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Infography

Best practice guideline for management of gastrointestinal (GI) infections, including Traveller's diarrhea, in Elite Road Cyclists

Neil Heron[1,2], Javier Gonzalez[3], James Moran[3], Ainhoa Prieto[3] and Jonny Elliott[2]

[1] Centre for Public Health Research, Queen's University, Belfast.
[2] Dept of Medicine, Keele University, Staffordshire, England.
[3] Nutrition Department, Team Ineos Cycling Team

* Correspondence: (N.H.) N.Heron@qub.ac.uk

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Abstract: This best practice guideline and infographic describe the prevention and management of gastrointestional (GI) infections, with a particular focus on Traveller's diarrhea (TD). This best practice guide has been developed for use in elite road cycling.

Keywords: Best practice; guideline; infographic; gastrointestinal (GI) infections; Traveller's diarrhea; road cycling; elite sport

1. Introduction

Gastrointestinal (GI) infections are the second commonest illness experienced by athletes (1) (2).

Traveller's diarrhea affects up to 40% of those travelling to resource limited regions (1)(3). Most cases present with diarrhea (3 or more unformed stools/day) between 4-14 days after travel and last from between 1-5 days (1). Other symptoms can involve nausea, abdominal bloating and cramps, fever and blood in stool.

In general, most GI infections are caused by viruses, the commonest being norovirus (4). In contrast, bacteria cause 90% of travellers diarrhoea, with the commonest bacterial cause being Escherichia Coli (1). Additional bacterial pathogens to consider for traveller's diarrhea are Salmonella, Shigella, Vibrio and Campylobacter species.

Parasites should be considered when symptoms last longer than 7 days and this includes Giardia Lamblia, Cryptosporidium parvum, and Cyclospora cayetanesis.

The pathogens for gastroenteritis infections are usually transmitted via the faecal-oral route (4).

High-risk times for GI infections are travel and during competitions (5) and therefore, it is important to minimise the risks around these times.

2. When do I need a stool culture?

Stool cultures should be obtained if the symptoms last longer than 7 days or if there is fever or colitis symptoms (tenesmus, urgency, cramping, or bloody diarrhea) (1).

Traveller's diarrhea can be classified as (6)(1):

- Mild – tolerable and not distressing, not interfering with activities.
- Moderate – distressing or interferes with activities.
- Severe – incapacitating symptoms, that prevents planned activities.

Persistent diarrhea is defined as that which lasts longer than 14 days (6).

3. Prevention

- No hand shaking – fist pump only.
- Meticulous hand hygiene.
- Avoid contact with unwell people or animals.
- Regular cleaning of team and home environment.
- Good toilet hygiene.
    - Keep the toilet seat down when flushing and not in use.
    - Keep toiletries in your toiletry bag when not in use.
    - Don't share toiletries with others.
- Staff and riders – report symptoms early to the team doctor to allow early self-isolation and reduce risk to others.
- Consider single room occupancy for riders during key competitions and training periods rather than sharing rooms.
- Do not share drink bottles, cups, cutlery, or towels.
- When travelling, always travel with an alcohol hand sanitiser to wash your hands regularly and consider using sterile gloves.
- Adequate sleep, aiming for more than 8 hours per day with an additional day time nap (7). If you think you have sleep difficulties, please discuss these with the team doctor. Additional things to consider:
    - Complete darkness in bedroom to allow restful sleep.
    - Monitor duration and quality of sleep via the team well-being App.
    - Consider monitoring sleep with an appropriate monitor/wearable device.
    - Have a relaxing, reproducible sleep hygiene routine each night.
- To prevent or detect a GI infection early, use the well-being, subjective monitoring (8) app as well as early morning resting heart rate in the team for all riders.
- All riders to have their own thermometer to allowing test of their temperature if feeling unwell.
- After particularly dirty races or training, rinse your mouth out with an acidic drink (e.g. a can of coke, or a mouthwash such as Corsodyl).
- Maintain good food hygiene practices. If preparing your own food, wash raw fruit and vegetables thoroughly. If eating in an external environment, then focus on cooked foods and peeled fruit/vegetables, rather than raw, unpeeled fruit and vegetables. For food, always remember 'cook it, boil it, peel it or forget it' (6).
- Generally, avoid shellfish and rare/undercooked meats. To be communicated to the chefs.
- Prebiotics on a daily basis with probiotics (9) used for 2-4 weeks pre-major competitions and then continued during key competitions.
- Pre-season testing for Coeliac disease for general gut health and consider further allergy testing as reported by athlete.

