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Kidney stone depiction on fictional television: how accurate are they?

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Abstract

Fictional portrayals of medical conditions on television have been shown to significantly shape understanding and management expectations of the viewing public. Given the high prevalence of kidney stone disease, we aimed to assess the frequency of its portrayal on US television and assess whether its depiction was reflective of the current epidemiology or management of urolithiasis in the US. A detailed search was conducted for English language depictions of kidney stones in fictional television using internet, movie and television database search engines. Television episodes with characters depicting a kidney stone occurrence were independently reviewed by two reviewers and analyzed for genre, initial air date on US television, character age, gender, race and management strategy. Seventeen episodes from 13 different television series portrayed a character with a symptomatic kidney stone. The majority were male (88%). Surgical intervention was performed in 7/17 cases (shockwave lithotripsy $n = 1$, ureteroscopy $n = 2$, nephrectomy $n = 1$, transurethral removal $n = 1$, unknown $n = 2$), spontaneous passage or medical expulsive therapy in 7/17 cases and no treatment or resolution portrayed in 3/17 cases. The only surgical complication shown was ureteral avulsion during ureteroscopy. Inpatient management was seen in 9/14 (64%) cases with event resolution. This study identified a number of kidney stone depictions that may be misleading or misrepresent the presentation and management of this condition. Although likely portrayed for plot development and dramatic effect, this could potentially reinforce inaccurate beliefs or misconceptions and future depictions should be mindful of this.

Keywords Kidney stone · Urolithiasis · Media · Television

Abbreviations

AUA	American Urological Association
CPR	Cardiopulmonary resuscitation
EMS	Emergency Medical Services
FOP	Fibrodysplasia ossificans progressive
MET	Medical Expulsive Therapy
PCNL	Percutaneous Nephrolithotomy
SWL	Shockwave lithotripsy
TV	Television

Introduction

The media has a powerful role, extending beyond pure entertainment, in distilling information. This is more magnified in recent years, with the proliferation of the internet and online streaming platforms. Many media entities are also intertwined, with depictions on television often spilling over into a flurry of web-based searches and social media mentions [1]. A widely accepted communication theory known as ‘Cultivation theory’ has indicated how the media, particularly television given its broad reach, can significantly ‘cultivate’ viewers’ perceptions of reality over time [2].

With the rising popularity and global accessibility via streaming platforms of medical based dramas, as well as an increasing number of medical conditions portrayed in television programs in general, it is critical to ensure accuracy as they can significantly influence the viewers’ perceptions (positively or negatively) regarding the presentation of disease conditions, the manner of management, as well as the impact of medical treatments or intervention on disease outcome or prognosis. Inaccurate depictions or misrepresentations in these fictional programs could adversely shape

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viewers' thoughts and resultant healthcare expectations, with potential negative impact on real life medical interactions or, more concerningly, an avoidance of medical care, based upon misperceived expectations of management or outcome. In an attempt to combat a culture of 'misinformation', a number of medical dramas such as *ER* and *Grey's Anatomy*, have often drafted physicians and medical professionals as writing staff. Despite these valid attempts, numerous studies have highlighted mixed results in their medical accuracy [3, 4]. One recent study of urologic conditions in *Grey's Anatomy* highlighted only a 62% accuracy with frequent misrepresentations or even mismanagement of some common urologic conditions [5].

Kidney or ureteral stones are common, affecting 1 of 11 adults in the United States [6] and the prevalence is rising [7]. It is therefore unsurprising that they have made their way into portrayal on television in recent decades; however, no prior study has formally assessed the accuracy of their depictions within these fictional television shows. Our study aimed to specifically identify the demographics of all persons portrayed with urolithiasis and also assess the treatment strategies employed and outcomes to correlate whether these match 'real life' occurrences.

