SOP on
Oral Rehydration Solution Preparation.

Department of Pharmacology
Faculty of Medicine
UWUSL

STANDARD OPERATING PROCEDURE (SOP) ON ORAL REHYDRATION SOLUTION (ORS) PREPARATION

Title
Oral Rehydration Solution (ORS) Preparation for Undergraduate Pharmacology Teaching

Issued by
Department of Pharmacology
Faculty of Medicine
Uva Wellassa University of Sri Lanka

(1) Purpose
To establish a standardized, evidence-based procedure for demonstrating the correct preparation and administration of Oral Rehydration Solution (ORS) in accordance with World Health Organization (WHO) recommendations. This SOP aims to ensure that undergraduate medical students acquire the knowledge and practical skills necessary to prepare ORS accurately, administer it safely, prevent dehydration associated with acute diarrhoeal illness, minimise preparation errors, and promote appropriate patient education regarding oral rehydration therapy (ORT).

(2) Scope
This SOP applies to undergraduate medical students, academic staff, medical officers, nursing officers, and other healthcare professionals participating in undergraduate pharmacology teaching sessions involving the demonstration of Oral Rehydration Solution preparation.
The SOP is intended solely for educational and demonstration purposes and follows the WHO-recommended low-osmolarity ORS formulation for the prevention and treatment of dehydration caused by acute diarrhoea in children and adults.

(3) Responsibilities
(3.1) Lecturer (Academic Staff)
1. Provide theoretical knowledge regarding dehydration, oral rehydration therapy, indications, contraindications, and the pharmacological basis of ORS.
2. Explain the composition and mechanism of action of WHO-recommended low-osmolarity ORS.
3. Demonstrate the correct preparation of ORS using safe drinking water and standard ORS sachets.
4. Supervise students during practical demonstrations and ensure correct preparation techniques.
5. Assess students' competency in ORS preparation and administration.
6. Reinforce infection prevention measures and safe handling of drinking water during demonstrations.
7. Educate students on counselling patients and caregivers regarding the correct preparation, administration, storage, and disposal of ORS.

8. Explain the differences between WHO low-osmolarity ORS and ReSoMal, including their composition, indications, contraindications, preparation, administration and monitoring.

(3.2) Healthcare Professionals / Students

1. Understand the indications for oral rehydration therapy.
2. Demonstrate correct preparation of ORS according to WHO recommendations.
3. Verify the integrity and expiry date of the ORS sachet before preparation.
4. Measure the correct volume of clean drinking water accurately.
5. Demonstrate proper mixing techniques until the powder dissolves completely.
6. Explain the appropriate administration of ORS according to patient age and clinical condition.
7. Educate patients or caregivers regarding storage, disposal after 24 hours, and continued feeding during diarrhoeal illness.
8. Recognise situations requiring referral for intravenous fluid therapy or urgent medical attention.
9. Differentiate between WHO low-osmolarity ORS and ReSoMal and select the appropriate solution according to the clinical scenario.

