experienced, not what happened within the hospital. It is useful, though, to keep track of which events occurred outside the hospital so that this can be noted when reporting data. Such data may also indicate an opportunity to collaborate with others — office practices, clinics, long-term care facilities — to improve patient safety.

Q: Our hospital is a referral center and if we count all the outside adverse events, are we not penalizing ourselves?

A: The outside event being counted in the hospital that finds the event is a definitional decision. When measured as a separate item in very tertiary medical centers, the event rate for those out-of-hospital occurrences are less than 10% of all adverse events identified.

Q: What are the approximate levels of harm that organizations are finding when using the IHI Global Trigger Tool?

A: Adverse events/1,000 patient days: Organizations are finding approximately 100 adverse events/1,000 patient days or 50 adverse events/100 admissions. Approximately 30-35% of all admissions are found to have adverse events.

Q: If there is more than one trigger found and 2 different manifestations of adverse drug events from the same drug, is this 2 adverse events or 1 (e.g., vomiting and thrombocytopenia from allopurinol)? What if there is vomiting that can be attributed to 2 drugs, is it one or two?

A: In both cases, we would count it as one event, but an important determination here is whether treatment or intervention was required. Vomiting on one or two occasions, even with treatment, is usually not considered harm; but protracted nausea and vomiting that requires treatment, reduces oral intake, or limits recovery would be an adverse event. Thrombocytopenia by itself is not an adverse event; you need to look for clinical manifestations of it and treatment.

In the first example, we would call it one event because all was likely related to the same medication. In the second example, it is considered as one event because there is no way to determine which medication caused the vomiting (unless one was discontinued and it resolved, which might make it clear). This is clearly harm from medication, which for the purposes of the tool is all you need to know.

Q: When an INR is above 6, this is unintended because it is out of the therapeutic range and noxious (part of the WHO definition of harm) because the patient is in coagulopathy; even without bleeding or any kind of physical complications, should it not be considered an adverse event? What about glucose less than 50? Even without clinical presentation, it is still unintended because with the use of any anti-diabetic drug, the aim would be to achieve normoglycemia. Should it be classified as an adverse drug event (ADE) in the absence of symptoms?

A: A key point for using Trigger Tools is distinguishing between a positive trigger and an adverse event, as these are not the same thing.

For example, INR greater than 6 is a positive trigger and nothing more. When this is found, one must investigate the record for evidence of harm. Some patients are fortunate and do not experience any harm (such as bleeding or bruising) even at such a level, while other patients do experience harm. That is the determination of an adverse event.

In the WHO definition of "unintended and noxious," while an elevated INR to this degree is unintended, it may not be noxious. Simply being in a state where there is the potential for harm is not harm itself.

Same applies for glucose less than 50. This is only a trigger. Some patients may drop below 50 and have no symptoms at all. If so, what is the harm in that case? We define it as none. However, if the patient becomes dizzy, has a syncopal episode and must receive glucose, then we would call it harm.

Our definition of an adverse event, including an ADE, is that it was unintended and harmful.

Q: We have done two reviews using our own records and are not finding any adverse events. Are we doing something wrong?

A: This is not uncommon and there are two primary reasons you may see this:

1) You are using a small random sample, so it is possible that there were no adverse events in the small set selected. On your next review, you may find many. This is the wide variation that can occur from sample to sample and why you need at least 12 data points before you will have a sense of your baseline.

2) Another possibility is that some category E events were missed. This is not unusual with new reviewers because many events in this category have been traditionally viewed as non-preventable or known risk of treatment. If you found positive triggers, but no adverse events, consider reviewing those records again to see if perhaps there were some category E events.

Q: We do not use Diphenhydramine (Benadryl) in our organization, so how do we use this trigger?

A: If there is a medication trigger that does not match your hospital formulary, the trigger should be revised. Consider the intent behind this trigger and the harm it identifies: allergic reactions. What medication is administered in your hospital for these reactions? If it is not Benadryl, then simply rename the trigger to match your formulary.

Q: Is there a specific reason that certain items are not listed as a trigger, such as Protamine, which is used to counteract another drug?

A: When we developed the IHI Global Trigger Tool, we realized that it would not be realistic to develop a comprehensive trigger list that would include every possible trigger for every possible adverse event. Such a tool would be incredibly large and nearly impossible to use for record review. The list of triggers is based on those adverse events that occur most frequently and, when they do occur, cause the most

harm to patients. The areas included in the current IHI Global Trigger Tool include many for which there are known improvement strategies.

