□ SAFH □ SAH □SDH □ SMCS ■ SRMC □ SMF □ SSMC	SHSSR Laboratory Service Procedure	Section/#: Urinalysis UA.ANA10.02-/-RV-02
	Title: **Determining Urine or Fluid Specific Gravity Using a Refractometer**	Initiated/Owned by: Lab Supervisor
	Effective Date: 2/7/18	Next Review Date: 2/7/20

Purpose

This procedure describes how to determine the specific gravity (SG) of urine or other fluids using a refractometer.

Policy

Urine specific gravity will be verified with a refractometer when:

- IRIS iChem 10SG test strips are used.
- Urine is highly colored, which may interfere with the dipstick specific gravity result.
- **Note:** Urine SG is performed as one component of a complete urinalysis. Urine SG can be used to assess the kidney's ability to concentrate urine. However, because protein, glucose and contrast dye have molecular masses that are relatively large compared to other major components of urine, they disproportionately affect SG. In these cases, instead of performing the individual test for USG, urine osmolality is a better measure of urine concentration.

Equipment

Refractometer

Reagents

Reagent	Storage & Stability
MAS UA Control Level 2	• Store at 2-8°C, tightly capped. Do NOT freeze. • Open stability: 3 months • Unopen stability: to manufacturer's expiration.
Deionized water	Obtain fresh aliquot daily.

Supplies

- Disposable pipettes
- Kimwipes or other soft tissue/cloth

Determining Urine or Fluid Specific Gravity Using a Refractometer, Continued.

Specimen Requirements

0.5 - 1 ml fresh urine or other fluid, collected in clean container.

Calibration/ Quality Control

Verify calibration daily:

- Confirm that the prism is clean and free of scratches
- Using deionized water, confirm that the boundary line is parallel to the memory lines.
- If the measurement value is incorrect after verifying calibration, adjust the scale at ambient temperature. To do this, turn the scale adjustment screw located on the underside of the refractometer, following manufacturer's instructions.

Two controls (high/low) will be run once each day patient testing is performed:

- High control: MAS UA Control Level 2
- Low control: Deionized water
- Record results in Sunquest:
    - Function: MEM
    - Worksheet: RVUA
    - Test: USG
    - Control ID:
        - C-SG1 (DI water)
        - C-SG2 (MAS UA Control Level 2)
- Record results on the Iris QC printout.

Procedure

Follow the steps below to perform testing.

Step	Action
1	For ordered specific gravity on urine or fluid, print a Sunquest worksheet. *A worksheet is not needed if the specific gravity is being done as part of a urinalysis.* • Urine worksheet: **RVUA** • Fluid worksheet: **RVFLDM**
2	Holding the refractometer horizontally: • Add 1 drop of patient urine, fluid or control to the exposed portion on the top or bottom of the measuring prism. • Alternatively, sample may be applied directly to the measuring prism by opening the cover plate, applying 1 drop, then closing the cover plate.

Determining Urine or Fluid Specific Gravity Using a Refractometer,
Continued

Procedure (continued)

<table>
<tr><th>Step</th><th>Action</th></tr>
<tr><td>3</td><td>Press the cover plate gently but firmly into place.</td></tr>
<tr><td>4</td><td>Expose the prism end of refractometer to bright light.</td></tr>
<tr><td>5</td><td>Look through the eyepiece and focus the scale by rotating the eyepiece, if needed.</td></tr>
<tr><td>6</td><td>Read the specific gravity from the left-side scale at the point where the dividing line between bright and dark fields crosses the scale.

<table><tr><th>If the specific gravity is...</th><th>Then...</th></tr><tr><td>≤ 1.050</td><td>Proceed to step 7.</td></tr><tr><td>>1.050 (exceeds scale)</td><td>A. Prepare a 1:2 dilution of the urine/fluid using DI water.
B. Clean the prism and cover plate by wiping with a moistened tissue or cloth, then wipe dry
C. Repeat steps 2-6 using the diluted sample. Calculate the correct specific gravity by multiplying the number to the right of the decimal by factor of 2.
Example: If the diluted urine refractometer reading is 1.030, then the correct urine specific gravity is 1.060.</td></tr></table></td></tr>
<tr><td>7</td><td>Record the patient result on the worksheet or IRIS result printout.</td></tr>
<tr><td>8</td><td>Clean the prism and cover plate by wiping with moistened tissue or cloth, then wipe dry.</td></tr>
</table>

Reference Range

Urine: 1.001 – 1.035
Other fluids: None

Determining Urine or Fluid Specific Gravity Using a Refractometer,
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Reporting Results

A. Follow the steps below to result a urine or fluid specific gravity into Sunquest LIS.

Step	Action
1	Follow the steps below:

Prompt	Action
Function	**MEM**
Worksheet	**RVUA** (urine) **RVFLDM** (fluid)
Test	**USG** (urine) **FSG** (fluid)
Test Method	For urine specific gravity, modify test method to **RVUA. (Fluid method default is RVHM)**
Acc No	Enter the patient's accession number.
USG (FSG)	Enter the specific gravity result. For fluids, also append the fluid type to the result. *Example: 1.025-;Pleural fluid*

2	Verify the accuracy of result entry by using inquiry function (IQ or GUI Laboratory Inquiry), or by printing a completed worksheet to review results. **Confirm by writing RVS and your initials on the original worksheet.**
3	Retain the original worksheet in the designated location.

Determining Urine or Fluid Specific Gravity Using a Refractometer,
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Reporting Results, cont

B. Follow the steps below to result a urine specific gravity done as part of a urinalysis in Sunquest GUI.

Step	Action
1	On Sunquest GUI main menu, double click on Urinalysis Result Entry
2	At Keyboard field, use the drop-down menu to select **RVURIN** (or manually type RVURIN), then click OK.
3	At Acc # prompt, scan the specimen barcode or enter the patient's accession number, then press [Enter].
4	Click the **USG** key.
5	Type the specific gravity result, then click Enter.
6	When finished entering results click Results Review tab.

If...	Then...
Result is accurate	Click Save.
Result needs editing	• Click Resulting tab • Repeat steps 4-6.
Results rejected	• Click Close • Click Do Not Save.

Step	Action
7	Verify the accuracy of result entry by using inquiry function (IQ or GUI Laboratory Inquiry). **Confirm by writing RVS and your initials on the printout.** Retain printout in designated location.

References

Atago Refractometer Instruction Manual, NSG Precision Cells Inc.2791-E06

End