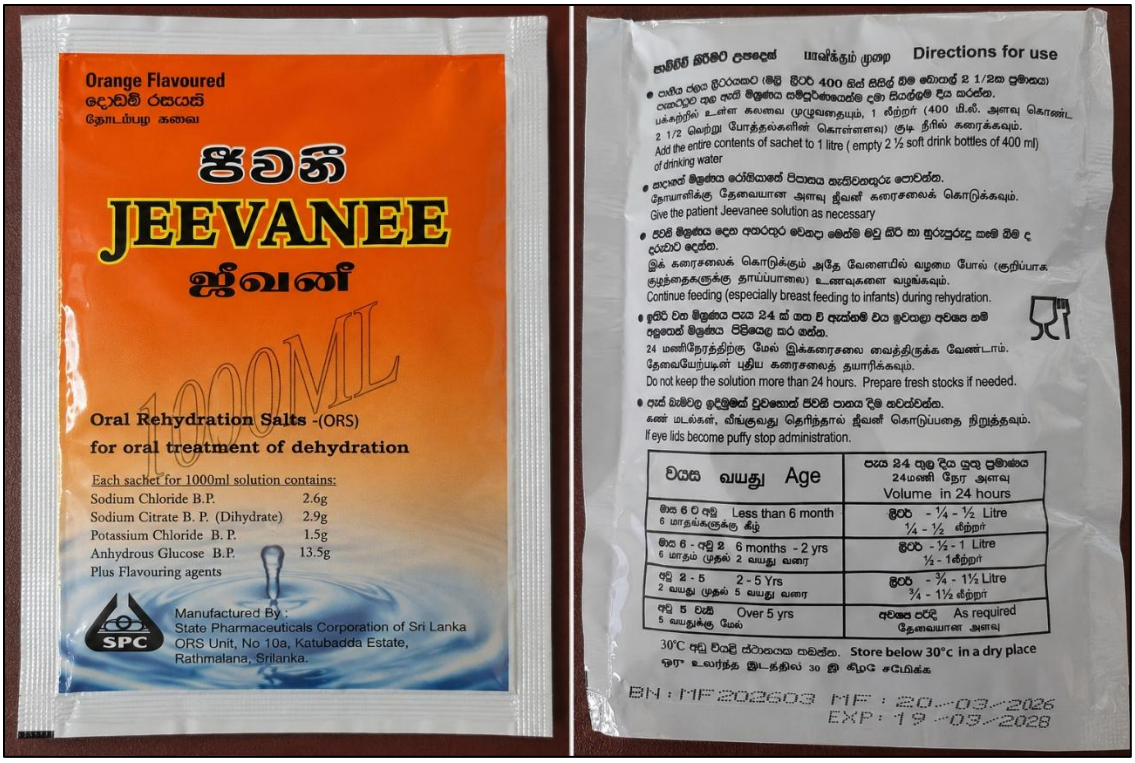
(4) Prerequisites

Before commencing the demonstration, ensure the following:

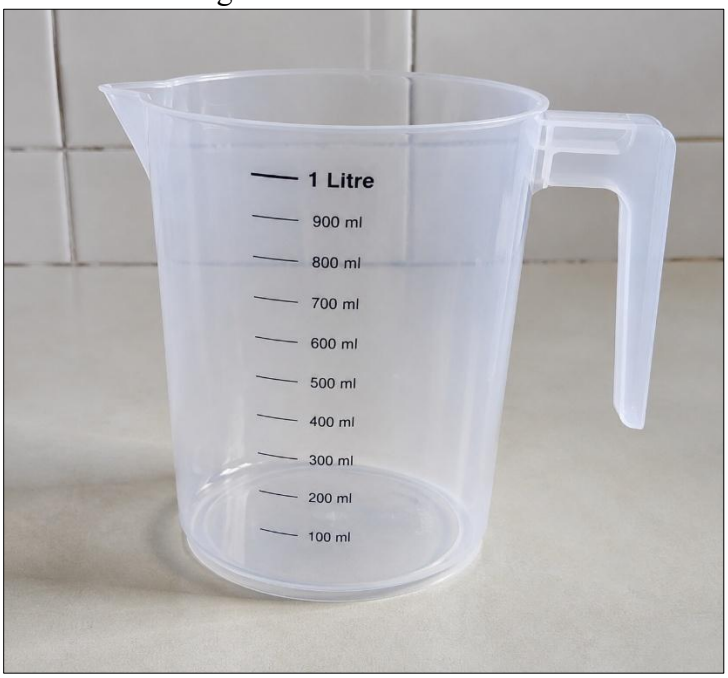
1. Availability of WHO-recommended ORS sachets.
2. Availability of one litre of clean, safe drinking water.
3. Availability of a clean measuring container capable of accurately measuring one litre.
4. Availability of a clean mixing container.
5. Availability of a clean stirring spoon.
6. Availability of clean cups or feeding spoons for demonstration.
7. Availability of facilities for proper hand hygiene.
8. Availability of waste disposal facilities.

