

# A Cross-Sectional Evaluation of Parents' Awareness Towards Testicular Torsion and Their Response to a Potential Torsion: A Northern Saudi Study

Mohammed Jayed Alenzi<sup>1,\*</sup>, Ahmed S Alshalash<sup>1</sup>, Abdulmohsen Nayef Al-enzi<sup>2</sup>, Fahad Suhayman Al-anazi<sup>2</sup>, Nawaf Mohammed Al-anzi<sup>2</sup>, Khalid Omar Alsharari<sup>2</sup>, Abdulhadi Abdullah Alanazi<sup>2</sup>, Sultan Mohammed Alanazi<sup>2</sup>, Ashokkumar Thirunavukkarasu<sup>3,\*</sup>

<sup>1</sup>Department of Surgery, College of Medicine, Jouf University, Sakaka, Aljouf, Saudi Arabia; <sup>2</sup>Medical Student, College of Medicine, Jouf University, Sakaka, Aljouf, Saudi Arabia; <sup>3</sup>Department of Community and Family Medicine, College of Medicine, Jouf University, Sakaka, Aljouf, Saudi Arabia

\*These authors contributed equally to this work

Correspondence: Ashokkumar Thirunavukkarasu, Department of Community and Family Medicine, College of Medicine, Jouf University, Sakaka, 72388, Saudi Arabia, Tel +966-599739619, Email ashokkumar@ju.edu.sa

**Background:** Assessment of parents' awareness of testicular torsion (TT) is essential to plan for necessary awareness-raising campaigns by policymakers. Hence, the preventable loss of testis due to inadequate awareness can be avoided. We aimed to evaluate the awareness of TT amongst parents from the Aljouf region, KSA, and to assess their response to a potential torsion.

**Methods:** We conducted a cross-sectional study among parents from the Aljouf region. The sample population was obtained using a consecutive sampling method. The present study used a pretested Arabic questionnaire. We used a statistical package for social science software for data analysis.

**Results:** There were 320 parents who participated in different public places for the present study. Of the respondents, 10.6% of their children had sudden pain in the scrotum. More than half (52.2%) had never heard of testicular torsion, and 72.5% of parents agreed that they would seek immediate medical attention for severe testicular pain, but a low (42.5%) proportion of parents responded that they would seek help immediately. Nearly one-fourth of them responded that less than 6 hours is the critical time for repair. Parents who were knowledgeable at the critical time had more odds of presenting to a healthcare facility immediately for both mild (OR = 2.77, CI = 1.55–4.03, p = 0.001) and severe (OR = 1.92, CI = 1.03–3.63, p = 0.032).

**Conclusion:** We found a lack of awareness of TT among Saudi parents. It is suggested to improve the knowledge among them through awareness-raising campaigns by the concerned health authorities through feasible methods. Furthermore, we recommend conducting a futuristic multicenter and exploratory study to find province-specific awareness.

**Keywords:** testicular torsion, awareness, Saudi, pain, parents, critical time

## Introduction

Scrotal-related problems are relatively common in the emergency unit, comprising a minimum of 0.5% of all emergency cases. Testicular torsion (TT) happens when the testicle rotates and twists the spermatic cord, blocking blood circulation to the testicles.<sup>1,2</sup> TT is a pediatric urologic emergency, and timely diagnosis is essential, as early assessment can help in necessary intervention to prevent the loss of testicles.<sup>3–5</sup> This scenario worsened during the COVID-19 pandemic, as a multicenter study by Pogorelić et al stated that significantly higher pediatric patients presented in the emergency department with late presentation of TT and a higher rate of orchidectomy were done among them.<sup>6</sup> The patients affected by TT commonly present with the symptoms of acute and excruciating pain in

the scrotum, swollen scrotum, fever, vomiting, and abdominal pain.<sup>1,5,7</sup> Even though previous studies have explored several causes for TT, the most common cause is the improper attachment of testicles with the scrotum at birth. Although TT can occur at any age, the incidence rate is comparatively higher among the age group of 1–17 years than in the older age group.<sup>8,9</sup> On assessing the epidemiological factors of TT, Greear GM et al reported that the predicted annual incidence rate of TT was 5.9 per 100,000 males in the age group of 1–17 years, while it was 1.3 per 100,000 males among 18 years and above.<sup>10</sup>