Q: What is average time to complete a IHI Global Trigger Tool method record review?

A: Time to manually review a record averages about 10-15 minutes with an experienced reviewer and should not exceed 20 minutes. If more time is being spent than that, usually it is because one starts reading the record rather than just looking for triggers.

Q: Can the Trigger Tool be automated and used with our computer system?

A: Many of the triggers can easily be captured from information systems. This is especially true for the medication and laboratory value triggers. If you have a system that captures these electronically and reports can be generated, this can save time during the review.

The recommended process for selection of records should be followed first. Once the records have been identified, generate a report from the information system based on the triggers for each patient. If none are identified, then you do not need to look in the record for them; however, if a positive trigger is found, then you will need to review the record for the details as to whether an adverse event occurred.

Not all of the triggers can be automated, so some record review will still be required. For example, evidence of over-sedation is often noted in progress notes indicating lethargy or inability to complete therapy due to fatigue.

Q: Do you have any examples of organizations that have actually decreased their adverse events after using the IHI Global Trigger Tool? If so, how did they identify which events to focus on, and how did they implement a change which resulted in a decrease in adverse events related to that particular issue?

A: First, the IHI Global Trigger Tool is a measurement tool, so using it will do nothing to your adverse event rate. A funny analogy: you can't lose weight by getting on a scale every day. The same is true with the IHI Global Trigger Tool: you can't decrease adverse events by measuring them. You have to implement change.

You may get a sense from a Pareto chart about where you need to start your improvement efforts if you categorize the events that you find (medications, surgery, etc.). However, when first using the tool, you may not have enough data for this. Small samples will vary in findings from one another. If you want to know where to start your improvement efforts, talk to front-line staff (maybe using Leadership WalkRounds). They will tell you where safety work should be done. In order to decrease harm across the organization at a global level, you will need to have work in multiple areas, not just one.

Q: We understand that it is a measurement tool and not an improvement tool and struggle with the cost versus value of a measurement tool. How has use of the tool impacted patient safety at other institutions?

A: Currently how do you decide which projects to choose? Most of us either follow someone's advice (Joint Commission, CMS, etc.) or "grease the squeaky wheel" that pops up with sentinel events. The IHI Global Trigger Tool is an organized way to gain information on your progress and where you want to aim your resources. The review of 10 records every 2 weeks takes 5 hours of mid-level time and about 15 minutes of physician time to accomplish the data point. This is really a small investment for the information being gained. The tool has been in use around the US and in Europe. Most of us are advising that a minimum of 24 data points need to be present before a good baseline and trending can even be considered. The tool itself should not be what impacts safety. The tool should direct resources and measure trends over time.

Q: We are formalizing our process for IHI Global Trigger Tool reviews. I am not clear on whether there is review by 2 people with confirmation by a physician for the first 20 records only, or whether the requirement for review by 2 people is ongoing.

A: You should always have at least 2 reviewers review each record. The separate reviewers will pick up different events at times. The reviewers should get together, discuss their findings and come to consensus, then have the physician review the findings of the consensus for the final determinations by the physician.

If you only have one person reviewing the records, the data will be a bit skewed as that person will catch about 75% of the adverse events. We have found that many of the E and F events have a greater chance of being detected with more than one reviewer.

Q: What number of records need to be reviewed to establish your baseline rate of adverse events?

A: We recommend 10 records every two weeks or 20 per month, randomly selected. Because it is a small, random sample, a minimum of 12 data points are needed before an analysis for baseline can really be done, and experienced organizations are recommending 24 data points. If you would like this baseline data sooner, consider reviewing 10 records every 2 weeks and plotting for each set of records rather than monthly. A note of caution: Don't get hung up on the baseline and not start on improvement. It takes a long time to move the adverse event rate, so improvement efforts should get started while data is being collected. It won't adversely affect your results.