(5) Materials Required

1. WHO-recommended Oral Rehydration Salts (ORS) sachet.



2. Measuring container calibrated to one litre.



3. One litre of clean, safe drinking water.

4. Stirring spoon.

5. Feeding spoon or cup suitable for infants and young children.

6. Handwashing facilities or alcohol-based hand rub.

7. Waste disposal container.

(6) Storage and Stability

1. Store ORS sachets in a cool, dry place away from direct sunlight and excessive humidity.
2. Keep ORS sachets in their original unopened packaging until use.
3. Do not use ORS sachets beyond the expiry date or if the packet is damaged, punctured, or shows evidence of moisture contamination.
4. Prepare ORS immediately before administration whenever possible.
5. After preparation, keep the solution in a clean, covered container.
6. Prepared ORS should be stored at room temperature or refrigerated if available.
7. Discard any remaining ORS solution after 24 hours and prepare a fresh solution if continued treatment is required.

(7) Indications for Oral Rehydration Therapy (ORT)

Oral Rehydration Therapy is indicated for the prevention and treatment of dehydration caused by acute diarrhoea in patients of all age groups.

Common indications include:

1. Acute watery diarrhoea.
2. Mild dehydration.
3. Moderate dehydration in patients who are able to drink.
4. Replacement of ongoing fluid losses during diarrhoeal illness.
5. Prevention of dehydration in patients with diarrhoea.
6. Fluid replacement following episodes of vomiting once vomiting has settled sufficiently to allow oral intake.

ORT should be commenced as early as possible after the onset of diarrhoea to minimize dehydration and reduce the need for intravenous fluids.

(8) Comparison of WHO Low-osmolarity Oral Rehydration Solution (ORS) and Rehydration Solution for Malnutrition (ReSoMal)

- Although WHO low-osmolarity Oral Rehydration Solution (ORS) is the standard oral rehydration therapy for the prevention and treatment of dehydration caused by acute diarrhoea in most children and adults, **Rehydration Solution for Malnutrition (ReSoMal)** is a modified oral rehydration solution specifically developed for children with **complicated severe acute malnutrition (SAM)**.
- ReSoMal contains a lower concentration of sodium and a higher concentration of potassium and other electrolytes than standard WHO ORS to meet the altered physiological requirements of children with severe acute malnutrition.

Clinical Comparison: WHO Low-osmolarity ORS vs. ReSoMal

Characteristic	WHO Low-osmolarity ORS	ReSoMal
Primary Indication	Acute diarrhoea with mild to moderate dehydration	Complicated severe acute malnutrition (SAM) with diarrhoea
Target Patient Group	Children and adults	Children with complicated SAM
Sodium	75 mmol/L	45 mmol/L
Potassium	20 mmol/L	40 mmol/L
Chloride	65 mmol/L	70 mmol/L
Glucose	75 mmol/L	125 mmol/L
Magnesium	Not included	3 mmol/L
Zinc	Not included	0.3 mmol/L
Osmolarity	245 mOsmol/L	Approximately 300 mOsmol/L
Preparation	One sachet in 1 litre of clean water	One 84 g sachet in 2 litres of clean boiled and cooled water
Use in Cholera	Recommended	Not recommended
Administration	According to WHO dehydration treatment plans	According to WHO/MSF recommendations for children with complicated SAM

(8.1) Indications for ReSoMal

ReSoMal is indicated for:

1. Prevention of dehydration in children with **complicated severe acute malnutrition (SAM)** and diarrhoea.
2. Treatment of **some dehydration** in children with complicated SAM.
3. Selected cases of severe dehydration in children with complicated SAM **without circulatory shock**, when slow oral or nasogastric rehydration is appropriate and close medical supervision is available.