Timely recognition of symptoms of TT by the parent (s) is crucial as they would be the first person whom the children present with the complaints. In a survey conducted in the Riyadh region of Saudi Arabia (KSA) by Alyami et al, the awareness about TT is very low in their study, which means that they should spend more time and invest more in raising awareness to increase knowledge and avoid the consequences of TT. The media, with its diverse tools, would play a significant role in raising awareness because they provide a lot of information that is easy to access for the whole community. On the other hand, awareness campaigns would also give another aspect of the interaction between healthcare providers and the community, resulting in well-informed parents.<sup>11</sup> Another survey conducted among Irish parents by Yap LC et al found that only 56% of the parents were aware of TT. They also found that the parents with an understanding of TT were four times more likely (OR = 4.2,  $p < 0.01$ ) to come to the emergency department immediately in case their child showed symptoms of TT than those who were unaware of TT. Those who responded correctly to the crucial period were three times (OR = 3.0,  $P = 0.08$ ) more probability of coming to the emergency department immediately than those who did not respond correctly.<sup>12</sup> Friedman et al looked at the parent awareness of TT in urology and ear, nose, and throat (ENT) clinics. They found no statistically significant difference in the awareness of TT between the parents in the urology and ENT clinics (34.2 vs 35.6%). In Friedman et al survey, 34% of parents had heard of testicular twisting/torsion, most commonly through friends, relatives, or knowing someone with torsion (35%).<sup>13</sup>

Assessment of parents' awareness of TT is very much essential to plan for necessary awareness-raising campaigns by the policymakers. Hence, the preventable loss of testis due to inadequate awareness can be avoided.<sup>14</sup> However, the authors did not find sufficient published research, especially in the northern regions. Hence, this survey aimed to evaluate the awareness of testicular torsion and its association with the presentation time amongst parents from the Aljouf region, KSA. Furthermore, we assessed their response to potential torsion.

## Materials and Methods

### Study Design and Settings

The present population-based study is a cross-sectional study conducted from December 2022 to March 2023 in the Al Jawf province of KSA. Al Jawf province is located close to Jordan in northern KSA, and the total population of this province is around half a million.

### Sampling Strategy

We measured the minimum required participants for this survey using the WHO sample size calculation formula ( $n = z^2pq/d^2$ ). In this equation, we considered the TT awareness ( $p = 0.19$ ) among the parents as 19% according to Alyami et al,<sup>11</sup>  $q = 1 - 0.19$ ,  $z = 1.96$  at 95% confidence interval, 5% acceptable precision ( $d = 0.05$ ). Additionally, we considered taking 25% to increase the present study's power. Hence, the final estimated sample was 320.

### Participants' Details, Inclusion, and Exclusion Criteria

By applying the consecutive sampling method, we invited the parents who visited public places such as malls, parks, and masjids. In order to include the participants on all days in the week, we will restrict the participants to 50 per day. The present study included all parents (male and female) aged 18 to 49 years, those willing to participate, and those from Al jawf province included study settings. We excluded those parents with a child who already had an episode of TT. Furthermore, this study will exclude non-Aljouf province participants.

## Data Collection Method

Firstly, we obtained the necessary permissions and ethical clearance from the concerned authorities (Jouf University ethical committee approval no: 1-04-44). Our study followed all the ethical consideration that complies with the Declaration of Helsinki. The present study used the data collection proforma prepared by the research team from a focus group discussion of experts from urology and family medicine departments and previously published studies (2, 11). We used the Arabic version of the questionnaire. Initially, we pretested with 30 parents to understand local adaptability and suitability. Furthermore, the Cronbach value for the data collection tool of the data collection tool was 0.79. Firstly, we briefed the TT awareness survey to the selected parents and obtained informed consent. Then, we requested the invited parents to complete the prepared TT awareness assessment proforma in the google form given to the data collectors' own electronic devices. The data collection form inquired about the participants' sociodemographic characteristics, parents' responses to their child's scrotal pain, the major source of information on TT, and the knowledge regarding the critical time to fix the TT-related complaints.

## Data Analysis

We used the statistical pack for social sciences (SPSS, V.23) for data entry, coding, and analysis. We presented the descriptive data as frequency, proportion, and diagrams. We executed binary logistic regression analysis to identify the factors associated with TT awareness (No vs Yes). All the analytical results were interpreted based on a two-tailed test with a significant value ( $p < 0.05$ ).

## Results

Of the 320 studied parents, the majority (37.2%) belonged to the age group of 30 to 40 years (mean  $\pm$  SD = 34.32  $\pm$  9.1), male gender (60.6%), studied university and above (72.2%), and working in the government sector (40.9%) (Table 1).

