Decreasing Protocoling Burden in MRI by using an "Auto-Protocol" Workflow

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Background

- Protocoling of MRI exams creates significant work for Radiology

- Exam codes can be split into two groups:
  - ❖Consistently follows a standard protocol
  - ❖Needs a human assigned protocol (attuned to clinical indication)

- Having radiology staff assign protocols that are performed in standard fashion leads to
  - ❖Wasted time spent assigning protocol or asking for a protocol
  - ❖Introduces chance of unintended error

Smart Goal

Create an auto-protocol workflow integrated into our Electronic Health Record (EHR; Epic Systems Corp., Verona, WI) to reduce the number of MR exams requiring manual protocol assignment by 20% within 90 days.

Methods

TEAM

SUBSPECIALTY RADIOLOGISTS, MR TECHNOLOGISTS, QUALITY IMPROVEMENT SPECIALISTS

CONSENSUS

ON MR STUDIES THAT UTILIZE “STANDARD PROTOCOL”

CREATE

AUTO-PROTOCOL WORKFLOW AND INTEGRATE IN EHR WITH FRONT LINE STAFF INPUT ON DESIGN

MEASURED

TIME TO PROTOCOL CASE VIA TIMED OBSERVATION

ANALYZED

PERCENT PROTOCOL REDUCTION AND IMPACT

Consensus of MR Codes Selected

No.	Code	Description	Section
1	IMG1268	MRA AND MRV BRAIN WO IV CONTRAST	Neuro
2	IMG4642	MRA BRAIN ANEURYSM POST COILING W WO IV CONTRAST (BH YH LM)	Neuro
3	IMG263	MRA BRAIN WO IV CONTRAST	Neuro
4	IMG268	MRA NECK W AND WO IV CONTRAST(GH YH BH LM WH)	Neuro
5	IMG266	MRA NECK WO IV CONTRAST(GH YH BH LM)	Neuro
6	IMG1040	MRI ABDOMEN WO IV CONTRAST MRCP	Body
7	IMG1039	MRI ADRENAL GLANDS WO IV CONTRAST (BH YH YHC LM WH)	Body
8	IMG1407	MRI ANKLE LEFT WO IV CONTRAST	MSK
9	IMG1405	MRI ANKLE RIGHT WO IV CONTRAST	MSK
10	IMG1760	MRI ARTHROGRAM ANKLE LEFT W CONTRAST(GH YH BH LM)	MSK
11	IMG1227	MRI ARTHROGRAM ANKLE RIGHT W CONTRAST(GH YH BH LM)	MSK
12	IMG1342	MRI ARTHROGRAM ELBOW LEFT W CONTRAST(GH YH BH LM)	MSK
13	IMG1337	MRI ARTHROGRAM ELBOW RIGHT W CONTRAST(GH YH BH LM)	MSK
14	IMG1226	MRI ARTHROGRAM HIP LEFT W CONTRAST(GH YH BH LM)	MSK
15	IMG1414	MRI ARTHROGRAM HIP RIGHT W CONTRAST(GH YH BH LM)	MSK
16	IMG1225	MRI ARTHROGRAM KNEE LEFT W CONTRAST(GH YH BH LM)	MSK
17	IMG1413	MRI ARTHROGRAM KNEE RIGHT W CONTRAST(GH YH BH LM)	MSK
18	IMG1343	MRI ARTHROGRAM SHOULDER LEFT W CONTRAST(GH YH BH LM)	MSK
