

Assessing Acute Diarrhea Awareness among Syrian Private University Medical Students in Syria: A Cross-Sectional Study

Lamaat Youzbahshi (✉ Lam3atyouz8@gmail.com)

syrian private university

Ahmad Ayash

syrian private university

Nizar Daher

syrian private university

Research Article

Keywords:

Posted Date: March 1st, 2022

DOI: <https://doi.org/10.21203/rs.3.rs-1404547/v1>

License:   This work is licensed under a Creative Commons Attribution 4.0 International License.

[Read Full License](#)

Abstract

Introduction:

Dehydration caused by diarrhea is one of the top ten leading causes of death worldwide and is of particular concern in children under five years of age. Most cases of acute diarrhea in adults are caused by infections and are often self-limiting in adults. Although diarrheal disease is very common, there is still a lack of knowledge about its causes and treatment. Food poisoning is an urgent concern that may threaten life and affect health but still underestimated.

This study aims to assess awareness and knowledge about acute diarrhea, its causes, and symptoms and how to manage it in students of the Syrian private university.

Methods:

A cross-sectional study was conducted among students of the Syrian private university using a self-managed statement. The questionnaire consists of six sections: socio-demographic characteristics, definition of diarrhea, its Types, Causes, Symptoms, measure.

T test and one way anova test were used to study the relationship between the average degree of awareness and the socio-demographic information of participants.

Results:

This study included 415 students of medical specialties at the Syrian Private University, of which 244 students (85.8%) ranged in age from 17 to 28 years and the average age was 21. The largest percentage of participating students is from the Faculty of human medicine (190) followed by the Faculty of Dentistry (113) followed by the Faculty of Pharmacy (112). 298 respondents had previously received information on diarrhea. Students' awareness and management scores on acute diarrhea ranged from 0 to 32 with an average score of 20.6. We found a correlation between the average scores of consciousness and the ages of the students. A correlation was found between the average scores of consciousness among medicine students, then [pharmacy](#) students, and then dental students.

Average awareness scores were higher in students who were married, then engaged, and then single. Average awareness scores are also higher in students who have previously received information about acute diarrhea and its management.

Conclusion:

More details have been identified regarding awareness and knowledge about acute diarrhea among students of the Syrian private university, including the implementation of large-scale awareness campaigns and emphasis on the importance of not indiscriminate use of antibiotics, and adequate fluid replacement in patients with acute diarrhea. Additional studies are needed to assess knowledge and awareness about acute diarrhea and its management.

Introduction:

Diarrheal disease is one of the ten leading causes of death worldwide and is of particular concern in children under five years of age in resource-limited settings [1]. Among adults in resource-rich environments, diarrhea is often a "disruptive illness" in a healthy individual.

Most cases of acute diarrhea in adults are of infectious origin, and most cases resolve with symptomatic treatment alone.

Diarrhea definition:

We say of a person that they have had diarrhea when the usual number of defecations has increased or the consistency of stool has changed to a liquid consistency within the last 24 hours [4] reflects the increased water content in the stool, whether due to poor water absorption and/or active water secretion from the intestine.

There are three types of diarrhea:

1. A. Acute diarrhea: diarrhea lasting less than two weeks.
2. B. Persistent diarrhea: lasts from 2–4 weeks.
3. C. Chronic diarrhea: lasting more than 4 weeks.

Indications for selective stool transplantation:

For most patients who do not have severe disease or high-risk comorbidities, it is preferable to continue laboratory management for several days without fecal microbiological testing.

We perform stool tests in patients with community-acquired acute diarrhea if they have: [2, 3, 7]

■ Severe illness:

1. A. Profuse watery diarrhea with signs of hypovolemia.
2. B. Passing stools more than 6 times in 24 hours.
3. C. Severe abdominal pain.
4. D. The need for hospitalization.

