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Quality of Care for Renal Masses: The Michigan Urological Surgery Improvement Collaborative—Kidney Mass: Identifying & Defining Necessary Evaluation & Therapy (MUSIC-KIDNEY)

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Abstract

Introduction: We describe the establishment of the Michigan Urological Surgery Improvement Collaborative—Kidney mass: Identifying and Defining Necessary Evaluation and therapY (MUSIC-KIDNEY) to improve the quality of care that patients in Michigan receive for localized, 7 cm or smaller (T1) renal masses.

Methods: The MUSIC-KIDNEY collaborative is comprised of 45 urologists from 8 group practices. From June 2017 to November 2018 surgeons collected data for 821 patients with newly diagnosed T1 renal masses. Goals are to reduce the overall burden of treatment for T1 renal masses specifically by avoiding treatment when a noninterventional approach is appropriate, reducing the treatment of benign renal masses, preventing radical nephrectomy when a kidney sparing approach is appropriate, and decreasing length of hospitalization and readmission rates.

Results: Median age at diagnosis was 66 years, 56.8% of patients were male and 83.8% were Caucasian. The patient populations differed across practice sites for age ($p < 0.001$), tumor size ($p = 0.002$), race ($p < 0.001$), Charlson comorbidity index and insurance type ($p < 0.001$). Tumor complexity was infrequently reported (35.1%). Initial management included surveillance/repeat imaging (45.1%), biopsy (15.4%), intervention (39.1%) and second opinion (0.6%). No treatment at initial presentation (0% to 74.5%) and nephron sparing treatment (0% to 100%) varied significantly among practices ($p < 0.001$). Of 133 patients with T1 renal masses who underwent radical nephrectomy (39.8%) 53 had tumors smaller than 4 cm and/or surgical findings without malignancy. Readmission or emergency department visit within 30 days after renal surgery occurred in 7.6%.

Abbreviations and Acronyms

AS = active surveillance

cT1RM = clinical stage T1 renal mass

KIDNEY = Kidney mass: Identifying & Defining Necessary Evaluation & therapY

MUSIC = Michigan Urological Surgery Improvement Collaborative

PCa = prostate cancer

PN = partial nephrectomy

QI = quality improvement

RCC = renal cell carcinoma

RM = renal mass

RMB = renal mass biopsy

RN = radical nephrectomy

T1 = clinical stage T1

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Conclusions: Initial findings of MUSIC-KIDNEY indicate practice level variation and several quality improvement opportunities. Focusing on these goals may optimize practice patterns and surgical outcomes across Michigan.

Key Words: carcinoma, renal cell; quality of health care; health information management

The Knowledge Gap

Renal cell carcinoma is 1 of the 10 most common cancers in men and women and is associated with a 5-year mortality rate of 35%.[1] When discovered, a localized renal mass 7 cm or smaller (clinical stage T1) may represent potentially aggressive RCC or a benign condition.[2–4] Risk of malignancy is strongly associated with tumor size. While more than 90% of tumors 6 to 7 cm are malignant, more than 40% of tumors smaller than 1 cm are benign.[2] This wide range of cT1 renal mass biology is matched by a similarly wide range of treatment options.[4–6]

Currently, no population based clinical registries or quality improvement initiatives exist to address variations in care for patients with cT1RM. With known institutional and provider specific differences in clinical evaluation and management, the Michigan Urological Surgery Improvement Collaborative (MUSIC) is uniquely positioned to explore variation in cT1RM treatment patterns. Our goals are to decrease overall burden of treatment, increase kidney preservation, and improve patient outcomes at a physician and practice level. By optimizing treatment pathways for cT1RMs, MUSIC expects increases in quality and cost savings for the patient, hospital and payer.