4. Before travel:

- Risk assessment - consider the risk of infection due to travel and discuss management of suspected cases.
- Vacciations: Dukoral (2 doses given 7 days apart on an empty stomach) (oral) vaccine against cholera to be considered after reviewing appropriate travel advice; vaxchora also available, single-use oral vaccine for cholera; shanchol is an alternative for cholera.
    - Typhoid vaccination.
    - Rotavirus vaccination (Rotarix)
- Consider antibiotic prophylaxis – rifaximin is the antibiotic of choice for traveller's diarrhoea prophylaxis (6) (3) – when travelling to high-risk areas (see prophylaxis section below);
- Bismuth Salicylate, 2 tabs 4 times a day (2.1g/day) is 65% effective at preventing Traveller's diarrhea (3) and can be used for up to 3 weeks. Warn the athlete regarding side-effects (black tongue and stool, nausea, constipation, tinnitus) and can't be used if allergic to aspirin.
- Empiric treatment provided to certain riders/staff when travelling to high-risk

areas, in case symptoms develop (i.e. azithromycin) (see below).

5. During travel:

- Classify Traveller's diarrhea:
  - Mild = conservative symptomatic treatment.
  - Moderate = conservative symptomatic treatment and consider use of antibiotic.
  - Severe = treat with antibiotics.

6. Medical management of TD

- The Bristol stool chart can be used to gauge the consistency of the stool and then enquire about stool frequency.
- Main stay of management is fluid replacement.
- Antibiotics reserved for TD classified as moderate to severe. That is, interfering with planned activities or distressing for the patient, fever, and/or blood, pus or mucus in the stool.
- Azithromycin 500mg once a day for 3 days or 1g stat is the preferred regimen for bacterial infections.
- Fluoroquinolones are to be avoided for the riders due to the potential risk to tendons (i.e. association with tendon rupture).
- For suspected parasite infections, metronidazole 500mg tid for 5 days is the preferred regimen.
- Loperamide can be considered for use in reducing the number of stool motions, particularly when used in combination with an antibiotic.
- Daily weighing to assess for fluid loss with urine osmolality check if concerned about dehydration.

7. Prophylaxis and special considerations

- Use of antibiotic prophylaxis is not standard practice.
- Antibiotic prophylaxis can be considered for use in athletes with underlying health problems who would be at higher risk of complications should they develop TD (e.g. inflammatory bowel disease, HIV or those with organ transplants).
- If prophylaxis is required, consider using rifaximin at 200mg od (6) (3).

8. Before travel to high-risk area

Education around:

- Selection of appropriate food and drink.
- Use only bottled water or carbonated canned drinks, drank from the container with a straw rather than from a glass.
- No ice in drinks.
- Only eat fully cooked hot food and fruit and vegetables that can be peeled.
- Avoid high-risk protein sources (shellfish and seafood, undercooked meat).
- Avoid food that is uncovered/unwrapped for long periods of time.
- No street food.
- Avoid buffets and food on air flights – eat pre-cooked meals prepared by the team or by yourself.
- Hand hygiene is key.
- Avoid sharing utensils and glasses/drink containers in high-risk areas – keep your own for the length of your stay in this area.