Methods

We conducted a search content analysis of urolithiasis depictions in television. A number of internet search engines were interrogated including Google (<http://www.google.com>), Bing (<http://www.bing.com>), International Movie Database (<http://www.imdb.com>), YouTube (<http://www.youtube.com>), and Wikipedia (<http://www.wikipedia.com>) using the key search terms "kidney stone" and "television" as well as "TV show character with kidney stone" and "TV show kidney stone" in July 2021. One reviewer (GY) manually reviewed the results of all these independent searches (limiting to top 500 when more were returned) for references to television show episodes with urolithiasis events portrayed. This study only included obstructive or symptomatic kidney, ureteral, and urethral stones whose symptoms and treatment were depicted by a fictional character while on camera. We limited data collection to English language television episodes broadcast in the United States. Television episodes that referenced previous urolithiasis events not portrayed directly on-screen were excluded from analysis. Television episodes dealing with urolithiasis featured on daytime talk shows, reality television shows, and internet-only short 'webisodes' were excluded. Documentary and reality films were also excluded. Television episodes or scenes that were identified for possible inclusion were cross-referenced in secondary searches, and the identified television episodes were viewed in full via web-based video search by two

independent reviewers (GY and NS) for independent data collection.

Data collected included media type, name of television show, genre, episode season, and initial air date. Data were collected with regards to the portrayed character's gender, approximate age of the character (based around actor's age at performance), race, presentation setting, as well as portrayal of outcomes or treatment, if applicable. For outcomes, we categorized spontaneous passage versus surgical removal/intervention. If details were available, the type of surgical intervention was also documented. Additionally, complications were documented if portrayed or referenced in that episode. Discordant findings were resolved by discussion and review by a third reviewer (NK) as required. All analyses were primarily descriptive, with frequencies and percentages used as necessary.

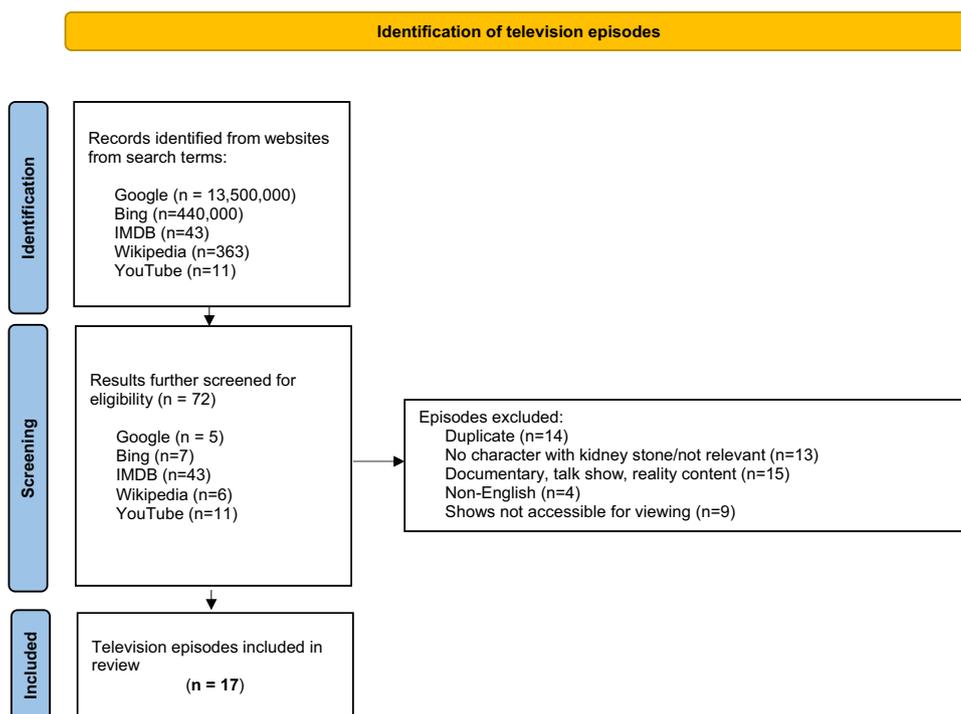
Results

Figure 1 shows the search results. A total of 17 episodes from 13 different television shows were reviewed, representing 17 different patients with obstructive uropathy secondary to urolithiasis (Table 1). The episodes reviewed were broadcast over a 27-year period (1994–2021). The majority of television shows that portrayed a character with obstructive uropathy were comedies (10/13, 76.9%), with two medical dramas and one drama as well. The medical drama, *Grey's Anatomy*, had the greatest number of episodes, with four individual characters in four separate episodes.