19	IMG1338	MRI ARTHROGRAM SHOULDER RIGHT W CONTRAST(GH YH BH LM)	MSK
20	IMG1608	MRI ARTHROGRAM WRIST LEFT W CONTRAST(GH YH BH LM)	MSK
21	IMG1336	MRI ARTHROGRAM WRIST RIGHT W CONTRAST(GH YH BH LM)	MSK
22	IMG4647	MRI BRACH PLEX BILAT THORACIC OUTLET W WO IV CONTRAST(B Y L W)	Neuro
23	IMG4648	MRI BRACH PLEX LEFT THORACIC OUTLET W WO IV CONTRAST(B Y L W)	Neuro
24	IMG4649	MRI BRACH PLEX RIGHT THORACIC OUTLET W WO IV CONTRAST(B Y L W)	Neuro
25	IMG4641	MRI BRAIN GAMMA KNIFE W IV CONTRAST (YH LM)	Neuro
26	IMG4838	MRI BRAIN NEONATE WO IV CONTRAST (YH NNICU)	Neuro
27	IMG4963	MRI BRAIN NEUROIMMUNO W WO IV CONTRAST (GH YH)	Neuro
28	IMG4955	MRI BRAIN NEUROIMMUNO WO IV CONTRAST (GH YH)	Neuro
29	IMG4795	MRI BRAIN TIA WO IV CONTRAST (YH)	Neuro
30	IMG4796	MRI BRAIN VERTIGO WO IV CONSTRAST (YH)	Neuro
31	IMG4029	MRI BRAIN W 3D VOLUMETRIC ANALYSIS W WO IV CONTRAST (YH)	Neuro
32	IMG4028	MRI BRAIN W 3D VOLUMETRIC ANALYSIS WO IV CONTRAST (YH)	Neuro
33	IMG273	MRI BRAIN W IV CONTRAST INTRAOP (YH)	Neuro
34	IMG274	MRI BRAIN W WO IV CONTRAST INTRAOP (YH)	Neuro
35	IMG272	MRI BRAIN WO IV CONTRAST INTRAOP (YH)	Neuro
36	IMG2716	MRI DEFECOGRAM (BH YH)	Body
37	IMG4714	MRI ELASTOGRAPHY	Body
38	IMG2384	MRI FETUS WO IV CONTRAST (YH)	Neuro
39	IMG1257	MRI INNER AUDITORY CANALS W WO IV CONTRAST	Neuro
40	IMG1688	MRI INNER AUDITORY CANALS WO IV CONTRAST	Neuro
41	IMG1408	MRI KNEE LEFT WO IV CONTRAST	MSK
42	IMG1406	MRI KNEE RIGHT WO IV CONTRAST	MSK
43	IMG4646	MRI NECK PARATHYROID W WO IV CONTRAST (YH LM)	Neuro
44	IMG1255	MRI ORBITS W WO IV CONTRAST	Neuro
45	IMG1252	MRI ORBITS WO IV CONTRAST	Neuro
46	IMG2702	MRI PELVIS PROSTATE W WO IV CONTRAST(GH YH BH LM)	Body
47	IMG1256	MRI PITUITARY W WO IV CONTRAST	Neuro
48	IMG1686	MRI PITUITARY WO IV CONTRAST	Neuro
49	IMG1332	MRI SHOULDER LEFT WO IV CONTRAST	MSK
50	IMG1331	MRI SHOULDER RIGHT WO IV CONTRAST	MSK
51	IMG4225	MRI SRS BRAIN W WO IV CONTRAST (BH GH)	Neuro
52	IMG259	MRI TEMPOROMANDIBULAR JOINTS	Neuro
53	IMG4651	MRI TOTAL SPINE ACUTE CORD COMPRESSION WO IV CONTRAST (YH)	Neuro
54	IMG1328	MRI WRIST LEFT WO IV CONTRAST	MSK
55	IMG1327	MRI WRIST RIGHT WO IV CONTRAST	MSK
56	IMG338	MRV BRAIN W AND WO IV CONTRAST (BH GH YH YHC LM)	Neuro
57	IMG4354	MRV BRAIN WO IV CONTRAST (YH BH GH YHC LM)	Neuro
58	IMG4805	MRI PELVIS WO CONTRAST RADIATION THERAPY TP (YH)	Body