**Table 1** Background Characteristics of the Parents (n = 320)

Variables	Frequency (n)	Proportion (%)
Age (mean $\pm$ SD)	34.32 $\pm$ 9.1	
Less than 30	108	33.8
30 to 40	119	37.2
More than 40	93	29.0
Gender		
Male	194	60.6
Female	126	39.4
Education status		
Up to high school	89	27.8
University and above	231	72.2
Occupation		
Government	131	40.9
Private	92	28.8
Self-employed/business	60	18.7
Unemployed	37	11.6
Number of children		
2 or less	104	32.5
3 to 4	160	50.0
More than 4	56	17.5

**Table 2** Participants' Response if Their Child Gets Scrotal Pain (n = 320)

Responses	During Working Hours n (%)	During Weekends and Non-Working Hours n (%)
Take him to hospital immediately	232 (72.5)	242 (75.6)
Give him pain medications	26 (8.1)	34 (10.6)
Take him to urology clinic after arranging appointment	40 (12.5)	35 (10.9)
Home remedies such as ice fermentation	22 (6.9)	9 (2.8)

Nearly three-fourths of the participants responded that they would take the baby immediately during working hours (72.5%) and non-working hours (75.6%). However, some parents answered that they would take the baby to a regular urology clinic after arranging an appointment (Table 2).

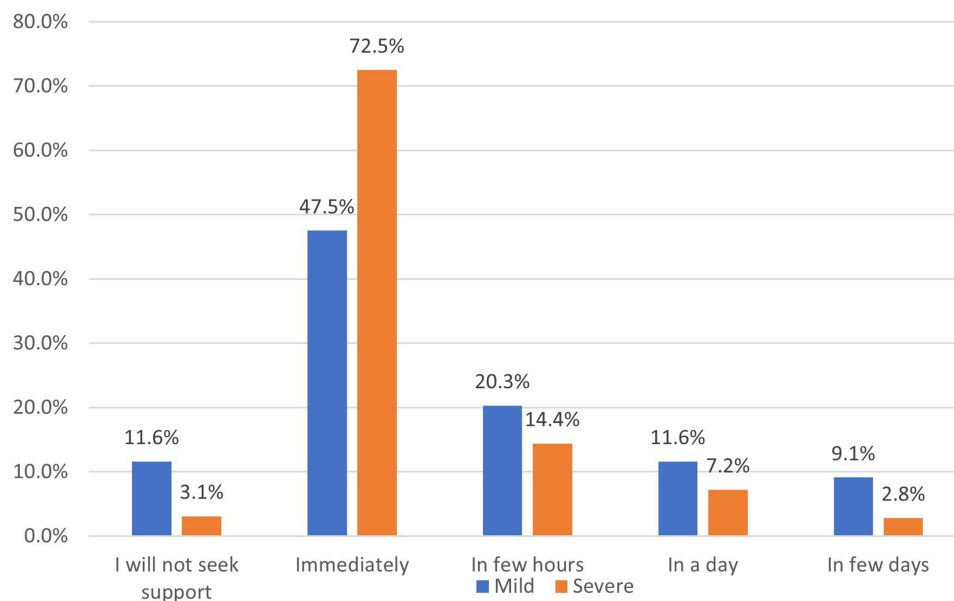
Figure 1 depicts the parents' responses to the child's scrotal pain on taking them to a healthcare facility. Of the responded parents, 47.5% and 72.5% answered that they would immediately take the baby to healthcare facilities for mild and severe scrotal pain, respectively.

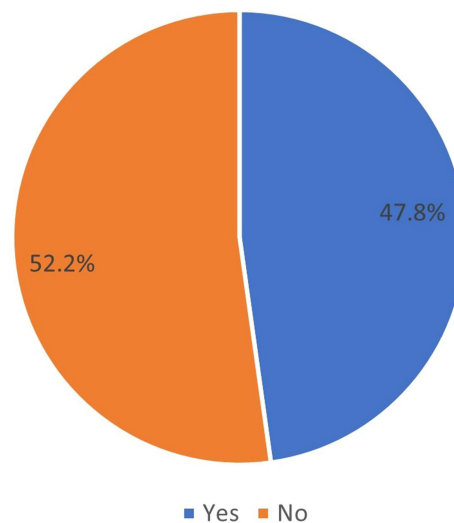
The present study revealed that less than half (47.8%) of participants were aware of the TT condition (Figure 2).