Materials and Methods

History of MUSIC

MUSIC is a statewide QI consortium established in 2011 through the Blue Cross Blue Shield of Michigan Value Partnerships program.[7] Comprised of 45 diverse community, private and academic practices, MUSIC includes 90% of the urologists in Michigan. MUSIC aims to improve the quality and cost efficiency of urological care. Urologists participating in the collaborative voluntarily submit data to a web based data registry to collect, review, and improve patient care pathways and outcomes. Initially, MUSIC focused on newly diagnosed prostate cancer. Early successes included reductions in biopsy-related complications and developing imaging appropriateness guidelines for patients.[8,9] MUSIC's success in achieving QI in PCa is accredited to the core operating principles, engaged clinical champions, active patient advocates and validated data registry.[7] The experience from MUSIC's PCa initiatives suggests that collecting and reviewing data are not enough to achieve QI goals. Information must be openly presented to participants and then processed together.

Growth of MUSIC beyond PCa: QI Project Approval

In June 2015 MUSIC asked participants to identify other key areas for urological QI. The MUSIC Executive Committee reviewed proposals in September 2015 (fig. 1) and voted to approve 2 proposals, one of which focused on standardizing care for patients with renal cancer. Initial evaluation and management for cT1RMs, which can be nonmalignant, localized cancer or metastatic cancer, remains highly dependent on individual surgeon and institution.[10,11] The level of evidence supporting specific practices is low as most prior research studies about cT1RMs are retrospective, observational series with only a single randomized clinical trial (EORTC 30904).[12,13] Our hypothesis was that substantial variation exists in initial management of cT1RMs with variability beginning before the treatment decision. To gain insight into the root of this variation the proposal included investigation of which patients/lesions were referred to urology and what initial testing is performed. Upon review, urologists differ widely in the additional testing (eg imaging, biopsy) ordered before finalizing the treatment decision with the patient. Type of treatment offered to each patient is also highly urologist determined based on experience, expertise and practice pattern. Options include various surgical approaches (laparoscopic vs robotic vs open surgery), partial nephrectomy vs radical nephrectomy and multiple methods for tumor ablation. Once chosen and performed delivery of the treatment and followup protocols remain varied for each surgeon and practice. All 4 areas of variation (initial management, treatment decision, treatment and followup) remain relatively unstudied with significant health care implications. Using the cooperative nature of MUSIC and its validated clinical data registry Michigan urologists can explore the QI opportunities in care and cost savings in RCC across the state.

First Prepilot

In March 2017, 4 MUSIC practices each selected 4 random cT1RM consultation visits (identified by ICD-9/ICD-10 codes) seen September 1, 2016 to October 30, 2016. The prepilot included compilation of data regarding clinical activity (eg visits, labs, imaging, biopsy) used before treatment decision, treatment related variables and 90-day followup via a web based tool. Reviewing the data from these 16 patients allowed for the determination of ease and availability of the variables in question. The prepilot aimed not only to explore whether data abstraction could be carried out by newly trained abstractors (rather than urologists or trainees) but also to limit