The overwhelming majority of patients portrayed on television were male. There were 15 (88.2%) males and only 2 (11.8%) female characters. In terms of race, there were 15 (88.2%) White and 2 (11.8%) African American characters included in this analysis. The age of the characters could not always be definitively determined; however, there was only one pediatric patient (age < 18 years) portrayed.

Resolution of the renal colic was portrayed in 14 (82.3%) episodes with three episodes not identifying any treatment or resolution of the event. For 5/14 (35.7%) characters, this was portrayed as occurring outside the hospital or clinic, with 9/14 (64.2%) shown within one of these settings. Spontaneous stone passage was demonstrated in 7/14 (53.8%) instances, with three incidences (23%) occurring within an inpatient setting. Presumption of passage based on a negative urinalysis occurred in one episode of *Grey's Anatomy*. Surgical intervention was required in 7/14 (50%) episodes. The exact type of surgical intervention could be determined by on-screen portrayal or discussed by the characters in only five instances (Table 2). Shockwave lithotripsy (SWL) was portrayed one time. Ureteroscopy was portrayed two times. In one instance, the time period of the show pre-dated modern minimally invasive surgical techniques for treatment of

Fig. 1 Flow diagram for search strategy results for kidney stone depictions on television shows



stones (c.1870s), and a transurethral removal of obstructing stone without anesthesia was portrayed. Another character performed a self-nephrectomy to resolve their intense renal colic at home in *Third String Kicker*, for comedic effect. In the medical drama, *The Night Shift*, a patient with a septic stone and other co-morbidities was offered primary ureteroscopy but declined and chose SWL. There was 1 (7.6%) surgical complication of intervention, a ureteral avulsion during ureteroscopy on *Grey's Anatomy*, requiring autologous renal transplant.

Discussion

Television represents a major source of health information for many Americans [8, 9] and many prominent shows feature health-related story lines. An analysis of ten scripted primetime shows airing 2009–2011 found that 25% of major, minor and dialogue-level storylines were health related [10]. Television shapes viewers' perceptions of 'norms' and this is equally applicable to representations of health problems and care. Shrum argues that television, in particular, produces vivid "media memories" that may play a disproportionate role in decision-making and estimates of prevalence of health-related behaviors, and health problems [11]. A 2005 Centers for Disease Control and Prevention survey [12] reported women were more likely to report learning about health issues from television (62%) and taking action on these issues (33%). There was even a report of a woman

self-diagnosing her breast cancer and seeking treatment based upon a storyline in *Grey's Anatomy* [13].

However, misrepresentation of facts or the reality of outcomes are potentially harmful. Patient surveys indicate television remains the main source of information about cardiopulmonary resuscitation (CPR) and media exposure is frequently cited as the reason for continued pervasive optimism regarding efficacy of CPR and successful outcomes despite the known poor prognosis related to cardiac arrest [14–17]. Even among those who have had CPR training, most people continue to cite television as a source of information about the intervention and successful outcomes [15]. This highlights the importance of accurate medical intervention on television and why this area calls for further research as it has been shown to influence patients' expectations.

The assessment of urologic conditions depicted in television is limited. A recent analysis of one specific medical drama, *Grey's Anatomy*, investigated the context, frequency, and accuracy of urologic conditions portrayed. They identified 21 urologic events across 15 seasons and 342 episodes. The majority (11/21 52%) related to male external genitalia and only three (14%) related to nephrolithiasis [5]. The authors highlight the importance of awareness to increase the public's perception of urological conditions from their assessment of a single popular medical drama but this is especially pertinent when considering depictions in all television genres.