Workflow in EHR (Epic®) Created

Agreed upon codes removed from the **protocol** worklists

New column created on **technologist** worklist. Column has an orange arrow icon to identify auto-protocol codes

Language automatically inserted into protocol instructions stating, "Perform as Ordered per policy"

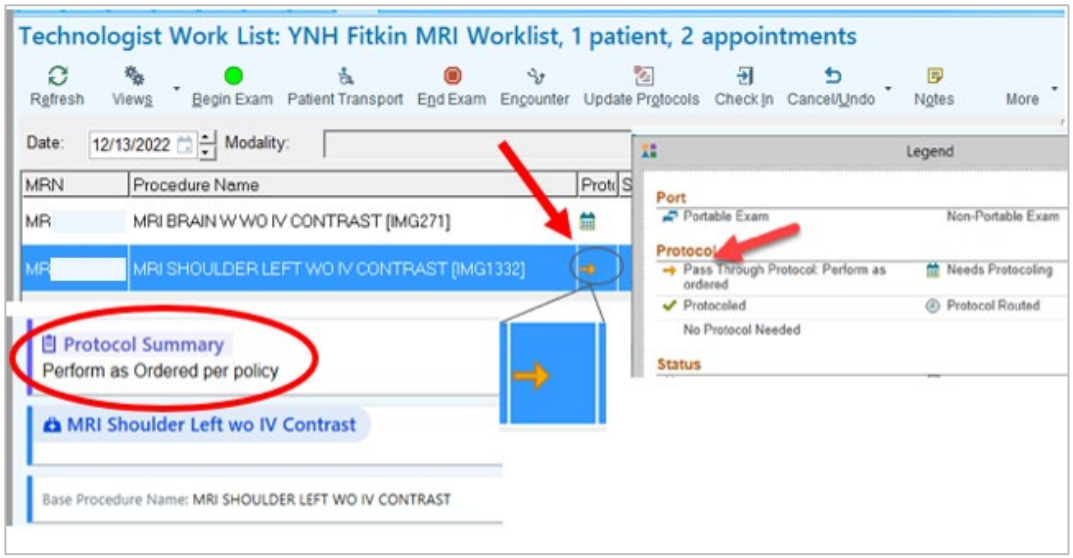

Figure 1: New MR technologist worklists.

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Results

19% (58/300) of MR codes originally selected as eligible for auto-protocol

Baseline: 98% of all ordered MRI scans were manually protocoled

Post intervention: 76-78% of all ordered MRI scans exams manually protocoled

22-24% absolute reduction (20% relative reduction) of cases needed manual protocol assignment

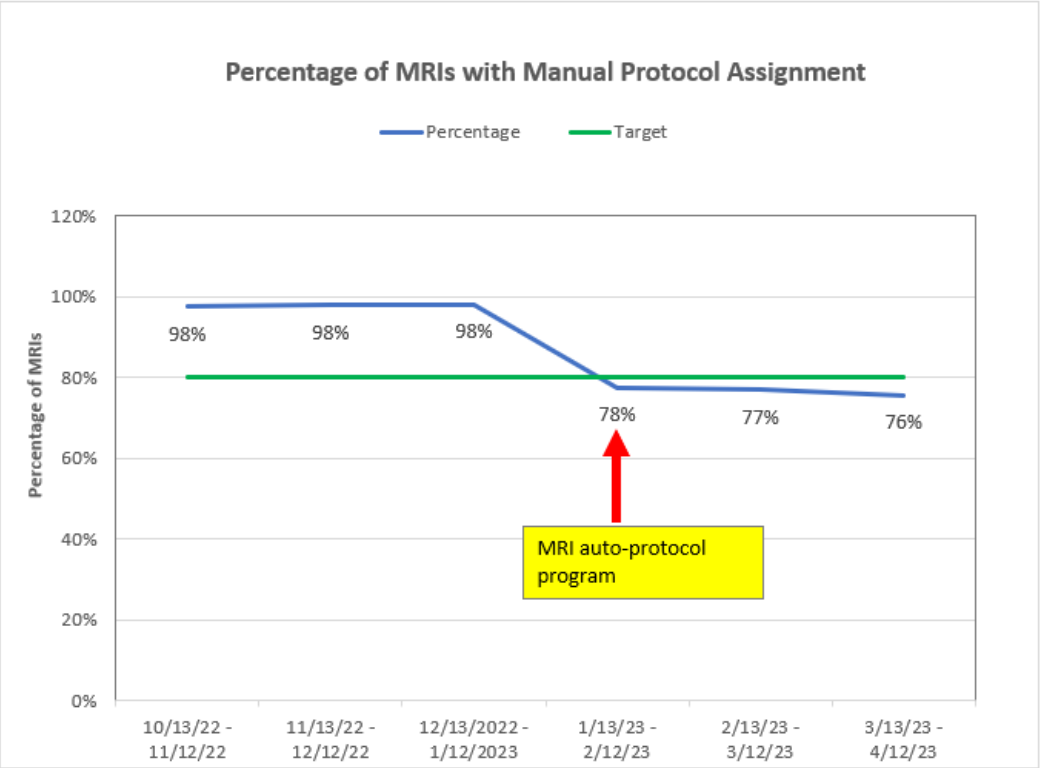

Figure 2: Run chart of MR orders receiving manually assigned protocol before and after auto-protocol project.

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Results

- Mean time to protocol MRI exams approximately 15 seconds
- Estimated 30.5 work hours saved annually spent protocoling
- No trends in increased call backs detected

Discussion

Creation of an “auto-protocol” program that automatically assigns language into the protocol within the EHR (Epic®) can substantially (and safely) reduce the protocol burden to radiologists and/or technologists. Key attributes for success are:

- MR codes carefully selected for inclusion
  - Pick codes that are essentially always scanned the same way
  - Let protocol process be focused on orders where variability exists on how to scan or that are frequently ordered incorrectly
- Encourage technologists to discuss any discrepancies between order and provided indication with appropriate radiology service before scanning