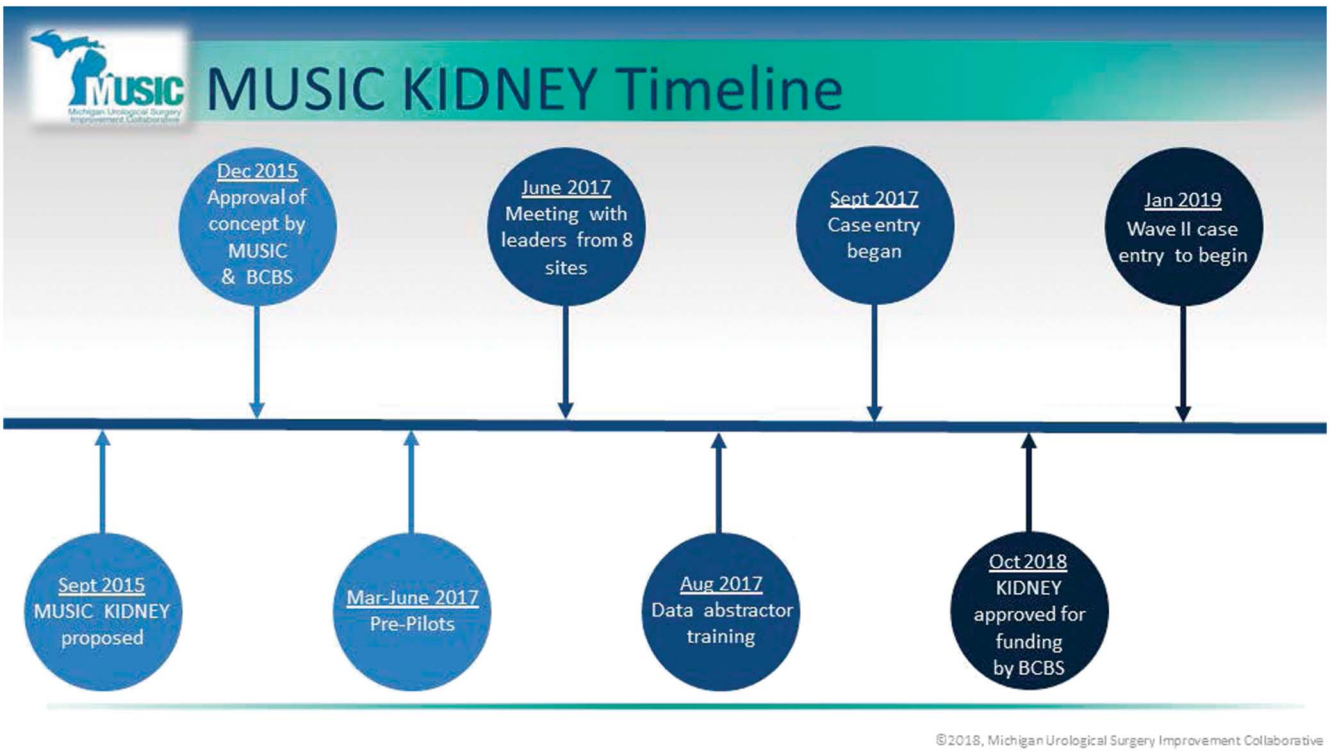

Figure 1.

or expand the variables included in the registry based on physician practice patterns observed.

Second Prepilot

Based on the lessons learned from the initial pilot a second prepilot began in May 2017 with the original 4 practices and 2 additional practices. Data elements of interest were further refined to identify patient outcomes and variability among practices via a web based tool. The newly named MUSIC-KIDNEY working group met in person and via web conferences to allow each site's clinical champion to provide feedback and direction about the QI goals.

Data Source

In 2017 MUSIC expanded the clinical registry to collect KIDNEY data and 2 more sites were added. Trained local data abstractors registered each patient prospectively entering approximately 120 unique variables at a single collection point 120 days after the initial visit to allow for pretreatment, treatment and 90-day outcome data (fig. 2).

Study Population

We included all patients older than 18 years of age who saw a participating urologist between June 2017 and November 2018 as a new cT1RM consult. Trained abstractors collected data on potentially eligible patients with RM excluding those not meeting entry criteria and marking those for whom the determination was unclear. Points of clarification included interpretation of conflicting results from multiple imaging studies, definition of the clinical suspicion of a given mass according to the urologist note (vs the radiology report) and resolution of multiple and bilateral lesions. The data set for analysis of outcomes for patients with cT1RM included only those with a suspicious RM (solid lesion or complex renal cyst [Bosniak III/IV]), excluding patients who presented with renal cysts not suspicious for RCC (Bosniak I/II/IIF), angiomyolipomas, urothelium based neoplasms (ie urothelial carcinoma) and those without a RM (fig. 2).