Our study is, to our knowledge, the first to specifically assess the depictions of kidney stone disease in fictional

Table 1 Summary of stone depictions in television shows

Initial air date	Television show	Season/episode	Genre	Subject gender	Age	Race	Location	Treatment	Description of event
11/3/1994	Seinfeld	S6/E6	Comedy	Male	40s	W	Outpatient	Spontaneous passage	'Kramer' experiences symptomatic stone. Outpatient diagnosis and management
10/8/1998	Friends	S5/E3	Comedy	Male	30	W	Hospital	Spontaneous passage	'Joey' has kidney stones while Phoebe gives birth to triplets. Joey given option of spontaneous passage versus procedure. Admitted to inpatient awaiting spontaneous passage
3/20/2003	Scrubs	S2/E18	Medical comedy	Female	30s	W	Hospital	No treatment	'Dr. Cox' discusses delayed lithotripsy with patient who refuses pain medication because she is breastfeeding
3/27/2005	Deadwood	S2/E3-4	Drama	Male	60s	W	Clinic	Surgical removal—transurethral removal	Frontier town. Managed by town doctor, no hospital. Discuss open surgery but able to perform transurethral removal
1/13/2006	Reba	S5/E11	Comedy	Male	50s	W	Outpatient	Spontaneous passage	'Brock' passes stone at Reba's house
11/5/2006	Family guy	S5/E4	Comedy	Male	60s	AA	Outpatient	Spontaneous passage	Flashback scene of 'Muddy Waters' passing kidney stone in toilet
2/8/2007	Scrubs	S6/E8	Medical comedy	Male	50s	W	Hospital	No treatment	'JD' suggests decreasing red meat consumption to reduce recurrence of stones
10/1/2009	Grey's anatomy	S6/E3	Medical drama	Male	9	AA	Hospital	Spontaneous passage	Child scheduled for SWL as inpatient, but no blood on urinalysis so presumed passage, intervention cancelled
1/6/2010	Modern family	S1/E11	Comedy	Male	40s	W	Hospital	Surgical removal—not portrayed	'Phil' taken to hospital by EMS, admitted and has surgical removal
2/10/2011	Grey's anatomy	S7/E14	Medical drama	Male	60s	W	Hospital	Surgical removal—not portrayed	Initially misdiagnosed as liver transplant rejection. Delayed diagnosis, inpatient evaluation and management
2/18/2011	The Ricky Gervais show	S2/E6	Comedy	Male	40s	W	Hospital	Surgical removal—Ureteroscopy	Offered MET but opted for primary ureteroscopy. Stent on string discussed, but not left with string

Table 1 (continued)

Initial air date	Television show	Season/episode	Genre	Subject gender	Age	Race	Location	Treatment	Description of event
4/4/2013	Parks and recreation	S5/E17	Comedy	Male	30s	W	Hospital	Discharged on medical expulsion therapy, no passage depicted	'Ben' has kidney stone and cannot attend event in his hometown. Admitted to hospital for one day, discharged with narcotic pain medication
7/7/2014	Third string kicker	S6/E1	Comedy	Male	30s	W	Outpatient	Surgical removal—nephrectomy with fork by patient	Character has severe kidney stone pain and depicted as performing a self-nephrectomy with a fork at a dinner party
10/2/2014	Grey's anatomy	S11/E2	Medical drama	Male	22	W	Hospital	No treatment	Planned PCNL. Diagnosed with cardiomyopathy during workup/surgical planning
7/13/2016	The night shift	S3/E8	Medical drama	Male	30s	W	Hospital	Surgical removal—SWL	Septic stone. Urologist recommends ureteroscopy, patient declines, opts for SWL
10/31/2018	It's always sunny in Philadelphia	S13/E9	Comedy	Male	60s	W	Outpatient	Spontaneous passage	'Frank' has a kidney stone. Each time he uses the bathroom, the Eagles score in the Super Bowl
4/1/2021	Grey's anatomy	S17/E10	Medical drama	Female	35	AA	Hospital	Surgical removal—ureteroscopy	Patient admitted for pain control and scheduled for primary ureteroscopy. Ureteroscopy complicated by ureteral avulsion requiring auto transplant

W White, AA African American, EMS Emergency Medical Services, MET Medical Expulsive Therapy, PCNL Percutaneous Nephrolithotomy, SWL Shockwave Lithotripsy

Table 2 Summary of outcomes for depicted characters after surgical intervention for kidney stones