We further inquired about the source of information on TT to the participants who were aware of TT. The major (39.2%) source of information they received about TT was from the ministry of health activities, followed by family and friends (22.9%), and media (15%) (Table 3).

Among the 320 respondents, 27.8% correctly answered that less than 6 hours after developing scrotal pain is the critical time frame to take the child to a healthcare facility to fix the problem (Figure 3).

Parents who were knowledgeable at the critical time had more odds of presenting to a healthcare facility immediately for both mild (OR = 2.77, CI = 1.55–4.03,  $p = 0.001$ ) and severe (OR = 1.92, CI = 1.03–3.63,  $p = 0.032$ ). Similarly, parents who were aware of TT also had higher odds of presenting to a healthcare facility for mild (OR = 2.36, CI = 1.11–3.18,  $p = 0.003$ ) and severe (OR = 3.53, CI = 2.11–4.96,  $p < 0.001$ ) (Table 4).

**Figure 1** Parents' response regarding waiting time for mild and severe testicular pain (n = 320).



**Figure 2** Aware of testicular torsion (TT) among the participants (n = 320).

## Discussion

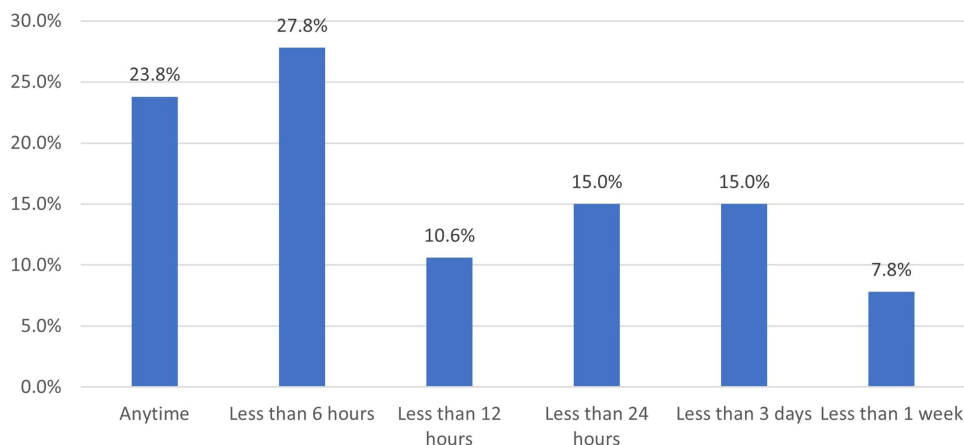
Public health education regarding important health problems is essential for the community. To explore the necessary programs, it is critical to evaluate the current health literacy and awareness of the target population. The present study assessed the parents' awareness to TT and their response to potential torsion. The commonest reason for testicular loss during TT is not seeking emergency attention immediately and promptly.<sup>3,15</sup>

One of the major reasons for not seeking attention immediately could be due to a lack of awareness. The present study reported that less than half (47.8%) of the parents were aware of TT in the Aljouf province. A survey conducted among Irish parents reported a higher proportion (56%) of parents were aware of TT.<sup>12</sup> Similarly, Abelson et al also reported a higher proportion of awareness among their study participants.<sup>16</sup> However, Friedmann et al and Alyami et al reported a lower proportion of awareness among their participants.<sup>11</sup> The variation from our TT awareness survey and other research might be study settings, our study was population-based, and the latter studies were done in hospital settings. These findings emphasize the need for education targeted the parents, as it is a powerful tool. One of the best methods of delivering to the targeted population is through role play and open discussion.<sup>17,18</sup> Interestingly, some Nigerian studies reported that the awareness level of TT and testicular self-examination was poor, even among undergraduate medical students.<sup>19,20</sup>

The right source of health information is critical to impart essential medical knowledge to the general population.<sup>21,22</sup> Non-authenticated health information not only decreases knowledge but also leads to a negative

**Table 3** Major Source of Information Regarding Testicular Torsion (TT) (n = 153)

Source	Frequency (n)	Proportion (%)
Friends and family members	35	22.9
Ministry health activities	60	39.2
School	15	9.8
Media (including social media)	23	15.0
Other sources	20	13.1



**Figure 3** Participants' knowledge regarding critical time to fix the TT (N = 320).

impact on health. Hence, it is crucial to follow the authorized health authorities' information.<sup>22</sup> However, the present study found that only 39.2% responded that the ministry of health, KSA was their major source of information about TT. Similar to the present study, Yap et al found that healthcare workers were the primary source of information related to TT.<sup>12</sup> Interestingly, the general Saudi population considers more credible information for some other information pertaining to health.<sup>21,23</sup> This indicates that concerned healthcare managers to focus on this subject with special consideration to the sociocultural situation.