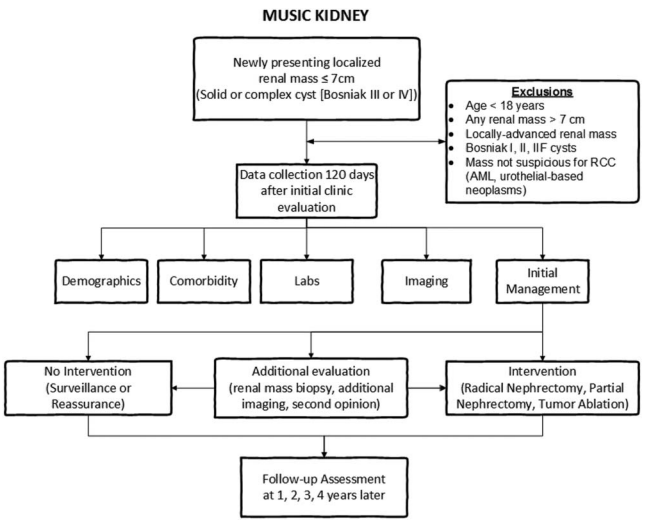

Figure 2.

Table.
Demographic and clinical characteristics of the study population overall and within each MUSIC-KIDNEY practice

	Overall	Practice A	Practice B	Practice C	Practice D	Practice E	Practice F	Practice G	Practice H	p Value*
No. pts	821	135	117	174	4	4	62	278	47	
Median age (IQR)	66.3 (57−75)	65.2 (53.1−75)	64.1 (55.5−71.9)	65.9 (56.3−73.6)	56.4 (41.8−70.2)	66.7 (45.5−76.9)	62.7 (52.5−70.9)	68.5 (59.7−76.1)	69.7 (59−80.7)	0.001
Median kg/m^2 body mass index (IQR)	29.5 (25.8−34.7)	30.3 (25.5−35.5)	29.8 (26.7−37.5)	29.2 (26.3−34)	32.4 (22.8−40.7)	36.5 (31.5−42.5)	29 (25.8−34.2)	29.4 (25.7−34.2)	28.5 (25.7−33.9)	0.383
Median cm tumor size (IQR):	2.7 (1.9−4.1)	2.5 (1.5−3.6)	3.2 (2.2−4.8)	2.9 (2−4.2)	3.6 (2.1−4)	4.2 (1.7−6.6)	3.0 (2.4−4.1)	2.6 (1.8−4)	2.4 (1.6−3.9)	0.002
No. T1a (%)	610 (74.5)	108 (80.0)	74 (63.8)	128 (73.6)	4 (100.0)	3 (75.0)	45 (73.8)	211 (76.2)	37 (78.7)	0.073
No. T1b (%)	208 (25.4)	27 (20.0)	42 (36.2)	46 (26.4)	0 (0.0)	1 (25.0)	16 (26.2)	66 (23.8)	10 (21.3)	
No. sex (%):										0.361
Male	466 (56.8)	69 (51.1)	62 (53.0)	104 (59.8)	1 (25.0)	2 (50.0)	41 (66.1%)	161 (57.9%)	26 (55.3%)	
Female	355 (43.2)	66 (48.9)	55 (47.0)	70 (40.2)	3 (75.0)	2 (50.0)	21 (33.9%)	117 (42.1%)	21 (44.7%)	
No. race (%):										<0.001
Caucasian	651 (83.8)	122 (91.0)	100 (89.3)	86 (56.2)	4 (100)	4 (100)	40 (83.3)	249 (90.5)	46 (97.9)	
African American	108 (13.9)	7 (5.2)	10 (8.9)	60 (39.2)	0 (0)	0 (0)	8 (16.7)	23 (8.4)	0 (0)	
Other	18 (2.3)	5 (3.7)	2 (1.8)	7 (4.6)	0 (0)	0 (0)	0 (0)	3 (1.1)	1 (2.1)	
No. Charlson comorbidity index (%):										<0.001
0	428 (52.1)	53 (39.3)	54 (46.2)	91 (52.3)	1 (25.0)	3 (75.0)	25 (40.3)	176 (63.3)	25 (53.2)	