Initial air date	Television show	Season/episode	Treatment	Description of intervention	Portrayed outcomes
3/27/2005	Deadwood	S2/E3-4	Surgical removal—transurethral removal	Frontier town. Managed by town doctor, no hospital	Painful transurethral removal of stone, no anesthetic. Patient survives intervention
1/6/2010	Modern family	S1/E11	Surgical removal—not portrayed	Phil taken to hospital by EMS, admitted, and has surgical removal	Phil shown after surgery recovering from effects of anesthesia. No long-term sequela discussed or portrayed
2/10/2011	Grey's anatomy	S7/E14	Surgical removal—not portrayed	Initially misdiagnosed as liver transplant rejection. Delayed diagnosis, inpatient evaluation and management	Character is taken to surgery (not described) and is shown afterwards recovering. No long-term sequela discussed or portrayed
2/18/2011	The Ricky Gervais show	S2/E6	Surgical removal—ureteroscopy	Offered MET but opted for primary ureteroscopy	Discussion between characters demonstrate confusion about ureteral stent versus urethral catheter. Leaving ureteral stent on string discussed, but not left with string
7/7/2014	Third string kicker	S6/E1	Surgical removal—nephrectomy with fork by patient	Character has severe kidney stone pain and depicted as performing a self-nephrectomy with a fork at a dinner party	Character passes out from pain/blood loss from self-nephrectomy
7/13/2016	The night shift	S3/E8	Surgical removal—SWL	Septic stone. Urologist recommends ureteroscopy, patient declines, opts for SWL	SWL machine malfunctions and requires overnight repair before treatment can be completed by General Surgeons
4/1/2021	Grey's anatomy	S17/E10	Surgical removal—ureteroscopy	Admitted for pain control and scheduled for primary ureteroscopy	Ureteroscopy complicated by ureteral avulsion requiring auto-transplant. Patient later shown returning home in good condition

EMS Emergency Medical Services, *MET* Medical Expulsive Therapy, *SWL* Shockwave Lithotripsy

television. The prevalence of urolithiasis has risen and this was mirrored in our findings that the majority of television episodes portrayals aired in the last 20 years. There may be other factors contributing to this, including the rising popularity of medical dramas that utilize medical problems as plot devices [18] which may indirectly promote their portrayal in other television genres. In the United States, the prevalence of self-reported urolithiasis among men is higher than women (10.6% versus 7.1% [6]); however, the percentage of female stone formers is steadily increasing [6]. On television, a disproportionate percentage of men have been portrayed with urolithiasis, which may lead to incorrect assumptions about the incidence and prevalence of urolithiasis in women by both patients and clinicians. This is especially pertinent given that women are more likely to learn and act upon health issues based on television depictions [12]. If women are not correctly represented, viewers may fail to correlate the signs leading to a delay in seeking appropriate medical care.

Regarding race, black, non-Hispanics have seen a dramatic relative > 150% increase in urolithiasis with a rise from 1.7% to a population-adjusted 4.5% prevalence in just over a decade [6]. Interestingly, there were just two black characters identified with obstructing nephrolithiasis in our analysis. This corresponds to a larger conversation about the need for greater diversity and inclusion in television and media to be reflective of the actual viewing population. African Americans account for about 14% of the population, however one study found that the on-screen percentage for Black people in cable lags behind at about 7.0%. A similar trend exists for women, Hispanics, and Asian Americans representation on screen versus the percent present in the American population and writers/producers should be conscious of this in the future [19].

Many factors influencing spontaneous passage probability, including stone size and position, were not identifiable to assess medical accuracy of this treatment selection. Three patients (23% of resolved renal colic) were admitted to the hospital for pain control until spontaneous passage of their obstructing stone. This rate is almost twice the overall 12% admission rate identified in a study utilizing the Nationwide Emergency Department Sample to identify patients who presented to the emergency room for urolithiasis between 2006–2009 [20]. The same study identified that 88% of patients were treated and released, presumably with medical expulsive therapy or plan for observation. Currently the AUA recommends observation, with or without medical expulsion, for ureteral stones < 10 mm as first line treatment [21]. While it is not possible to determine the size of the obstructing stones in these patients based on the information provided in the dialog, admission until observed stone passage as shown in three instances, is not recommended or clinically feasible as can take many days or even weeks to

occur. Writers and producers may prefer the dramatic effect of the hospital environment for plot/character development, but this portrayal could lead to unrealistic patient expectations of diagnostic workup and monitoring, especially for small stones. Also, confirmation of passage based on a negative urinalysis as shown in *Grey's Anatomy* is misleading, as absence of microscopic hematuria does not eliminate the presence of renal colic and should not be utilized as confirmatory test for passage [22].