■ Other signs or symptoms related to inflammatory diarrhea:

1. A. Bloody diarrhea.
2. B. Passage of many small sized stools containing blood and mucus.
3. C. Temperature – 38.5.

We usually perform stool culture for microbiological stool testing, which can identify the most common bacterial causes of diarrhea.[2, 8, 9]

Routine stool cultures are of little value in patients who develop diarrhea after hospitalization for 72 hours or longer.[10] A C. difficile test is likely to be helpful. [11

Fecal transplant:

1. A sample of diarrheal stool is taken, and it must be inoculated onto culture plates as soon as possible. A routine stool culture will identify Salmonella, Campylobacter, and Shigella, the three most common causes of bacterial diarrhea in the United States.
2. Escherichia coli O157:H7 can be isolated on sorbitol-McConkey plates or identified with an antigen test or fecal polymerase chain reaction.
3. A stool culture sample positive for one of these pathogens in a patient with symptoms of acute diarrhea can be interpreted as true positive.
4. If a stool sample cannot be obtained immediately, a culture sample can be obtained through a rectal swab to expedite diagnosis [12], although some data suggest reduced sensitivity in adults. [13, 14]
5. Special media or methods may be required to isolate or identify organisms of interest (eg Campylobacter jejuni or Yersinia)[15, 17]
6. Germs continue to be excreted in the stool continuously, unlike eggs and parasites, which are often eliminated intermittently. Thus, a negative bacterial culture result is usually not a false negative, and repeat sampling is rarely required.bloody diarrhea:

Additional testing should be performed in patients with bloody diarrhea caused by Shigella or Shiga toxin-producing Escherichia coli, which warrant additional testing. In addition to culture, we check bloody stool for Shiga toxin and, if available, fecal leukocytes or lactoferrin;[20, 22] if the fecal leukocyte/lactoferrin test is negative, dysentery should be investigated. The possibility of non-infectious mechanisms may also warrant further evaluation.

Research Justifications And Objectives:

Diarrhea is a common disease, despite its importance, and despite the existence of previous studies that focused on assessing awareness among parents and health care providers, there are no studies that assess general awareness among university students from medical specialties, so our study aims to:

Assessing the degree of awareness of acute diarrhea among medical students at the Syrian Private University.

Assessment of the effect of demographic characteristics on the degree of awareness and knowledge about acute diarrhea (sex, age, specialization and academic year).

Identification of factors that may have an impact on the degree of awareness (economic, social and cultural status).

Methods:

Study preparation, participants

This cross-sectional study was conducted online in December 2021 using an appropriate sampling pattern among students of the Syrian Private University in Damascus. Students were asked to participate voluntarily, and written informed consent was obtained from all participants. They were informed that all of their responses were anonymously recorded, that responding to all questions was not mandatory, and that they were allowed to opt out of the survey at any time. The inclusion criteria included students studying at the Syrian Private University, 17 years and over. The objectives of the study were explained to the students in written form attached to the questionnaire. The sample size 357 was calculated based on a 5% margin of error and a 95% confidence factor, for a population of 5,000 students using the sample size calculator. The hypothesis of the research is that the degree of awareness about acute diarrhea among medical students is highly correlated with socio-demographic factors. Ethical approval was obtained from the Institutional Review Board (IRB, Faculty of Human Medicine, Syrian Private University).

Study tools

A self-administered and self-filled questionnaire in Arabic was used for students of the Syrian Private University from medical colleges regarding awareness and management of acute diarrhea. This survey was adopted from previously published studies [1]. Reliability was evaluated by Cronbach's alpha test at 0.815. The questionnaire consists of two parts:

1. A) Socio-demographic information included twelve questions about age, gender, college, school year, place of residence, marital status, financial status, number of family members, educational level of the mother and father and whether the student had previously received information about diarrhoea.
2. B) Questions about awareness of diarrhea: definition of diarrhea, types, causes, symptoms, treatment.

Statistical study:

The statistical study was conducted using SPSS software. The demographic characteristics were described, and the sample distribution was described according to the study variables that measure students' awareness of acute diarrhea and its measures.

The averages of the independent groups were also compared using parametric tests (T-Test Independent Samples, One way ANOVA) with the homogeneity test to compare group variance and dimensional comparisons using LSD and Games-Howell.

The Chi-Square independence test was also used to test the independence of qualitative variables, and the correlation test according to Kramer's coefficient was used to study the relationship between qualitative variables and Spearman's coefficient to study the relationship between quantitative variables.

Results:

The study included 415 medical students from the Syrian Private University. Below we review some characteristics of the sample according to demographic variables and study variables that measure students' awareness about acute diarrhea (its causes, symptoms and measures).

The sample is distributed according to demographic characteristics

More than half of the sample is female, with a percentage of 58.8% of the sample, compared to 41.2% of males.