1	166 (20.2)	30 (22.2)	18 (15.4)	35 (20.1)	2 (50.0)	1 (25.0)	20 (32.3)	55 (19.8)	5 (10.6)	
2 or Greater	227 (27.7)	52 (38.5)	45 (38.5)	48 (27.6)	1 (25.0)	0 (0)	17 (27.4)	47 (16.9)	17 (36.2)	
No. insurance type (%):										<0.001
Private	399 (48.7)	75 (56.0)	67 (57.3)	94 (54.0)	2 (50.0)	2 (50.0)	34 (54.8)	111 (39.9)	14 (29.8)	
Public	409 (49.9)	57 (42.5)	50 (42.7)	73 (42.0)	2 (50.0)	2 (50.0)	28 (45.2)	164 (59.0)	33 (70.2)	
None	12 (1.5)	2 (1.5)		7 (4.0)				3 (1.1)		
No. tumor type (%):										<0.001
Solid tumor	561 (71.9)	107 (81.7)	91 (79.8)	130 (79.3)	4 (100)	2 (100)	51 (86.4)	137 (52.9)	39 (83.0)	
Complex cyst	54 (6.9)	4 (3.1)	20 (17.5)	7 (4.3)	0 (0)	0 (0)	6 (10.2)	14 (5.4)	3 (6.4)	
Indeterminate	165 (21.2)	20 (15.3)	3 (2.6)	27 (16.5)	0 (0)	0 (0)	2 (3.4)	108 (41.7)	5 (10.6)	
No. documentation of tumor complexity (%)	99 (35.1)	21 (48.8)	16 (24.2)	56 (73.7)	−	1 (100.0)	0 (0.0)	3 (5.9)	2 (6.7)	<0.001
No. chest x-ray or computerized tomography thorax performed (%)	294 (37.7)	61 (46.6)	63 (55.3)	88 (53.7)	3 (75.0)	1 (50.0)	20 (33.9)	42 (16.2)	16 (34.0)	<0.001
No. treatment type (%):										<0.001
No intervention	408 (49.7)	69 (51.1)	62 (53.0)	79 (45.4)	0 (0)	2 (50.0)	4 (6.5)	157 (56.5)	35 (74.5)	
Tumor ablation	19 (2.3)	4 (3.0)	3 (2.6)	2 (1.1)	0 (0)	0 (0)	0 (0)	8 (2.9)	2 (4.3)	
Partial nephrectomy	261 (31.8)	49 (36.3)	35 (29.9)	58 (33.3)	4 (100)	1 (25.0)	50 (80.6)	61 (21.9)	3 (6.4)	
Radical nephrectomy	133 (16.2)	13 (9.6)	17 (14.5)	35 (20.1)	0 (0)	1 (25.0)	8 (12.9)	52 (18.7)	7 (14.9)	
No. malignant surgical pathology (%)	342 (86.8)	51 (82.3)	48 (92.3)	85 (91.4)	2 (50.0)	2 (100)	48 (82.8)	98 (86.7)	8 (80)	0.16