(8.2) Situations in Which ReSoMal is not Appropriate.

1. Children with **cholera**.
2. Children with profuse watery diarrhoea for whom normally prepared WHO low-osmolarity ORS should be used instead.
3. Patients with **circulatory shock** requiring intravenous fluid resuscitation.
4. Patients in whom oral or nasogastric administration is contraindicated.

(9) Procedure

(9.1) Exclusion Criteria (to be determined by Lecturer/Academic Staff before demonstration) Patients should be referred for urgent medical evaluation rather than oral rehydration alone if they have:

1. Severe dehydration requiring intravenous fluid therapy.
2. Shock or circulatory collapse.
3. Persistent vomiting preventing oral intake.
4. Altered level of consciousness.
5. Suspected intestinal obstruction.
6. Paralytic ileus.
7. Severe abdominal distension.
8. Inability to drink safely.
9. Severe electrolyte disturbances requiring hospital management.

(9.2) Pre-demonstration Preparation

1. Explain the objectives of the demonstration.
2. Review the indications and principles of Oral Rehydration Therapy.
3. Perform hand hygiene using soap and water or alcohol-based hand rub.
4. Assemble all required equipment.
5. Check the expiry date and integrity of the ORS sachet.
6. Ensure that clean, safe drinking water is available.
7. Measure exactly one litre of water using a calibrated container.
8. Explain the importance of using the correct volume of water to obtain the recommended electrolyte concentration.

(9.3) Demonstration of ORS Preparation

1. Wash hands thoroughly before handling the ORS sachet.

2. Measure one litre of clean drinking water accurately.

3. Pour the measured water into a clean mixing container.

4. Open one WHO-recommended ORS sachet immediately before preparation.

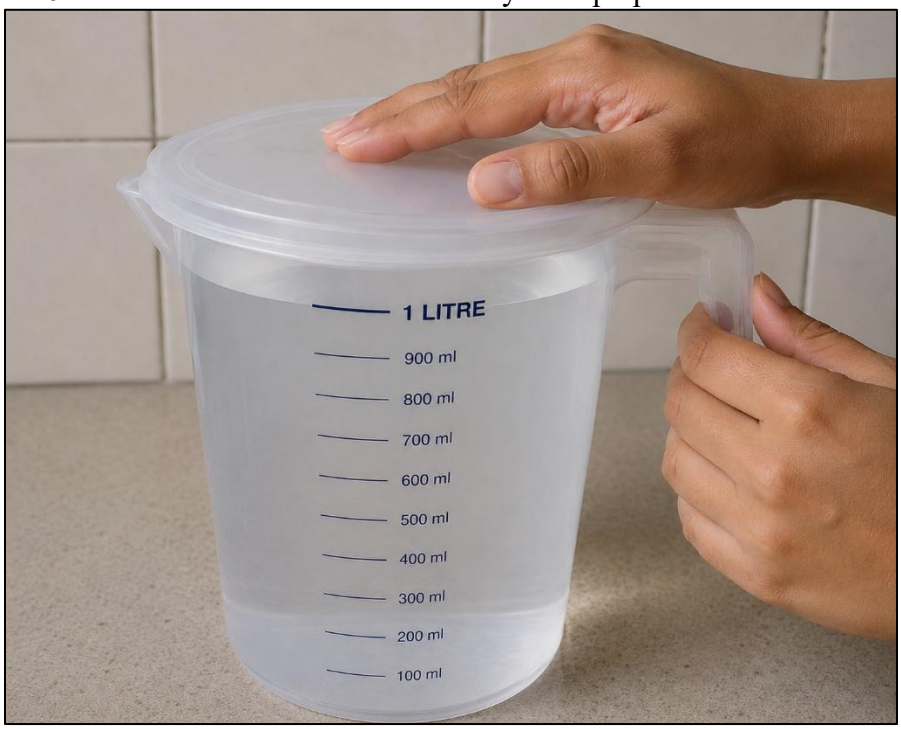
5. Empty the entire contents of the sachet into the container containing one litre of water.