The largest percentage of students are single, with a percentage of 83.4% of the sample, while those who are related are 12%, and only 4.6% of the sample are married.

We note that the largest group of the sample had a good economic level, i.e., sufficient to secure basic needs with some luxuries, and their percentage was 62.2% of the sample, followed by students whose economic level was excellent that ensures comfort and well-being for them, and their percentage was 22.4%, then students whose economic level is average enough to secure basic needs only and their percentage 14.7% of the sample. As for students whose economic level is low and not sufficient to secure the basic needs of the family, their percentage is 0.7% of the sample.

Some statistical indicators for the ages of students

Patients' ages ranged between 17 and 28 years with a mean of 21.92 years, with most of the ages deviating from the mean by $2.249 \pm$ years.

The sample is distributed according to the characteristics of the students' families

The largest percentage of fathers were university graduates with a percentage of 62.7%, followed by those who had studied up to secondary school at 17.6%, then those who could read and write at a rate of 12.3%, then those who had attended an institute and their percentage by 7.5%.

The largest percentage of mothers are university students, and their percentage is 45.5%, followed by those who have studied until high school with a percentage of 27%, then those who are able to read and write at a rate of 17.3%, and then those who have studied an institute with a rate of 10.1%.

The largest percentage of students has more than six members in their family, 28.9% of the sample, followed by six members of their family, 24.3%, followed by five members of their family, 23.9%, followed by four members of their family, 14.5. Then there are three members of their family, and their percentage is 8.4% of the sample. 74.7% of the students have a member of their family working in the medical field, compared to 52.73% of them who do not have a family member working in the medical field.

The sample is distributed according to the specialization and academic year of the students

The largest proportion of the sample are human medicine students, representing 45.8% of the sample, while dentistry students constituted 27.2% of the sample, and pharmacy students represented 27% of the sample.

The percentage of first-year students from all disciplines was 11.6% of the sample, as well as sixth-year students, while the percentage of second-year students was 15.4%, and the percentage of third-year students was 17.1%, and in the fourth year they were 13.7%, and in the fifth year they accounted for 30.6%, which is the largest percentage of the sample.

Distribution of the sample according to the answers about acute diarrhea

Frequencies and percentages were calculated for both students who had previously received information on diarrhea and those who had not. Frequencies and percentages of students were also calculated according to their definition of acute diarrhea and the following tables show the results.

We note that more than two thirds of the students had previously received information about diarrhea, and their percentage was 71.8% of the sample. As for the students who had never received any information about diarrhea, their percentage was 28.2% of the sample.

We note that only about a third of the sample answered correctly about the definition of acute diarrhea, as 34.2% of the sample defined acute diarrhea as diarrhea lasting less than two weeks, compared to 65.8% who answered incorrectly, distributed to 45.1% of the sample who defined it as diarrhea lasting less than a week. And 20.7% defined it as diarrhea lasting less than two days.

The sample is distributed according to the answers about the symptoms and signs of acute diarrhea

Frequencies and percentages of students' answers about the signs of acute diarrhea, which are an increase in the number of defecations, laziness and paresthesia in the intestines, a change in stool consistency (loose, watery), accompanied by mucus, bloody, fatty, flatulence, were calculated.

1. 90.4% of the students answered that an increase in the number of defecations is a symptom of acute diarrhea, meaning that most of the students answered correctly, while 2.7% of them answered no and 7% were unaware of it.
2. 46.1% of the students answered that laziness and intestinal paresis are not symptoms of acute diarrhea, meaning that the largest proportion of the sample answered correctly, compared to 33.2% of them answered yes and 20.7% were unaware of that.

The largest percentage of the students answered that the change in stool consistency is one of the symptoms of acute diarrhea, reaching 91.2%. Therefore, most of the students answered correctly, compared to 2.9% of them who answered no and 5.9% were unaware of that.

1. 67.6% of the students answered that the stool in acute diarrhea may be associated with mucus, meaning that nearly two-thirds of the sample answered correctly, compared to 11.2% of them

answered no and 21.2% were unaware of this.

2. 62.2% of the students answered that acute diarrhea may be bloody, meaning that the largest percentage of them answered correctly, compared to 17.3% of them answered no and 20.5% were unaware of that.
3. 57.1% of the students answered that the stool in acute diarrhea may be greasy, meaning that more than half of the sample answered correctly, compared to 16.3% of them answered no and 26.6% were unaware of this.
4. 49.3% of the students answered that flatulence is a symptom of acute diarrhea, meaning that the largest proportion of the students answered correctly, compared to 30.5% of them answered no and 20.2% were unaware of that.