VII. APPENDIX

A. References

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Appendix B: IHI Global Trigger Tool Worksheet

	Cares Module Triggers	+	Event Description and Harm (E-I)		Medication Module Triggers	+	Event Description and Harm (E-I)
C1	Transfusion or use of blood products			M1	Clostridium difficile positive culture		
C2	Any code or arrest			M2	Partial Thromboplastin Time greater than 100 seconds		
C3	Dialysis			M3	International Normalized Ratio (INR) greater than 6		
C4	Positive blood culture			M4	Glucose less than 50 mg/dl		
C5	X-ray or Doppler studies for emboli			M5	Rising BUN or Serum Creatinine greater than 2 times baseline		
C6	Abrupt drop of greater than 25% in Hemoglobin or Hematocrit			M6	Vitamin K administration		
C7	Patient fall			M7	Benadryl (Diphenhydramine) use		
C8	Decubiti			M8	Romazicon (Flumazenil**)** use		
C9	Readmission within 30 days			M9	Narcan (Naloxone) use		
C10	Restraint use			M10	Antiemetic use		
C11	Infection of any kind			M11	Over-sedation/hypotension		
C12	In hospital stroke			M12	Abrupt medication stop		
C13	Transfer to higher level of care			M13	Other		
C14	Any procedure complication				**Intensive Care Module Triggers**		
C15	Other			I1	Pneumonia onset		
	Surgical Module Triggers			I2	Readmission to intensive care		
S1	Return to surgery			I3	In unit procedure		
S2	Change in procedure			I4	Intubation/Reintubation		
S3	Admission to intensive care post-op				**Perinatal Module**		
S4	Intubation/Reintubation/BiPap in Post Anesthesia Care Unit (PACU)			P1	Apgar less than 7 at five minutes		
S5	X-ray intra-op or in PACU			P2	Maternal/neonatal transport/transfer		
S6	Intra or post-op death			P3	Magnesium Sulfate or terbutaline use		
S7	Mechanical Ventilation greater than 24 hours post-op			P4	3rd or 4th degree lacerations		
S8	Intra-op epinephrine or nor-epinephrine			P5	Induction of delivery		
S9	Post-op Troponin level greater than 1.5 ng/ml				**Emergency Department Module**		
S10	Change anesthetic during surgery			E1	Readmission to ED within 48 hours		
S11	Consult requested in PACU			E2	Time in ED greater than 6 hours		
S12	Pathology report normal or unrelated to diagnosis						
S13	Insertion of arterial or central venous line during surgery						
S14	Operative time greater than 6 hours						
S15	Removal/injury or repair of organ						

Patient Identifier _____ Total Events _____ Total LOS _____ Write descriptions of the events in greater detail on reverse

Appendix C:

IHI Global Trigger Tool Review Summary Sheet

Record #	LOS	Triggers	Events (note trigger identifying)	Harm
Totals				

Measurement #1: Adverse events/1,000 patient days
Total number of adverse events/Total length of stay (LOS) for all records reviewed x 1,000 =
Adverse events/1,000 patient days
Events _____/ Total LOS for all records reviewed _____x 1,000 =_____

Measurement #2: Adverse events/100 admissions
Total number of adverse events/Total records reviewed x 100=Adverse events /100 admissions
Events _____/ Total records reviewed_____x 100=Adverse events/100 admissions

Measurement #3: Percent admissions with adverse events
The number of admissions with at least one adverse event
Number of records with at least 1 event x 100=Percent of admissions with adverse events

Appendix D: Answers to Training Records

The training records like all records will look different to different reviewers. These are the most common answers, but others are possible. The answer sheets reflect real life. The aim is not to find every possible event, but sample those events to a fairly high degree of dependability by reasonable reviewers in short periods of time.

TRAINING RECORD #1

The patient is a 51-year-old female admitted to the hospital for an ovarian cyst. The triggers commonly identified are:

- C1 Transfusion
- M10 Antiemetic use
- C6 Abrupt drop of Hct
- C14 Any procedure complication

Two adverse events are identified:

1. A large hematoma occurring post-operatively and requiring a longer length of stay for the hospitalization. Due to extension of the hospitalization the event was classified as an F.
2. Nausea lasting about 2 days. Since the event was temporary and was not felt to have substantially increased the length of stay due to the other adverse event it was classified as an E.

The key learning points from this record are:

- All post-operative complications whether or not the patient was advised of the complication prior to surgery are to be considered events. Even if the complication was clearly unpreventable it is counted as an adverse event. The question of "would you be happy if it happened to you" sometimes puts these complications in the right perspective. The issue is not whether there was an error or not. The prime concern is the identification of harm as a result of some medical intervention or treatment.

- A minor event such as nausea needs to be looked at carefully. One or two episodes of nausea adequately treated should not be considered an event. But when nausea lasts a day or more in spite of treatment, or when the nausea interferes with post-operative progress, it is almost always considered an event. Most reviewers over a short time will get a pretty good concept of how much of a small or minor occurrence has to happen before it becomes an event. It is true there might be different definitions from organization to organization, but within one hospital the definition will become reasonably stabilized. Each hospital will decide what constitutes an event versus a minor episode not to be considered an event. Admittedly this loose definition will cause some people to question the validity of this measurement, but experience has shown that reasonable reviewers with the physician oversight will make the identification reasonable.

