

Acu Rate Pty Ltd

"For infusion that demands precision"

Challenges in IV Infusion



- Electronic pumps are a gold standard when it comes to accurate and reliable flow, however, this comes at a HIGH cost.
- At the other end of the spectrum are commonly used, LOW cost, infusion systems which are unreliable and inaccurate

Other Infusion Devices

Device



Functionality

 Reusable – Electrically powered flow control

Single use – Pressurised flow control

Features

- Highly expensive
- Accurate flow control
- Require ongoing calibration and maintenance
 - May be impractical, complex and cumbersome, especially in emergency transport
- Expensive
 - Accurate to within ±15% under strict calibrated conditions ¹
- Substantially affected by temperature and viscosity variation

Single use – Non powered flow control (gravity flow)

Inaccurate and unreliable Require constant human intervention and monitoring Risk of "freeflow" Substantially affected by temperature, viscosity and pressure variation Highly dependent on user

¹ Skryabina E.A, Dunn T.S Am J Health-Syst Pharm. 2006;63(13):1260-1268.

Acu Rate's Value Proposition

Acu Rate provides both fixed (Single Flow) and variable (Multi Flow) controllers for infusion.

- AS ACCURATE as electronic pumpdriven devices
- Accurate and reliable irrespective of temperature, viscosity
- Less sensitive to pressure variation
- **"SAFE"** No runaways, No patient interference
- Able to be integrated easily into ANY infusion system
- No monitoring required once set
- Costs little more than simple IV sets





Figure 1 : TOP – Acu Rate's fixed (single flow) flow controllers integrated into different infusion systems. BOTTOM LEFT – Acu Rate's variable (multi flow) flow controller. BOTTOM RIGHT – An example of one of Acu Rate's 100mL/h single flow flow controllers.



How the Device Works



principles of Poiseuille's Equation, hence :-

- Flow rate is directly proportional to pressure
- Flow rate is inversely proportional to viscosity



ACU RATE flow controllers follow the principles of Bernoulli's Equation, hence :-

- Flow rate is proportional to the SQUARE **ROOT** of the pressure
- Flow rate is **NOT** affected by viscosity (or temperature)

Temperature Variation

Acu Rate Controller:

 Flow remains unchanged with temperature drop









250

200

Acu Rate Controller:

 Flow remains unchanged with fluids of different viscosity



Dial a Flow Saline vs Dextrose

Figure 3 : A graphical flow rate comparison between Acu Rate and Dial a Flow flow controller with fluids of differing viscosity.



Pressure Variation



Acu Rate Controller:

Patient activity induced pressure fluctuations do not affect the Acu Rate device as much as other non-energised devices

This is because Acu Rate's
devices follow Bernoulli's
equation whereby flow rate is
only proportional to the
SQUARE ROOT of the

pressure

Figure 4 : A graphical flow rate comparison between Acu Rate and non energised device as the pressure varies over time from patient induced activities.

Converts Simple Giving Sets into

Accurate Infusion Devices



Acu Rate Controller vs Electronic Pump



Acu Rate Controller vs Electronic Pump



Acu Rate Controller vs Electronic Pump





Applications



Safety

Single use – disposable
Eliminate possibility of "freeflow" or "runaway"

Single flow device – Flow rates are fixed and cannot be altered by patient ; tamper proof

Cost & Manufacturability

Costs little more than simple IV sets Eliminate costs of pump powered infusion: Calibration / Maintenance Repair Nursing (responding to alarms & home visits) High precision manufacturing produces an orifice within $\pm 3\%$ accuracy