- 90.8% of the students answered that the abdominal pain is associated with acute diarrhea, meaning that most of the sample of the students answered correctly, compared to only 3.1% who answered no and 6% of the students were unaware of this.

- 44.6% of the students answered that vomiting is associated with acute diarrhea, meaning that the largest percentage of them answered correctly, compared to 31.1% of them answered no and 24.3% were unaware of that.

- 34% of the students answered that the headache is not associated with acute diarrhea, which is the group of students who answered correctly, compared to 38.3% of them who answered yes and 27.7% were unaware of that.

- 66.7% of the students answered that the higher

The appropriate timing is immediately after diarrhea, 27.1% of the students found that the appropriate timing is within 24 hours of the start of diarrhea, and 34.9% of them found that the antibiotic treatment is when the diarrhea is bloody.

- 91.3% of the students answered that water is one of the fluids used to correct dehydration and replace fluids orally, meaning that most of the students answered correctly, compared to 4.1% who answered no and 4.6% of them were unaware of this.

- 74% of the students answered that fruit juice is one of the liquids used to correct dehydration and replace fluids orally, meaning that the largest percentage of the students answered correctly, compared to 16.9% who answered no and 9.2% of them were unaware of this.

- - Only 14% of the students answered that soft drinks are one of the liquids used to correct dehydration and replace fluids orally, and they answered correctly, compared to 76.9% who answered no, meaning that more than three quarters of the sample had answered incorrectly, and 9.2% of them did not. aware of that.

- - Only 5.3% of the students answered that energy drinks are one of the liquids used to correct dehydration and rehydration orally, and they answered correctly, compared to 85.1% who answered no, meaning that most of the students answered incorrectly, and 9.6% of them were unaware of that.
- 65.1% of the students answered that tea and herbal drinks are among the fluids used to correct dehydration and replace oral fluids, meaning that the largest percentage of students answered correctly, compared to 21.2% who answered no and 13.7% of them were unaware of this.
- 52.8% of the students answered that milk is not one of the fluids used to correct dehydration and replace oral fluids, meaning that more than half of the sample answered correctly, compared to 21.4% who answered yes and 25.8% of them were unaware of this.

Students' awareness levels

Students' awareness of acute diarrhea and its management ranged from 0 to 32 with a mean of 20.6, but most of the scores could deviate from the mean by ± 4.96 .

Studying the relationship between degrees of awareness and some study variables:

Examining the relationship between students' levels of awareness and their ages:

We note that there is a statistically significant correlation between the age of the student and the degree of awareness about acute diarrhea and its management.

Testing the differences in the average degrees of awareness between the groups

By gender:

We note that the probability value of the homogeneity test is $P\text{-value} > 0.05$ and therefore we accept the null hypothesis that says that the groups of males and females are homogeneous, and therefore we take the probability value in the first line to test the difference and note that $P\text{-value} > 0.05$ and therefore we accept the null hypothesis which says that the degree of awareness of the students There is no difference between males and females, meaning there is no real difference between them.

The degree of awareness of students does not differ between males and females, meaning there is no real difference between them.

By university major:

We note that there is a statistically significant difference in the average degrees of awareness between students of human medicine and both dentistry and pharmacy, considering the values of $P\text{-value} < 0.05$, as it was higher among human medicine students, followed by pharmacy students and then dental students.

By school year:

We note that there is a statistically significant difference in the average degrees of awareness between students of the sixth year and all other school years considering $P\text{-value} < 0.05$. There is also a difference between students of the first year and other academic years except for the second year, and between students of the fifth and second year in addition to the first, where The average degree of awareness increases with the increase in the school year.

By social status:

We note that there is a statistically significant difference in the average degrees of awareness between single students and both related and married students considering $P\text{-value} < 0.05$, as the average degree of awareness was higher among married students, followed by those who are related and then single.

By economic level:

We note that the value of $P\text{-value} > 0.05$ and therefore we accept the null hypothesis that says that the average degrees of awareness do not differ between students of different economic levels, that is, there is no real difference between them:

According to the educational level of the mother:

We note that the value of $P\text{-value} > 0.05$ and therefore we accept the null hypothesis that the average degrees of awareness do not differ according to the educational level of the students' parents, that is, there is no real difference between them.