6. Stir continuously using a clean spoon until the powder has completely dissolved.

7. Ensure that the solution is clear and that no undissolved particles remain.

8. Do not add sugar, salt, milk, fruit juice, flavouring agents, or any other substances to the prepared solution.

9. Cover the container immediately after preparation to minimize contamination.



10. Label the container with the preparation time when appropriate.

11. Explain that the prepared solution should be discarded after 24 hours, even if some solution remains.

(9.4) Demonstration of ORS Administration

1. Encourage frequent small sips of ORS rather than large volumes at one time.
2. Infants should receive ORS using a spoon, cup, or syringe if necessary.
3. Continue breastfeeding throughout the illness.
4. Older children and adults should drink ORS according to thirst and replace ongoing fluid losses after each loose stool.
5. If vomiting occurs, wait approximately 5–10 minutes before restarting ORS slowly using small frequent sips
6. Continue ORS until signs of dehydration have resolved.
7. Continue normal feeding during diarrhoeal illness whenever possible.
8. Refer patients who develop worsening dehydration despite ORS therapy for further medical management.

(9.5) Patient and Caregiver Education:

The demonstrator should emphasize the following:

1. Always prepare ORS using the entire sachet with exactly one litre of safe drinking water.
2. Never divide the sachet or prepare partial quantities unless specifically instructed by the manufacturer.
3. Do not boil the prepared solution after mixing.
4. Store the prepared solution in a clean covered container.
5. Discard unused solution after 24 hours.
6. Continue breastfeeding and age-appropriate feeding.
7. Seek immediate medical attention if the patient develops persistent vomiting, inability to drink, lethargy, convulsions, bloody diarrhoea, worsening dehydration, or reduced urine output.

(10) Precautions

1. Always use WHO-recommended ORS sachets whenever available.
2. Prepare ORS only with clean, safe drinking water.
3. Measure the water accurately. Using too little or too much water alters the electrolyte concentration and may reduce the effectiveness or safety of ORS.
4. Use the entire contents of one sachet for one litre of water. Do not divide sachets unless specifically manufactured for smaller volumes.
5. Do not add sugar, salt, milk, fruit juice, carbonated beverages, flavourings, or any other substances to the prepared solution, as these alter the osmolarity and electrolyte composition.
6. Maintain strict hand hygiene throughout preparation.
7. Use only clean utensils and containers to prevent microbial contamination.
8. Keep the prepared solution covered until administration.
9. Discard any remaining ORS solution after 24 hours, regardless of whether it has been refrigerated.
10. ORS should not delay referral of patients with severe dehydration or shock requiring intravenous fluids.
11. Continue appropriate feeding and breastfeeding during oral rehydration therapy.
12. Monitor patients for signs of worsening dehydration or inability to tolerate oral fluids.

(11) Limitations

1. Oral Rehydration Therapy is effective only in patients who are able to drink or receive oral fluids safely.
2. ORS replaces water and electrolytes losses and helps prevent or treat dehydration, but it does not treat the underlying cause of diarrhoea.
3. Patients with severe dehydration, persistent vomiting, shock, altered consciousness, or intestinal obstruction require hospital management and intravenous fluid therapy.
4. Improper preparation using incorrect water volumes may lead to ineffective rehydration or electrolyte imbalance.
5. ORS does not replace the need for appropriate investigation and treatment of the underlying cause of diarrhoea.
6. Demonstration using simulated equipment may not completely reflect challenges encountered in community or clinical practice.

(12) References

1. World Health Organization (WHO). Oral Rehydration Salts: Production of the New ORS. WHO/FCH/CAH/06.1. Geneva: World Health Organization; 2006.
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