Testicular viability significantly decreases after 6 hours of TT; hence, this period is crucial to salvaging the twisted testis.<sup>9,24</sup> Nonetheless, the present study findings explored that only 27.8% of the parents were aware of the critical time frame to fix the TT, and those who were aware had significantly higher odds of bringing their children in the event of mild and severe testicular pain. Similar to the present findings, other authors also found poor knowledge among the parents on the critical time frame to bring the children if their children present with scrotal pain.<sup>12,14</sup>

## Strengths and Weakness of the Present Survey

Our study is the first of its kind conducted in the northern KSA that evaluated one of the least explored topics in pediatric urology. However, we assessed parents' awareness of TT through the cross-sectional study. Hence, the readers to consider the constraints of this method, such inability to find the temporal association. Since we used a questionnaire-based survey, we may consider biases related to recall and self-reported. Finally, the present survey findings may not reflect parents' awareness of TT in other regions of KSA.

**Table 4** Correlation Between Parents' Awareness with the TT, Critical Time (CT) Span, and Presentation at Healthcare Facilities

	Mild Pain: Odds Ratio (OR)/95% Confidence Interval (CI)	p-value	Severe Pain: OR (95% CI)	p-value
Knowledge on CT span – Present immediately	2.77 (1.55–4.03)	0.001	1.92 (1.03–3.63)	0.032
Knowledge on CT span – Present within a few hours	3.81 (1.94–6.37)	<0.001	1.89 (1.37–3.03)	0.007
Aware of TT – Present immediately	2.36 (1.11–3.18)	0.003	3.53 (2.11–4.96)	<0.001
Aware of TT – Present within a few hours	1.91 (1.38–2.73)	0.001	2.54 (0.81–3.59)	0.001

## Conclusion

We found a lack of awareness of TT among Saudi parents. We also found that knowledgeable parents had higher odds of presenting to the healthcare facility immediately in the event that the child develops mild or severe testicular pain. It is suggested to improve the knowledge among them through awareness-raising campaigns by the concerned health authorities through feasible methods. Furthermore, we recommend conducting a futuristic multicenter and exploratory study to find province-specific awareness.

## Acknowledgments

The authors want to thank the parents who participated in the present survey. Furthermore, we extend our sincere thanks to the scientific committee of the college of medicine, Jouf university for their immense help for the research.

## Disclosure

The authors report no conflicts of interest in this work.