According to the educational level of the father:

We note that the value of $P\text{-value} > 0.05$ and therefore we accept the null hypothesis that the average degrees of awareness do not differ according to the educational level of the students' parents, that is, there is no real difference between them.

According to the presence of a family member working in the medical field:

We note that the probability value of the homogeneity test is $P\text{-value} > 0.05$ and therefore we accept the null hypothesis that says that the two studied groups are homogeneous, and therefore we take the probability value in the first line to test the difference and note that $P\text{-value} > 0.05$ and therefore we accept the null hypothesis which says that the degree of awareness of the students is not It differs between students for whom there is a member of their family working in the medical field and those who have no family member working in the medical field, meaning there is no real difference between them.

According to previous information on diarrhea:

We note that the $P\text{-value} < 0.05$ and therefore reject the null hypothesis that the students' awareness degree does not differ between the two groups, meaning there is a real difference between them, as the

average degrees of awareness were among the students who had previously received information about acute diarrhea and its measures.

Discussion:

The results of this study revealed the degree of awareness about acute diarrhea and its relationship with demographic and social factors.

The students answered a set of questions related to knowledge and awareness about acute diarrhea, where (90%) of the students reported that diarrhea is associated with an increase in the number of defecation times, while the American study [57] showed that only (40%) answered that diarrhea is associated with An increase in the number of defecations.

(91%) of the students answered that diarrhea is associated with loose stools, which is similar to the results of the American study where (90%) of the participants said that diarrhea is associated with loose stools.

Our results indicated that (73%) answered that acute diarrhea is due to an infectious cause, which is less compared to a study from America (82%). [57]

With regard to foods that cause diarrhea, all the percentages of correct answers we had were lower than the percentages of correct answers in the Canadian study [56], for example:

(36.6%) answered correctly that the salad may cause diarrhea and it was less than the result of the Canada study which showed that (85.6%) of the students that the salad may cause diarrhea

While (34.2%) answered that barley drink does not cause diarrhea, compared to (82.7%) of the participants answered that barley drink does not cause diarrhea in the American study.

1. (67.7%) of the students answered that eating cooked meat does not cause diarrhea compared to (83.7%) of the participants in the Canadian study.
2. (51.3%) answered that eating corn and popcorn does not cause diarrhea, while (88.5%) of the participants in the Canadian study answered correctly.
3. (22.7%) of the students answered correctly that ice cubes may cause diarrhea, while (47.1%) of the participants in the Canadian study knew the correct answer.

When studying the relationship between the average degree of awareness among students and demographic and social information, it showed a direct relationship between age and the increase in the level of awareness, but it contradicts the American study and Ross' study, which did not find a correlation between the level of awareness and age.

Our results revealed a statistically significant relationship between the level of awareness about acute diarrhea and the educational level of the participants, similar to studies in America, Saudi Arabia and

Thailand. [57–60]

Our results showed a statistically significant relationship between the level of awareness about acute diarrhea and receiving previous information about diarrhea, which was agreed with by other studies such as the American study, the study in Saudi Arabia, and the study in Thailand.

Study Limitations:

Like any study, there are some limitations that must be included. The results of this study are limited to a sample of students from only one university, which may not be representative of all university students in Syria. In addition, students who join the special education unit usually have high social and economic standards; Therefore, collecting samples from different universities may provide a more comprehensive picture of Syrian university students with their different economic statuses. Neither the cross-sectional study design nor the age range limitation allow for a true conclusion of the amount of consciousness to be drawn.

Conclusion:

Awareness campaigns should be increased to increase knowledge and awareness about acute diarrhea by spreading the distribution of brochures and publishing advertisements that would raise awareness among students, parents and health care providers, especially regarding food poisoning and foods that cause infectious diarrhea. Apply the required diet and know how to properly replace fluids without delay.

Attention to the use of antibiotics during acute diarrhea without consulting a doctor. Conducting a study that includes samples from different universities that may provide a more comprehensive picture of Syrian university students with their different economic statuses.

Declarations

Ethics approval and consent to participate:

This study was approved by the Institutional Review Board (IRB) at Syrian Private University. Written consent was obtained from all participants. Participation in the study was voluntary and participants were assured that there would be no victimization of anyone who did not want to participate or who decided to withdraw after giving consent.