Surgical management was depicted in 46% of episodes that demonstrated resolution of renal colic, in contrast, the literature has cited about 10–20% of renal stone disease results in surgical intervention [23]. In some cases, the intervention was not described with enough detail to determine exact treatment type. For example, in *Modern Family*, the character is shown returning from the operating room without discussion of the procedure details. When surgical intervention was attempted, it did appear successful. Surgical management options portrayed aligned with overall recommendations, with ureteroscopy and SWL being the most commonly used treatment modalities [21]. However, on *The Night Shift* (S3E8), a patient with a history of fibrodysplasia ossificans progressive (FOP) is diagnosed with an obstructive ureteral stone causing sepsis. In FOP, bone growth occurs outside the skeleton and can replace connective tissue during inflammatory events. The urologist on screen recommended ureteroscopy with stent placement however the patient desired to avoid “surgery” as he associated it with disease progression and the general surgeons are portrayed as treating the patient with SWL. Decompression of the obstructed, infected urinary system is the hallmark of treatment for obstructive pyelonephritis secondary to nephrolithiasis and SWL would not be the recommended initial treatment in that particular clinical scenario [24]. Additionally, SWL is still performed by urologists, not general surgeons. Nephrectomy for symptomatic urolithiasis is an infrequently used treatment option, mainly reserved for kidneys with negligible function [21]. However, this was observed in 1/7 (14%) surgical treatment depictions which is a gross overestimation, albeit shown for comedic effect. Only one portrayal displayed a complication with treatment, which was in fact catastrophic. In an episode of *Grey's Anatomy* (S17E10), a patient was depicted as having ureteral avulsion requiring attempted open ureteral-ureteral anastomosis and eventual auto-transplant of the ipsilateral kidney. Avulsion of the ureter is an uncommon devastating intraoperative complication associated with ureteroscopy, with reported incidence between 0.04 and 0.9% [25]. Due to the relatively small number of surgical stone treatments portrayed, this complication may give the false impression that surgical stone disease treatment carries a high risk of a devastating complication such as this and may naturally negatively affect viewers' thoughts on proceeding with surgical intervention. A potential solution to avoid these inaccurate or false representations, which would be equally applicable in any medical

condition depiction, would be the involvement of specialty specific medical consultants by scriptwriters to counteract the potential for disinformation.

Limitations and future directions

This study has several limitations. Despite extensive efforts made in the search strategy to maximize inclusion of all relevant television programs by utilizing multiple internet search engines and media sources, some may not have been accessible or viewed, especially those broadcasts prior to the 1990s or those shows that did not enter syndication. The lack of database record of television show content broadcast in the United States to specifically reference this against is a limitation in complete inclusivity. Additionally, lack of inclusion of non-English shows may result in some bias affecting global applicability of the findings. However, we feel that the programs included do reflect the stone depictions found in the most current and widely viewed shows to the general English-speaking public. Future work would look at how these depictions actually influence viewer perception when exposed to them and the degree of accuracy they are felt to possess. A web-based survey of viewers may also be an interesting follow up on viewer perception.

Conclusions

This study identified a number of kidney stone depictions in television shows that may be misleading or misrepresent the presentation and management of this condition which could potentially reinforce inaccurate beliefs and future depictions should be mindful of this.

Author contributions All authors contributed to the study conception, design, data collection, analysis. The first draft of the manuscript was written by GY and NK and all authors commented on previous versions of the manuscript. All authors have read and approved the final manuscript.

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Declaration

Conflict of interest The authors declare that they have no conflict of interest.

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