



Radiologist Order Entry: Making Imaging Protocol Management Meaningful

Kevin W. McEnery MD, Danna Stone, RN, Joanna Po, RN, Yu-Fan Ma, RN, Joseph R. Steele, MD
Division of Diagnostic Imaging, The University of Texas MD Anderson Cancer Center, Houston, TX

PROJECT AIM

Transition process of imaging protocol management into a clinical order entry process with coordination of radiologist, nursing and technologist interactions for CT, MR and PETCT modalities.

PURPOSE

Traditional modality study protocol process has been regarded as important to maintain imaging procedure quality and consistency. In many institutions, radiologists assess the clinical exam request and then tailor the imaging examination to provide optimal imaging to best address the clinical question being posed by referring clinicians. Increased emphasis on mitigation of radiation exposure, medication administration policies and more recently qualification of radiologists as Eligible Providers for the purpose Meaningful Use eligibility under the Health Information Technology for Economic and Clinical Health (HITECH) Act necessitate a logical transition of exam protocol activity into a more formal clinical order entry process.

METHODS

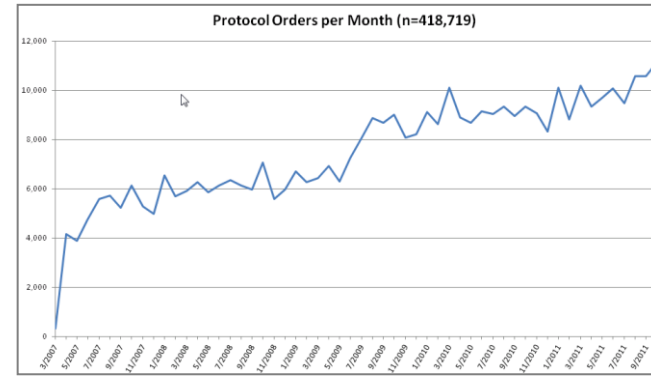
The protocol order entry system is available as a clinical module in ClinicStation™, M.D. Anderson Cancer Center's internally developed Electronic Medical Record (EMR). The meet the requirements for Meaningful Use (MU) incentive payments, ClinicStation recently obtained Complete EHR certification for both In-patient and Eligible Provider criteria.



An electronic protocol system was create specifically to allow formal order entry proce for Diagnostic Imaging involving both the examination protocol as well as administration of oral and intravenous contrast. The system then provides an electronic capture of medication administration process. The system also provides a formal medication order, available in the EMR to fulfill Pharmacy Department requirements for electronic documentation of medication orders (contrast and pre- or post-procedure medications).

RESULTS

The system provides the creation of a Protocol Order Entry documentation and subsequent documentation workflow for CT, imaging services.



The protocol order document is stored in the EMR as permanent record of the performed procedure. Examination parameters, clinical history, lab values and allergy history are also stored in a separate database to allow capability to verify consistent protocol implementation for provided clinical information and clinical parameters. The system also provides an electronic collaboration method for nursing and technologist needs to clarify orders and examination parameters.

CLINICAL DECISION SUPPORT(CDS)

CDS application in radiology is typically considered from the clinician's perspective, enabling verification of appropriate indications for imaging studies. However, with the ever increasing availability of patient's clinical data in EMR systems, immediately accessible to radiologists, it is reasonable to expect that "Radiologist CDS "be incorporated into process by which the radiologist transitions the clinician order into a medical order protocol noting scan parameters and associated medications required.

The process by which the radiologist determines the most appropriate scanner protocol is best made by an informed radiologist both in the clinical question being addressed as well as the patient's clinical state to tolerate contrast administration or required medications. While scan protocols can be optimized to reduce expected radiation dose, the best radiation administration decision is one that is completely informed by the patient's clinical presentation.

COMPUTERIZED RADIOLOGIST ORDER ENTRY

Computerized Radiologist Order Entry (CROE) is optimized by having direct availability of patient's current clinical presentation , laboratory data and allergy status viewable for the radiologist.

Ordering efficiency is enabled though standardized protocols with pre-set contrast options and contrast medication instructions. The available protocol selections reflect the standardized protocol selections available/stored on CT scanners. CDS rules inform radiologist regarding allergy conflicts and impaired renal function.

Computerized Radiologist Order Entry: Radiologist is presented with an ordering screen which, on a single display, notes required exam, brief history and indication. Abnormal laboratory values and contrast allergies are colorized to highlight potential contraindications to contrast. As order within EMR, patient's supporting clinical data is immediately available with folders in left column.

Protocol Order Display: Order entry input reformatted into an order document. Document lists required scan parameters, medication, electronic signature and change history

IMAGING ORDER SET AND CLINICAL SUMMARY

Imaging Procedure Order Set

Standard Institution Order Set

The current protocol document displayed above is in the process of transition into an "order set" document with similar formatting as institutional order set. This document will also capture laboratory, medication and problem list data to fulfill the MU requirement of summary of patient encounter documentation.

MEANINGFUL ORDER PROCESS

In our opinion, the traditional imaging protocol must transition into a clinical order process. Optimized scan performance requires direct radiologist involvement scan selection. Most imaging center utilize a screening and documentation process for contrast-based imaging procedures. The same clinical documentation processes performed within a Certified EMR to optimize scan selection as well as provide the opportunity for fulfillment of clinical documentation requirements for fulfillment of MU metrics.

Allergy Verification: a necessary step to document patient's possible adverse prior reactions to intravenous contrast. It represents key supporting data for contrast administration decision

Vital Signs: BP, Height & Weight: essential data for dose base imaging studies.

Medication Reconciliation: Review of current medication listing can ensure medications such as Glucophage (Metformin) have been suspended prior to contrast administration.

Problem List Management: current problem list can inform on patient's past medical issues not mentioned in a clinician's provided supporting clinical history.

ORDER WORKFLOW

The system provides the creation of a Protocol Order Entry documentation for CT imaging and planned future expansion into MR and PET imaging services. The order management process provides an electronic collaboration method for nursing and technologist to clarify orders and examination parameters.

Order Entry Queue filters: The user selects the provider role (radiologist, nurse, etc.), modality, and scan location providing a customized work queue to manage order entry process. User can save options to personal profile.

Radiologist Order Queue: Contains all orders requiring signature or clarification

Nurse Order Queue: Contains all orders signed by radiologist.

Technologist Queue: Contains all orders designated by nurse which indicates patient has completed examinations preparations and ready for scan.

DI (Patient) Coordinator Queue: Contains all orders for selected area(s) regardless of the current role which order is assigned.

FUTURE DIRECTIONS

Development and refinement of the protocol system continues with expansion of the order entry system into modalities of MRI and PETCT this spring. The updated system will leverage the already deployed work queues in place for CT imaging expanded to additional modalities. The efficiency of this transition to other areas should be facilitated by the radiologists simply having more options for scan ordering of FDG and gadolinium. However, the clinical data review and patient screening process will be enhanced by nursing and technical staff already performing clinical documentation within the EMR.

CONCLUSION

The transition of a protocol entry system to a formal Protocol Order Entry System allows a more precise determination of clinical imaging practice. The system rightfully places the radiologist at the center of the imaging decision making process as well as provides capabilities for improved consistency of Diagnostic Imaging operations. The transition also provides the opportunity for radiologists to qualify for Meaningful Use certification with incorporation of the protocol order capabilities into a certified outpatient EMR application.

ACKNOWLEDGEMENT

Kelly R. Duggan for expertise in exhibit preparation.