Consent for publication:

Not applicable.

Availability of data and materials:

All data related to this paper's conclusion are available and stored by the authors. All data are available from the corresponding author on reasonable request.

Competing interests:

None of the authors have any competing interests. The authors alone are responsible for the content and writing of the article. No conflict of interest is declared.

Funding:

This research received no specific grant from SPU or any other funding agency in the public, commercial or non-profit sectors.

References

1. GBD 2016 Diarrhoeal Disease Collaborators. Estimates of the global, regional, and national morbidity, mortality, and aetiologies of diarrhoea in 195 countries: a systematic analysis for the Global Burden of Disease Study 2016. *Lancet Infect Dis* 2018; 18:1211.
2. Shane AL, Mody RK, Crump JA, et al. 2017 Infectious Diseases Society of America Clinical Practice Guidelines for the Diagnosis and Management of Infectious Diarrhea. *Clin Infect Dis* 2017; 65:e45.
3. Riddle MS, DuPont HL, Connor BA. ACG Clinical Guideline: Diagnosis, Treatment, and Prevention of Acute Diarrheal Infections in Adults. *Am J Gastroenterol* 2016; 111:602.
4. Guerrant RL, Van Gilder T, Steiner TS, et al. Practice guidelines for the

management of infectious diarrhea. *Clin Infect Dis* 2001; 32:331.

5. Dryden MS, Gabb RJ, Wright SK. Empirical treatment of severe acute community-acquired gastroenteritis with ciprofloxacin. *Clin Infect Dis* 1996; 22:1019.

6. Wanke CA. Small intestinal infections. *Curr Opin Gastroenterol* 1994; 10:59.

7. Thielman NM, Guerrant RL. Clinical practice. Acute infectious diarrhea. *N Engl J Med* 2004; 350:38.

8. Koplan JP, Fineberg HV, Ferraro MJ, Rosenberg ML. Value of stool cultures. *Lancet* 1980; 2:413.

9. Bresee JS, Marcus R, Venezia RA, et al. The etiology of severe acute gastroenteritis among adults visiting emergency departments in the United States. *J Infect Dis* 2012; 205:1374.

10. Rohner P, Pittet D, Pepey B, et al. Etiological agents of infectious diarrhea: implications for requests for microbial culture. *J Clin Microbiol* 1997; 35:1427.

11. Savola KL, Baron EJ, Tompkins LS, Passaro DJ. Fecal leukocyte stain has diagnostic value for outpatients but not inpatients. *J Clin Microbiol* 2001; 39:266.

12. Jean S, Yarbrough ML, Anderson NW, Burnham CA. Culture of Rectal Swab Specimens for Enteric Bacterial Pathogens Decreases Time to Test Result While Preserving Assay Sensitivity Compared to Bulk Fecal Specimens. *J Clin Microbiol* 2019; 57.

13. Kotar T, Pirš M, Steyer A, et al. Evaluation of rectal swab use for the determination of enteric pathogens: a prospective study of diarrhoea in adults.

Clin Microbiol Infect 2019; 25:733.

14. Kotton CN, Lankowski AJ, Hohmann EL. Comparison of rectal swabs with fecal cultures for detection of *Salmonella typhimurium* in adult volunteers.

Diagn Microbiol Infect Dis 2006; 56:123.

15. Guerrant RL, Shields DS, Thorson SM, et al. Evaluation and diagnosis of acute infectious diarrhea. Am J Med 1985; 78:91.

16. DeGirolami PC, Ezratty CR, Desai G, et al. Diagnosis of intestinal microsporidiosis by examination of stool and duodenal aspirate with Weber's modified trichrome and Uvitex 2B strains. J Clin Microbiol 1995; 33:805.

17. Hart AS, Ridinger MT, Soundarajan R, et al. Novel organism associated with chronic diarrhoea in AIDS. Lancet 1990; 335:169.

18. Axelrad JE, Freedberg DE, Whittier S, et al. Impact of Gastrointestinal Panel Implementation on Health Care Utilization and Outcomes. J Clin Microbiol 2019; 57.

19. Binnicker MJ. Multiplex Molecular Panels for Diagnosis of Gastrointestinal Infection: Performance, Result Interpretation, and Cost-Effectiveness. J Clin Microbiol 2015; 53:3723.