* p Value based on comparison across 6 practices (excluding practice dilation and evacuation) due to small sample sizes.

Statistical Analysis

Clinical and demographic characteristics of patients were summarized overall and by practice using chi-squared test for categorical variables and Wilcoxon rank-sum test for continuous measures. Practice level variation in the use of active surveillance among patients with T1 was examined. All the analyses were performed using SAS 9.4, and statistical significance was set at 0.05.

Results

Patient and Tumor Characteristics

MUSIC-KIDNEY examined 821 new patients with cT1RM evaluated by one of 45 physicians at 8 different practices. The patient population referred to urologists for cT1RMs was largely similar across practice site (see table), although several variables demonstrated statistical differences. Median age was 66.3 years (IQR 57−75), 56.8% were males and median tumor size was 2.7 cm (IQR 1.9−4.1). Tumor complexity assessment was never found to be documented completely for the prepilot studies and for only 35.1% of patients afterwards. Cross sectional imaging studies commonly omitted mention of tumor location (55.9%) and/or growth pattern (82.9%).

Renal Mass Management and Outcomes

At the initial consultation treatment plans were observation/repeat imaging (45.1%), biopsy (15.4%), intervention (39.0%) or referral to another institution (0.6%). Across the 8 sites renal mass biopsy use ranged from 6.4% to 25%. All 126 RMBs were core needle biopsies and only 9 (7.1%) were nondiagnostic. For the 96 patients for whom the number of cores was recorded 89 had multiple cores and 7 had only a single core. Of the 93 patients (74%) diagnosed with cancer at RMB 72% (67) underwent surgery and 28% (26) underwent no intervention. Of the 24 patients with a benign RMB 20 received no intervention (83%). Four patients with biopsy report of oncocytic tumor suspicious for oncocytoma underwent partial nephrectomy with 3 oncocytomas and 1 hybrid oncocytic tumor. In fact, patients undergoing RMB more commonly pursued intervention (60.3%) than those not undergoing pretreatment biopsy (48.5%, p=0.015).

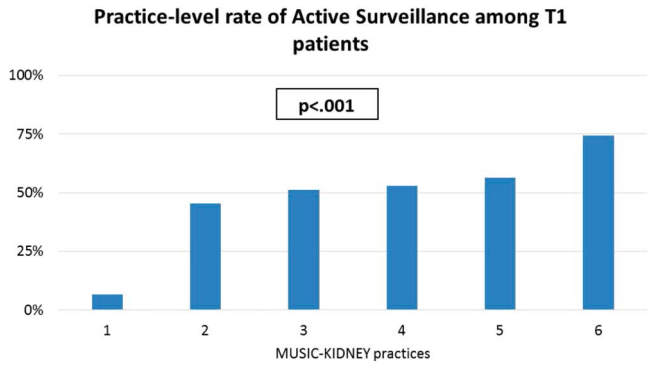

Figure 3.

The treatment plan pursued (as evident at 90-day followup) was observation in 49.7% and treatment in 50.3%. Rates of surveillance varied across practices from 7% to 75% (fig. 3). For T1a tumors AS was pursued in 55.9% of patients overall and in 79.7% of those 75 years or older. Among patients with cT1RM receiving treatment 66% had nephron sparing procedures. RN was performed for 18.3% of T1a tumors and 60.6% of T1b tumors. Individual urologist use of nephron sparing interventions ranged from 0% to 100% of cT1RM cases. Of the 133 patients with cT1RMs who underwent RN 53 had tumors smaller than 4 cm and/or surgical findings without malignancy (39.8%).

Posttreatment events (eg emergency department visit, readmission) were recorded for all patients. ED visits occurred within 30 days after 2 of 126 RMBs (1.6%), 0 of 19 TAs (0%), 17 of 261 PNs (6.5%) and 10 of 133 RNs (7.6%). Surgical pathology revealed malignant pathology in 342 patients (86.8%). Of the 52 patients with benign surgical pathology 7 (13.5%) underwent prior RMB. Practice level variation in malignant pathology is demonstrated in the table.

Discussion

Michigan urologists and practices remain engaged and eager to leverage the MUSIC infrastructure for QI beyond PCa, allowing for MUSIC's growth to focus on patients with cT1RMs. Initial analysis of prospectively collected data within the MUSIC-KIDNEY registry demonstrates variation in cT1RM patient management, treatment decisions and outcomes in practices across the state. MUSIC-KIDNEY is a new initiative within the RCC field. The closest comparator to this statewide QI collaborative is the Delayed Intervention and Surveillance for Small Renal Masses registry (DISSRM).[14,15] DISSRM includes patients with cT1aRMs (4.0 cm or less) evaluated at 3 academic institutions with the primary objective to compare AS and primary intervention in the domains of demographics, tumor characteristics, comorbidity and patient reported quality of life. MUSIC-KIDNEY includes patients with cT1RMs (up to 7 cm), spans academic and community based practices and has broader QI goals. In the initial assessment of the data prospectively collected within MUSIC-KIDNEY significant practice level variation has been identified and several QI opportunities have been targeted.