## References

1. Laher A, Ragavan S, Mehta P, Adam A. Testicular torsion in the emergency room: a review of detection and management strategies. *Open Access Emerg Med.* 2020;12:237–246. doi:10.2147/oaem.S236767
2. Schick MA, Sternard BT. Testicular torsion; 2017.
3. Kumar V, Matai P, Prabhu SP, Sundeept PT. Testicular loss in children due to incorrect early diagnosis of torsion. *Clin Pediatr.* 2020;59(4–5):436–438. doi:10.1177/0009922820903037
4. Patoulias D, Farmakis K, Kalogirou M, Patoulias I. Transient testicular torsion: from early diagnosis to appropriate therapeutic intervention (a prospective clinical study). *Folia Med Cracov.* 2017;57(2):53–62.
5. Sharp VJ, Kieran K, Arlen AM. Testicular torsion: diagnosis, evaluation, and management. *Am Fam Physician.* 2013;88(12):835–840.
6. Pogorelič Z, Milanović K, Veršič AB, et al. Is there an increased incidence of orchietomy in pediatric patients with acute testicular torsion during COVID-19 pandemic? A retrospective multicenter study. *J Pediatr Urol.* 2021;17(4):479.e1–479.e6. doi:10.1016/j.jpuro.2021.04.017
7. Keays M, Rosenberg H. Testicular torsion. *Cmaj.* 2019;191(28):E792. doi:10.1503/cmaj.190158
8. Smith T, Gross CL, Ryan M, Hwang CW. A rare case of bilateral testicular torsion in a 57-year-old man. *J Am Coll Emerg Physicians Open.* 2021;2(5):e12545. doi:10.1002/emp2.12545
9. Obi AO, Okeke CJ, Ugwuide EI. Acute testicular torsion: a critical analysis of presentation, management and outcome in southeast Nigeria. *Niger J Clin Pract.* 2020;23(11):1536–1541. doi:10.4103/njcp.njcp\_188\_20
10. Greear GM, Romano MF, Katz MH, Munarriz R, Rague JT. Testicular torsion: epidemiological risk factors for orchietomy in pediatric and adult patients. *Int J Impot Res.* 2021;33(2):184–190. doi:10.1038/s41443-020-0331-8
11. Alyami FA, Modahi NH, Alharbi AM, et al. Parents' awareness and knowledge of testicular torsion: a cross-sectional study. *Urol Ann.* 2019;11(1):58–61. doi:10.4103/ua.Ua\_62\_18
12. Yap LC, Keenan R, Khan J, et al. Parental awareness of testicular torsion amongst Irish parents. *World J Urol.* 2018;36(9):1485–1488. doi:10.1007/s00345-018-2269-8
13. Friedman AA, Ahmed H, Gitlin JS, Palmer LS. Standardized education and parental awareness are lacking for testicular torsion. *J Pediatr Urol.* 2016;12(3):166.e1–166.e8. doi:10.1016/j.jpuro.2016.01.008
14. Green C, Stubbs V, Green JS. Public health education initiatives for testicular torsion. *Trends Urol Men's Health.* 2020;11(6):14–16. doi:10.1002/tre.775
15. Dunne PJ, O'Loughlin BS. Testicular torsion: time is the enemy. *Aust N Z J Surg.* 2000;70(6):441–442. doi:10.1046/j.1440-1622.2000.01853.x
16. Abelson B, Mason K, Adams C, et al. MP11-17 improving awareness of testicular torsion among boys, their parents and school nurses to decrease delays in care for acute testicular pain. *J Urol.* 2022;207(Supplement 5):e163. doi:10.1097/JU.0000000000002533.17
17. Ryszawy J, Kowalik M, Wojnarowicz J, et al. Awareness of testicular cancer among adult Polish men and their tendency for prophylactic self-examination: conclusions from November 2020 event. *BMC Urol.* 2022;22(1):149. doi:10.1186/s12894-022-01098-1
18. Pietrzyk Ł, Denisow-Pietrzyk M, Czezelewski M, Ślizień-kuczapski K, Torres K. Cancer education matters: a report on testicular cancer knowledge, awareness, and self-examination practice among young Polish men. *Sci Rep.* 2020;10(1):20684. doi:10.1038/s41598-020-77734-3
19. Ibitoye BM, Suleiman EK, Ampofo AG. The awareness and practice of testicular self-examination among male undergraduates in Nigeria: a descriptive cross-sectional study. *BMC Med Educ.* 2022;22(1):495. doi:10.1186/s12909-022-03562-w
20. Obafemi SJ. Awareness and sources of information relating to testicular self-examination and torsion among male undergraduates in a Nigerian University. *Int J Med Med Sci.* 2014;1:143–150.
21. Alduraywish SA, Altamimi LA, Aldhuwayhi RA, et al. Sources of health information and their impacts on medical knowledge perception among the Saudi Arabian Population: cross-sectional study. *J Med Internet Res.* 2020;22(3):e14414. doi:10.2196/14414
22. Kington RS, Arnesen S, Chou W-YS, Curry SJ, Lazer D, Villarruel AM. Identifying credible sources of health information in social media: principles and attributes. *NAM Perspect.* 2021;2021. doi:10.31478/202107a
23. Young Y, Alharthy A, Hosler AS. Transformation of Saudi Arabia's health system and its impact on population health: what can the USA learn? *Saudi J Med Med Sci.* 2021;1(3):93–102. doi:10.1159/000517488
24. Mellick LB, Sinex JE, Gibson RW, Mears K. A systematic review of testicle survival time after a torsion event. *Pediatr Emerg Care.* 2019;35(12):821–825. doi:10.1097/pec.0000000000001287

Patient Preference and Adherence

Dovepress

### Publish your work in this journal

Patient Preference and Adherence is an international, peer-reviewed, open access journal that focusing on the growing importance of patient preference and adherence throughout the therapeutic continuum. Patient satisfaction, acceptability, quality of life, compliance, persistence and their role in developing new therapeutic modalities and compounds to optimize clinical outcomes for existing disease states are major areas of interest for the journal. This journal has been accepted for indexing on PubMed Central. The manuscript management system is completely online and includes a very quick and fair peer-review system, which is all easy to use. Visit <http://www.dovepress.com/testimonials.php> to read real quotes from published authors.

Submit your manuscript here: <https://www.dovepress.com/patient-preference-and-adherence-journal>