TRAINING RECORD #2

A 48-year-old male was admitted with a pulmonary embolism. The positive trigger is C5, x-ray studies for emboli. The adverse event was a pulmonary embolus and because it required admission to the hospital the severity of the event was rated as F. By definition if an adverse event causes hospitalization it is an F. Severity of F can be attained either by prolonging a hospital stay or causing a hospitalization.

The key learning points from this record are:

- Events occurring outside the hospital, whether or not initiated in your hospital, are first and foremost considered events and by definition your organization will "take credit" for them. The credit for outside events is an operational definition. This means that if you are a referral hospital and a patient is transferred to your hospital and you identify an adverse event as responsible for the transfer and subsequent admission, then this is to be identified as an event and counted as an event in your hospital. In this particular case the patient had prostate surgery. It is not relevant in which hospital the surgery took place. The hospital where the patient ended up with the event will need to "take credit" for the event. Many hospitals will place a marker on these types of admissions so they can keep track of this percentage of admissions. In major referral centers the adverse event rate attributable to outside caused events is less than 10%. Lastly, if you are a major referral center and event trends are noted from referring physicians or hospitals, this might well provide an opportunity for your outreach education efforts.

- The duration of time from the initial surgery and the presentation of the pulmonary embolus might well require input from the physician reviewer to decide the relationship. Most would agree the relationship between prostate surgery and subsequent pulmonary embolus exists, but the relationship may require physician-based knowledge to make the final decision. In this case the initial record reviewers might well have had questions about causality.

TRAINING RECORD # 3

A 74-year-old woman was admitted with a fractured vertebra.

Review of this record reveals no clear trigger. The approach should be to use M13 Other. The patient had an adverse event related to confusion from medications. There is mention in the notes of the confusion, and there was indecision as to whether it was from the Robaxin, Somax, or Xanax. The exact cause is not necessary to identify an adverse event. Clearly someone thought it was drug-related. Most reviewers feel this event is an E as there was no permanent harm and was not responsible for extending the patient's hospital stay.

The key learning points from this record are:

- Not all adverse events have to have a trigger. Events count if they have no trigger and many triggers have no events. If events are found just as the result of the trigger review, even though there is no identified trigger, it must be counted.

- In this case the caregivers suggested the confusion was related to a medication. When a statement is made in the record that suggests an adverse event, this is taken at face value.

Do not try to make your own judgments as to whether the nurses or physicians were right in their assessments.

TRAINING RECORD #4

A 59-year-old woman was admitted for surgery for a prolapsed vagina.

Most reviewers will identify the trigger as S15 Removal/Injury of an Organ. In this record review, a trigger led to a perforation of the bladder during surgery. In this event the reviewers felt the complication extended the hospital stay and graded the severity as F.

The key learning points from this record are:

- A complication of surgery is always an adverse event. Even though this is a known complication it requires classification as an adverse event.

- Some reviewers when looking at the discharge summary identified atelectasis and there have been discussions as to whether this represents an adverse event or just a minor episode. Most agree that in certain body configurations (patient was 5-foot-6-inches in height and weighed 226 pounds) this will commonly occur. When treated appropriately it appeared to have no effect on the case. In this record most suggest this is just a minor episode and not an event. Reviewers will need to come to a consensus on these types of episodes and then use the physician reviewer as not only the final decision maker, but also the educator about some of these episodes. The aim is to find adverse events, not minor episodes.

TRAINING RECORD #5

A 45-year-old male underwent surgery for aortic valve insufficiency. Positive triggers identified include:

- S3 Admission to the ICU post procedure
- M10 Antiemetic use
- M11 Over-sedation and hypotension

The adverse events identified were reintubation and significant nausea. The reintubation was classified as H and the nausea as E.

The key learning points from this record are:

- The patient was extubated when the effects of drugs were obviously still affecting the patient. Increasing somnolance occurred and the patient became quite acidotic with significant CO2 retention. In order to save this person's life an intervention needed to take place. The intervention must be necessary within about one hour to classify the severity as H (Intervention required to sustain life). In the extreme, almost all interventions could be construed as lifesaving. For example, over longer periods of time antibiotics for an infection are "lifesaving," but are certainly not considered so within one hour.