Several specialty specific guidelines in recent years focused on the initial management of RMs suspicious for cancer.[4−6,16] Limited information is available regarding adherence with these guidelines. For example, chest imaging is recommended for all suspicious RMs by the American Urological Association. MUSIC-KIDNEY practice patterns demonstrate the omission

of chest imaging in 62.3% of patients (see table). Further investigation of the reasons for this and emphasis on improved compliance particularly for those at greatest risk for metastases and incidental lung cancers is one of our initial QI goals.

Numerous scholarly publications indicate a renal tumor complexity's association with many aspects of RM care, including choice of management, surgical outcomes, pathology and complications.[11,17–19] Nevertheless, the vast majority of published studies are based on retrospective assessment of tumors performed by urology trainees at academic centers. The penetrance of tumor complexity documentation in clinical practice is poor.[20,21] In the prepilot studies information about tumor complexity (eg growth patterns, location) was incomplete in radiographic reports and not routinely documented by clinicians. Another QI focus of MUSIC-KIDNEY is the implementation of tumor complexity documentation into routine clinical practice.

Though RMB is a tool readily available to most urologists only 15.3% of MUSIC-KIDNEY patients underwent RMB as a part of their management pathway. The majority of patients who underwent surgery without malignant pathology did not undergo a preoperative RMB, indicating a potential QI opportunity. Of the patients treated with RN 10.5% had benign pathology, an undesirable treatment outcome. MUSIC-KIDNEY has the opportunity to help practices better identify patients who may benefit most from RMB. The top priorities for MUSIC-KIDNEY are to retain cancer control while safeguarding kidney function.

Perhaps most interesting is the finding that AS use among these practices, although somewhat heterogeneous, is much higher than nationally reported practice patterns.[22] A recent analysis of the National Cancer Database from 2010 to 2014 reported AS use for only 2.9% of patients, which is much lower than the 49.7% reported in our initial data. Although a current limitation of MUSIC-KIDNEY is the short duration of followup information available after initial evaluation, data from DISSRM found that only 9% of patients crossed over to treatment during 5 years of followup.[15] AS provides patients and providers an avenue to pursue a conservative treatment pathway when appropriate with tailoring followup and transition to treatment based on the clinical scenario. Although noninterventional strategies are being well utilized, it remains to be seen whether they are being used appropriately. The variation in noninterventional approaches across the state presents MUSIC-KIDNEY with the opportunity to better understand treatment pathways used and to learn from those with better outcomes to optimize AS performance.

Evaluation of the surgical treatment of cT1RMs provides opportunities for QI in several areas including surgical morbidity, oncologic outcomes and renal functional outcomes. The rates of unplanned health care encounters following surgery were 6.5% for PN and 7.6% for RN, similar to previously reported rates of 4.5% to 6.3% for PN and 5.2% to 6.8% for RN per American College of Surgeons National Surgical Quality Improvement Program data.[23,24] Reducing the rates of ED visits/readmissions after intervention would reduce costs and improve patient experience during the course of treatment. Deeper dives into readmissions, and tabulation of each practice and surgeon's postoperative treatment pathways may help to understand the drivers for these unplanned encounters. Looking to high performers in the collaborative, MUSIC-KIDNEY surgeons aim to learn from one another.

The majority of previous series indicate that approximately 20% of surgically treated RMs are benign, which makes MUSIC-KIDNEY's initial finding of a 13% benign surgical pathology rate encouraging. Nevertheless, we feel this rate may still be too high, and we will leverage the MUSIC infrastructure to develop ways to reduce this rate. With appropriate use of noninterventional approaches and increased use of RMB we believe MUSIC-KIDNEY physicians will better identify patients with benign renal neoplasms and others with RCC with low malignant potential to safely avoid treatment.

When considering the long-term health of patients with cT1RM in Michigan, preserving kidney function is a high priority for the patient and physician. Loss of kidney function may lead to cardiovascular events and morbidity with long-term quality of life and health care costs for the patient.[25–28] Physicians may consider a multitude of factors when determining the appropriateness of kidney preserving options for each patient such as tumor size, location, complexity, patient overall health, fitness for surgery and life expectancy.[4,29] Tumor complexity is a strong predictor of PN (vs RN) and particularly for intermediate complexity tumors there is great variation in the use of PN.[11] Reduction in the use of RN for benign, and low and intermediate complexity tumors will remain a QI focus.