9. If you develop symptoms of a GI illness or infection

- Communicate the symptoms early to the medical team particularly to avoid spread to others in the group.
- Maintaining good hydration is key, particularly with water and electrolyte replacement – electrolyte tabs or dioralyte sachets to be used.
- Immodium/loperamide (loading dose 4mg with 2mg taken with loose stools, upto 16mg/day) can be considered to reduce stool frequency but should only be started after discussing this with your team doctor.
- Pepto-Bismol 2 x 262mg tablets 4 times a day can reduce the frequency and

duration of your symptoms (6) – discuss with your team doctor.
- Discuss with your team doctor the need for a course of antibiotics. Options include azithromycin 500mg od for 3 days or a stat dose of 1,000mg.
- Generally, continue with probiotics during an episode of gastroenteritis but stop your prebiotic.
- Training modification ('head/neck rule') will likely be required, particularly if you have a temperature. Discuss this jointly with your coach and team doctor.
- Contact nutrition for an appropriate nutritional plan
    - Increase water intake – try to maintain hydration as extra fluid will be lost with diarrhea.
    - Use electrolyte supplementation (dioralyte/SiS hydro tabs) to replace electrolytes lost in diarrhea.
    - Limit/avoid foods which can exacerbate gastrointestinal distress and/or fluid losses:
        - Avoid alcohol - can exacerbate GI distress and increase fluid losses
        - Limit caffeine intake – can exacerbate GI distress
        - Avoid fruit juice and fizzy drinks - can exacerbate GI distress
        - Limit high-fat foods - can exacerbate GI distress
        - Limit fresh fruit to three portions per day – can exacerbate GI distress
        - Avoid spicy foods and rich sauces– can exacerbate GI distress
        - Some people can become temporarily lactose intolerant during a period of diarrhea, so limiting dairy intake is a consideration.
    - Limit high-fibre foods (e.g. whole-wheat bran, dried beans, pulses, nuts etc.) focus on oats, lean meats, and eggs instead
    - Avoid shellfish and undercooked meats.
    - If intake of meals is challenging, then meal replacements can be an option (e.g. SiS REGO).
    - Avoid protein bars and plant-based bars due to potential for increasing GI distress (polyol and fiber content)

10. When should the medical team do a stool culture? (6)
- Take a fresh stool culture for people with a high temperature (>39oC), blood in stool, excessive watery diarrhea in keeping with diagnosis of chlorea, severe abdominal cramps, in those who are immunocompromised, other underlying significant medical conditions.
- Persistent symptoms lasting longer than 7 days.
- Freshly passed stool cultures should be collected on 3 different days and sent for microscopic examination for ova, cysts, and parasites.
- Request testing for C. difficile if the patient has had an antibiotic in the last month.

Avoid risk to others
- Isolate yourself from others as soon as you think you have symptoms.
- Meticulous hand hygiene.
- Consider the need to deep clean the area the affected person has been living in following resolution of symptoms, particularly the bathroom.

11. Return to training and competition
- Return to training and competition can be started when the rider is afebrile, well hydrated, and back to tolerating solid food with no residual gastrointestinal symptoms (head/neck rule).

12. Avoid impact of exposure
- Use bismuth subsalicylate (avoid if allergic to aspirin) in high-risk areas. Dose = 2x262mg tablets 4 times in high-risk areas (65% protection against TD). Can be taken for up to 3 weeks, starting a few days before travel starts. Long

term use side effects include dark tongue and stool and tinnitus. Can interfere with absorption of certain medications (e.g. doxycycline – discuss with team doctor).
- Incorporate both vinegar and virgin olive oil into your diet (both may have bactericidal activity and may reduce the incidence of bacterial infections).

13. Before training and/or competitions
- Cover any open wounds to avoid risk of infection.
- Consider gargling with mouthwash.

14. During the ride
- Wear glasses/eye wear to avoid eye contamination.
- Try to keep your mouth closed and avoid swallowing water/dirt from the road.
- Consider using caps on your water bottles to avoid contaminating the nozzle which you drink from.
- Wear appropriate clothing for the weather conditions.

15. After the on-bike activity
- Gargle with an appropriate mouthwash (e.g., Corsodyl [chlorhexidine]).
- Consider taking two 262mg tablets of Pepto-Bismol (avoid if allergic to aspirin) to reduce risk of bacterial infection.
- Remove any dirty clothing as soon as possible and wash these in an appropriate wash.
- Shower and get into clean clothing as soon as possible after finishing with the bike.