20. Chitkara YK, McCasland KA, Kenefic L. Development and implementation of cost-effective guidelines in the laboratory investigation of diarrhea in a community hospital. Arch Intern Med 1996; 156:1445.

21. Huicho L, Sanchez D, Contreras M, et al. Occult blood and fecal leukocytes as screening tests in childhood infectious diarrhea: an old problem revisited. Pediatr Infect Dis J 1993; 12:474.

22. Herbert ME. Medical myth: Measuring white blood cells in the stools is useful

in the management of acute diarrhea. *West J Med* 2000; 172:414.

23. Kane SV, Sandborn WJ, Rufo PA, et al. Fecal lactoferrin is a sensitive and specific marker in identifying intestinal inflammation. *Am J Gastroenterol* 2003; 98:1309.
24. Siegel DL, Edelstein PH, Nachamkin I. Inappropriate testing for diarrheal diseases in the hospital. *JAMA* 1990; 263:979.
25. Aisenberg GM, Grimes RM. Computed tomography in patients with abdominal pain and diarrhoea: does the benefit outweigh the drawbacks? *Intern Med J* 2013; 43:1141.
26. Guerri S, Danti G, Frezzetti G, et al. Clostridium difficile colitis: CT findings and differential diagnosis. *Radiol Med* 2019; 124:1185.
27. Avery ME, Snyder JD. Oral therapy for acute diarrhea. The underused simple solution. *N Engl J Med* 1990; 323:891.
28. Carpenter CC, Greenough WB, Pierce NF. Oral-rehydration therapy—the role of polymeric substrates. *N Engl J Med* 1988; 319:1346.
29. Santosham M, Burns B, Nadkarni V, et al. Oral rehydration therapy for acute diarrhea in ambulatory children in the United States: a double-blind comparison of four different solutions. *Pediatrics* 1985; 76:159.
30. Duggan C, Santosham M, Glass RI. The management of acute diarrhea in children: oral rehydration, maintenance, and nutritional therapy. Centers for Disease Control and Prevention. *MMWR Recomm Rep* 1992; 41:1.
31. de Zoysa I, Kirkwood B, Feachem R, Lindsay-Smith E. Preparation of sugar-salt solutions. *Trans R Soc Trop Med Hyg* 1984; 78:260.
32. Wiström J, Jertborn M, Ekwall E, et al. Empiric treatment of acute diarrheal

disease with norfloxacin. A randomized, placebo-controlled study. Swedish

Study Group. *Ann Intern Med* 1992; 117:202.

33. Bennish ML, Salam MA, Haider R, Barza M. Therapy for shigellosis. II.

Randomized, double-blind comparison of ciprofloxacin and ampicillin. *J*

Infect Dis 1990; 162:711.

34. Khan WA, Seas C, Dhar U, et al. Treatment of shigellosis: V. Comparison of

azithromycin and ciprofloxacin. A double-blind, randomized, controlled trial.

Ann Intern Med 1997; 126:697.

35. Wong CS, Jelacic S, Habeeb RL, et al. The risk of the hemolytic-uremic

syndrome after antibiotic treatment of *Escherichia coli* O157:H7 infections. *N*

Engl J Med 2000; 342:1930.

36. Mattila L, Peltola H, Siitonen A, et al. Short-term treatment of traveler's

diarrhea with norfloxacin: a double-blind, placebo-controlled study during two

seasons. *Clin Infect Dis* 1993; 17:779.

37. Salam I, Katelaris P, Leigh-Smith S, Farthing MJ. Randomised trial of single-

dose ciprofloxacin for travellers' diarrhoea. *Lancet* 1994; 344:1537.

38. Taylor DN, Sanchez JL, Candler W, et al. Treatment of travelers' diarrhea:

ciprofloxacin plus loperamide compared with ciprofloxacin alone. A placebo-

controlled, randomized trial. *Ann Intern Med* 1991; 114:731.

39. Pichler HE, Diridl G, Stickler K, Wolf D. Clinical efficacy of ciprofloxacin

compared with placebo in bacterial diarrhea. *Am J Med* 1987; 82:329.

40. Sirinavin S, Garner P. Antibiotics for treating salmonella gut infections.

Cochrane Database Syst Rev 2000; :CD001167.