Acknowledging the limitations of a registry for cT1RMs including the exclusion of larger tumors and the nonrandomization of patients MUSIC-KIDNEY will be able to examine and improve the quality of care patients receive. The guiding principles of MUSIC-KIDNEY are to improve guideline adherence and documentation in order to optimize the management for cT1RMs and to reduce the overall treatment burden for patients. Our next steps focus on QI activities aimed towards avoidance of treatment when a noninterventional approach is appropriate, reductions in the treatment of benign RMs, prevention of RN when a kidney sparing approach is appropriate, and decreases in the length and rates of hospitalization and ED visits/readmissions after RMB, ablation and surgery.

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Editorial Commentaries

The collaborators from MUSIC, whose previous efforts focused on quality improvement in prostate cancer across 45 practices and 90% of urologists in the state of Michigan, now present their initial report on management of over 800 newly diagnosed cT1 renal masses at 8 participating practices in the state. Notably but unsurprisingly, they identified significant practice level variation in management, most notably surveillance and use of nephron sparing modalities.

The strength of MUSIC is in the resultant collaboration among clinical champions in participating sites to address and implement opportunities for QI. For example, the data are limited in the availability of lesion complexity in a significant proportion of patients, and the investigators have already initiated efforts to include complexity assessment (such as RENAL scoring) as part of standard radiology reporting in their sites. In the course of their efforts they identified other areas for improvement including incomplete staging of T1 renal masses (chest imaging was not performed in more than 40% of patients with T1b lesions), for which efforts are underway to improve and track in participating practices.

As the MUSIC-KIDNEY initiative continues to expand to new sites, I would encourage the collaborators to include patient reported outcomes (including anxiety and satisfaction of care) to better understand the implications of active surveillance, a common management option with cT1 kidney tumors. I look forward to hearing future reports about improvements in renal mass/renal cell carcinoma management as the investigators have previously demonstrated in prostate cancer.

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The management of localized renal masses has evolved during the past decade, providing opportunities for quality improvement. There has been an increased focus on minimizing morbidity of management such as expanding the use of active surveillance, optimizing the utility of renal mass biopsy and improving patient selection for thermal ablation.[1] The data supporting these changes are highlighted in the most recent AUA renal mass guidelines (reference 4 in article).

Like any other aspect of urology the management of localized renal masses is prone to variations that may result in lower quality care and value. Herein, the Michigan Urological Surgery Improvement Collaborative (MUSIC) launches another critical initiative (MUSIC-KIDNEY) to complement its previous research efforts and provide a platform for future quality improvement.

The authors leverage their robust collaborative across multiple urologists and practice settings in the state of Michigan.[2] In this first analysis they evaluate practice patterns in managing clinical T1 renal masses. Key findings from this paper include marked variation in individual urologist use of nephron sparing surgery, low rates of renal mass biopsy and surprisingly high use of active surveillance at initial diagnosis.

While these preliminary results are interesting we look forward to seeing further insights from the registry as more groups and patients are included, and followup time increases. Undoubtedly, MUSIC-KIDNEY will prove to be a valuable resource in identifying variations in care, and optimizing outcomes for patients with newly diagnosed renal masses.

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Reply by Authors

We agree with the editorial comments that the MUSIC-KIDNEY collaboration is a unique opportunity to identify and implement quality improvement in the management of renal masses. We agree with Dr. Prasad's comments regarding further engagement with clinicians to improve the documentation of tumor complexity and address heterogeneity in staging and treatment of cT1RM. We have been collecting data for other urological diseases within MUSIC as patient reported outcomes are a vital aspect of patient care and, therefore, have this infrastructure in place to expand to include these outcomes for KIDNEY in time. We appreciate the positive comments from Drs. Stensland and Zaid as well.