Before starting any medication (including over the counter medication), these should be discussed with your team doctor and/or checked on globaldro.com to ensure they are not prohibited to use.

16. Nutritional supplementation to prevent GI infections

The most important nutritional strategy to reduce the risk of GI infections is to practice good food hygiene and avoid high-risk foods (shellfish, undercooked food, unwashed, unpeeled fruit and vegetables). However, the specific use of the prebiotic B-GOS (a specific galacto-oligosaccharide mixtures sold commercially as Bimuno) has been shown to reduce the risk and duration of diarrhea by ~30-50% when travelling to high-risk environments (10). Therefore, the specific supplementation with 5.5 g per day of B-GOS should be used for 7 days before and during travel to high-risk environments (e.g. grand tours and key training camps).

17. Medical review

For those experiencing apparent recurrent GI infections, consider:
1. Stool cultures.
2. Thyroid function tests.
3. Allergy testing (e.g. coeliac disease – all athletes screened for coeliac disease in pre-season).
4. Lactose intolerance (hydrogen breath test) (11).
5. Investigations for inflammatory bowel disease including endoscopy examinations.

18. Conclusion

This best practice guideline has been developed for managing GI infections, especially Traveller's diarrhoea, in elite road cyclists and provides guidance for both prevention and management of these infections.

19. Journal article

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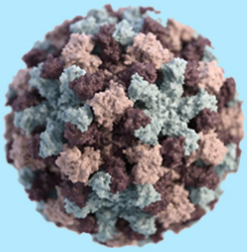
Management of Gastrointestinal Infections in Athletes



Gastrointestinal (GI) infections are the second commonest illness experienced by athletes. Traveller's diarrhea (TD) affects up to 40% of those travelling to resource limited regions. Most cases present with diarrhea between 4-14 days after travel and last from between 1-5 days. Other symptoms can involve nausea, abdominal bloating and cramps, fever and blood in stool.

FIRST STEPS WHEN SYMPTOMS BEGIN

- ALERT THE MEDICAL TEAM IMMEDIATELY
- MAINTAIN GOOD HYDRATION, PARTICULARLY WITH WATER/ELECTROLYTE REPLACEMENT
- TRAINING MODIFICATION WILL BE REQUIRED, PARTICULARLY IF YOU HAVE A TEMPERATURE
- GET PERSONALISED NUTRITION ADVICE FROM NUTRITIONAL TEAM

GENERAL NUTRITION PRINCIPLES

- AVOID FIZZY JUICES, FIZZY DRINKS, ALCOHOL & LOW-CALORIE SWEETNERS
- LIMIT HIGH FAT FOODS, HIGH FIBRE FOODS (INC FRESH FRUIT) & SPICY FOODS
- AVOID PROTEIN BARS & PLANT BASED BARS
- USE A SIS REGO IF EATING MEALS IS DIFFICULT
- TAKE A DAILY MULTIVITAMIN TO ENSURE ADEQUATE NUTRIENT INTAKE

MEDICAL MANAGEMENT

- ANTIBIOTIC FOR MOD-SEVERE TD, E.G. AZITHROMYCIN
- BISMUTH 2 TABS UP TO 4X/DAY (4.1G/DAY) FOR MAX 3/52. CONSULT TEAM DOCTOR & NOTE SIDE EFFECTS
- GENERALLY AVOID FLUROQUINOLONES IN ATHLETES
- CONSIDER NEED FOR LOPERAMIDE
- DAILY WEIGHING TO MONITOR FLUID LOSS
- ISOLATE FROM OTHERS UNTIL ASYMPTOMATIC
- TEAM DOCTOR TO MONITOR STOOL CONSISTENCY VIA BRISTOL STOOL CHART

FOR THOSE EXPERIENCING RECURRENT INFECTIONS CONSIDER

- STOOL CULTURES
- THYROID FUNCTION TESTS
- THYROID FUNCTION TESTS
- INFLAMMATORY BOWEL DISEASE INVESTIGATIONS (INCLUDING ENDOSCOPY)
- LACTOSE INTOLERANCE (HYDROGEN BREATH TEST)