41. Prince Christopher R H, David KV, John SM, Sankarapandian V. Antibiotic

therapy for Shigella dysentery. Cochrane Database Syst Rev 2010;

:CD006784.

42. Ternhag A, Asikainen T, Giesecke J, Ekdahl K. A meta-analysis on the effects of antibiotic treatment on duration of symptoms caused by infection with *Campylobacter* species. *Clin Infect Dis* 2007; 44:696.
43. Petruccelli BP, Murphy GS, Sanchez JL, et al. Treatment of traveler's diarrhea with ciprofloxacin and loperamide. *J Infect Dis* 1992; 165:557.
44. Murphy GS, Bodhidatta L, Echeverria P, et al. Ciprofloxacin and loperamide in the treatment of bacillary dysentery. *Ann Intern Med* 1993; 118:582.
45. Riddle MS, Arnold S, Tribble DR. Effect of adjunctive loperamide in combination with antibiotics on treatment outcomes in traveler's diarrhea: a systematic review and meta-analysis. *Clin Infect Dis* 2008; 47:1007.
46. DuPont HL, Hornick RB. Adverse effect of lomotil therapy in shigellosis. *JAMA* 1973; 226:1525.
47. Steffen R. Worldwide efficacy of bismuth subsalicylate in the treatment of travelers' diarrhea. *Rev Infect Dis* 1990; 12 Suppl 1:S80.
48. Graham DY, Estes MK, Gentry LO. Double-blind comparison of bismuth subsalicylate and placebo in the prevention and treatment of enterotoxigenic *Escherichia coli*-induced diarrhea in volunteers. *Gastroenterology* 1983; 85:1017.
49. DuPont HL, Sullivan P, Pickering LK, et al. Symptomatic treatment of diarrhea with bismuth subsalicylate among students attending a Mexican university. *Gastroenterology* 1977; 73:715.
50. DuPont HL, Flores Sanchez J, Ericsson CD, et al. Comparative efficacy of

loperamide hydrochloride and bismuth subsalicylate in the management of acute diarrhea. *Am J Med* 1990; 88:15S.

51. Johnson PC, Ericsson CD, DuPont HL, et al. Comparison of loperamide with bismuth subsalicylate for the treatment of acute travelers' diarrhea. *JAMA* 1986; 255:757.

52. Salazar-Lindo E, Santisteban-Ponce J, Chea-Woo E, Gutierrez M. Racecadotril in the treatment of acute watery diarrhea in children. *N Engl J Med* 2000; 343:463.

53. Gallelli L, Colosimo M, Tolotta GA, et al. Prospective randomized double-blind trial of racecadotril compared with loperamide in elderly people with gastroenteritis living in nursing homes. *Eur J Clin Pharmacol* 2010; 66:137.

54. Prado D, Global Adult Racecadotril Study Group. A multinational comparison of racecadotril and loperamide in the treatment of acute watery diarrhoea in adults. *Scand J Gastroenterol* 2002; 37:656.

55. Allen SJ, Martinez EG, Gregorio GV, Dans LF. Probiotics for treating acute infectious diarrhoea. *Cochrane Database Syst Rev* 2010; :CD003048.

56. Johnson, J. Y. M., McMullen, L. M., Hasselback, P., Louie, M., & Saunders, L. D. (2006). Travelers' knowledge of prevention and treatment of travelers' diarrhea. *Journal of Travel Medicine*, 13(6), 351–355.

57. Anidi I, Bazargan M, James FW. Knowledge and management of diarrhea among underserved minority parents/caregivers. *Ambul Pediatr*. 2002 May-Jun;2(3):201-6. doi: 10.1367/1539-4409(2002)002<0201:kamoda>2.0.co;2. PMID: 12014980.

58. Ross MH, Barron PM. Awareness of oral rehydration at well-baby clinics in Johannesburg. *S Afr Med J*. 1989 Nov 4;76(9):492-5. PMID: 2814729.

59. Moawed SA, Saeed AA. Knowledge and practices of mothers about infants' diarrheal episodes. *Saudi Med J*. 2000 Dec;21(12):1147-51. PMID: 11360088.

60. Ittiravivongs A, Masdoeki RS, Pattara-Arechachai J. Knowledge of diarrhea and socioeconomic factors in relation to the use of oral rehydration therapy in Samut Songkhram Province, Thailand.

