

INSULIN INFUSION, CONTINUOUS, INTRAVENOUS (Regular Insulin) FOR PATIENTS GREATER THAN 2.5 kg

For ICN patients less than 2.5 kg, use ICN policy “Insulin Infusion for Management of Hyperglycemia in Low Birth Weight (LBW) 2.5 kg or Less Neonates.”

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Critical Points

1. To avoid iatrogenic hypoglycemia, insulin infusion is given in a dedicated line via bifuse tubing.
 - Insulin infusion is connected to a dextrose containing IV fluid running at maintenance rate. **See [Appendix A](#).**
 - **Exception: patient admitted to intensive care with Diabetic Ketoacidosis (DKA) with blood glucose (BG) greater than 300 mg/dL. Normal saline IV fluid is connected until BG is under 300 mg/dL and per provider order.**
 - **When decreasing the rate of a dextrose containing IV fluid infusion, consult provider to prevent iatrogenic hypoglycemic event.**
2. To avoid inadvertent insulin boluses, use separate IV site for other fluids or medications.
 - If vascular access is limited and insulin is infused with other fluids or medications, the primary attending MD and the Endocrine Service is notified and a plan developed to prevent inadvertent insulin boluses. Plan is documented in the provider order. Insulin infusion is still connected to a dextrose containing IV fluid. See [Appendix A](#).
3. All insulin infusions are administered using the infusion pump Guardrails® Drug Library and volume to be infused feature (VTBI). VTBI should not be set for greater than two times the hourly rate.
4. If TPN or enteral tube feeds are interrupted for longer than 30 minutes, administer D₁₀W at the rate of TPN or tube feeding and notify provider immediately to obtain orders for dextrose.
5. Insulin binds to plastic. To ensure dose accuracy, prime tubing as outlined in [Insulin Infusion #4](#).

Supplies

- Infusion pump (Alaris™) or syringe pump (Medfusion®)
- Insulin solution from Pharmacy
- Tubing (Pharmacy attaches and primes tubing if syringe is used)
- IV labels

Insulin Infusion, Continuous, Intravenous (Regular Insulin) for patients > 2.5 kg (continued)**Procedure****INSULIN INFUSION**

1. Review pediatric insulin infusion orders.
2. Use a **dedicated** IV line (to avoid iatrogenic hypoglycemia). **Insulin infusion is connected to a maintenance IV, via bifuse tubing, containing dextrose except when treating DKA and BG is greater than 250 mg/dL. See [Critical Point #1](#).**
3. Obtain insulin infusion bag/syringe (prepared by Pharmacy). Standard concentration is 1 unit per 1 mL for patients > 2.5 kg.
4. Connect insulin infusion bag to appropriate tubing and prime with 20 mL before connecting to patient. Apply insulin label to tubing.
 - When a syringe is dispensed, Pharmacy will prime attached tubing.
5. Insulin infusions require a 2-RN independent check upon initiation, change of shift, and assumption of care, as well as with any dose, IV bag, and/or IV infusion syringe change. Two RNs independently check insulin type, concentration, number of units/kg/hour, and pump rate.
6. Check BG and follow appropriate pediatric insulin infusion titration guidelines, if applicable, per order set:
 - IP PED IV Insulin – Hyperglycemia (NOT DKA)
 - IP PICU Diabetic Ketoacidosis (DKA) Addendum
 - ED PED Diabetic Ketoacidosis (DKA) Addendum
7. RN to round calculations to the furthest, most precise, decimal place possible (e.g., 0.012 units/kg/hour is more precise than 0.01 units/kg/hour) when following titration orders. Syringe size limits the minimum and maximum rate of infusion. When ordering new syringe, notify pharmacy of current rate/dose to assist in dispensation of an appropriate sized syringe. See [Appendix B](#).
8. If insulin bolus is required, use bolus feature on IV pump.

DISCONTINUING INSULIN INFUSION

If subcutaneous insulin is indicated, before stopping IV insulin infusion initiate either:

1. Subcutaneous insulin **via syringe**-
 - Long-acting insulin (e.g., detemir) given at least 3 hours before discontinuing IV insulin infusion.

OR

 - Long-acting insulin AND fast-acting insulin (e.g., aspart) given at least 1 hour before discontinuing IV insulin infusion.
2. Subcutaneous insulin **via insulin pump**-
 - Insulin pump basal rate started at least 3 hours before discontinuing IV insulin infusion.

OR

 - Insulin pump basal rate started AND bolus given via insulin pump at least 1 hour before discontinuing IV insulin infusion.

Insulin Infusion, Continuous, Intravenous (Regular Insulin) for patients > 2.5 kg (*continued*)

MANAGEMENT OF HYPOGLYCEMIA

1. Monitor for symptoms of hypoglycemia (e.g., sweating, shaking, irritability, headache, paleness, confusion).
2. Provide intervention as ordered and report to provider.

DOCUMENTATION

- Document insulin infusion in **units/kg/hour** in patient's MAR.

Troubleshooting

Problem	Suspected issue	Action
Non-response of BG to IV insulin infusion	<ul style="list-style-type: none"> • Error with dose/rate calculations or entry in pump • BG meter inaccurate • BG sample influenced by recent dextrose infusion • tubing not adequately primed • dehydration • bag/syringe prep error 	<ul style="list-style-type: none"> • Re-check insulin dose/rate calculations • Re-check entries in pump • Obtain lab sample to verify glucose meter accuracy • Ensure venous specimen site has not infused a recent dextrose solution • Validate tubing was primed, per procedure, before connection to patient • Assess hydration status • Contact provider and discuss any dextrose containing infusions and the potential need for stopping them • Request new infusion bag or syringe from Pharmacy
Calculated dose cannot be programmed into pump	<ul style="list-style-type: none"> • Syringe size is too big 	<ul style="list-style-type: none"> • Contact Pharmacy with current rate/dose and request smaller sized syringe

References

Level of Evidence (FAME*)	Level*	Reference
	E4	Wolfsdorf, J. I., Glaser, N., Agus, M., Fritsch, M., Hanas, R., Rewers, A., Sperling, M. A., & Codner, E. (2018). ISPAD Clinical Practice Consensus Guidelines 2018: Diabetic ketoacidosis and the hyperglycemic hyperosmolar state. <i>Pediatric Diabetes</i> , 19 Suppl 27, 155–177. https://doi.org/10.1111/pedi.12701
	E3	Goldberg, P. A., Kedves, A., Walter, K., Groszmann, A., Belous, A., & Inzucchi, S. E. (2006). "Waste not, want not": determining the optimal priming volume for intravenous insulin infusions. <i>Diabetes Technology & Therapeutics</i> , 8(5), 598–601. https://doi.org/10.1089/dia.2006.8.598
* FAME Scale details: See nursing policy Policy, Procedure, & Competency Development, Review, & Approval		

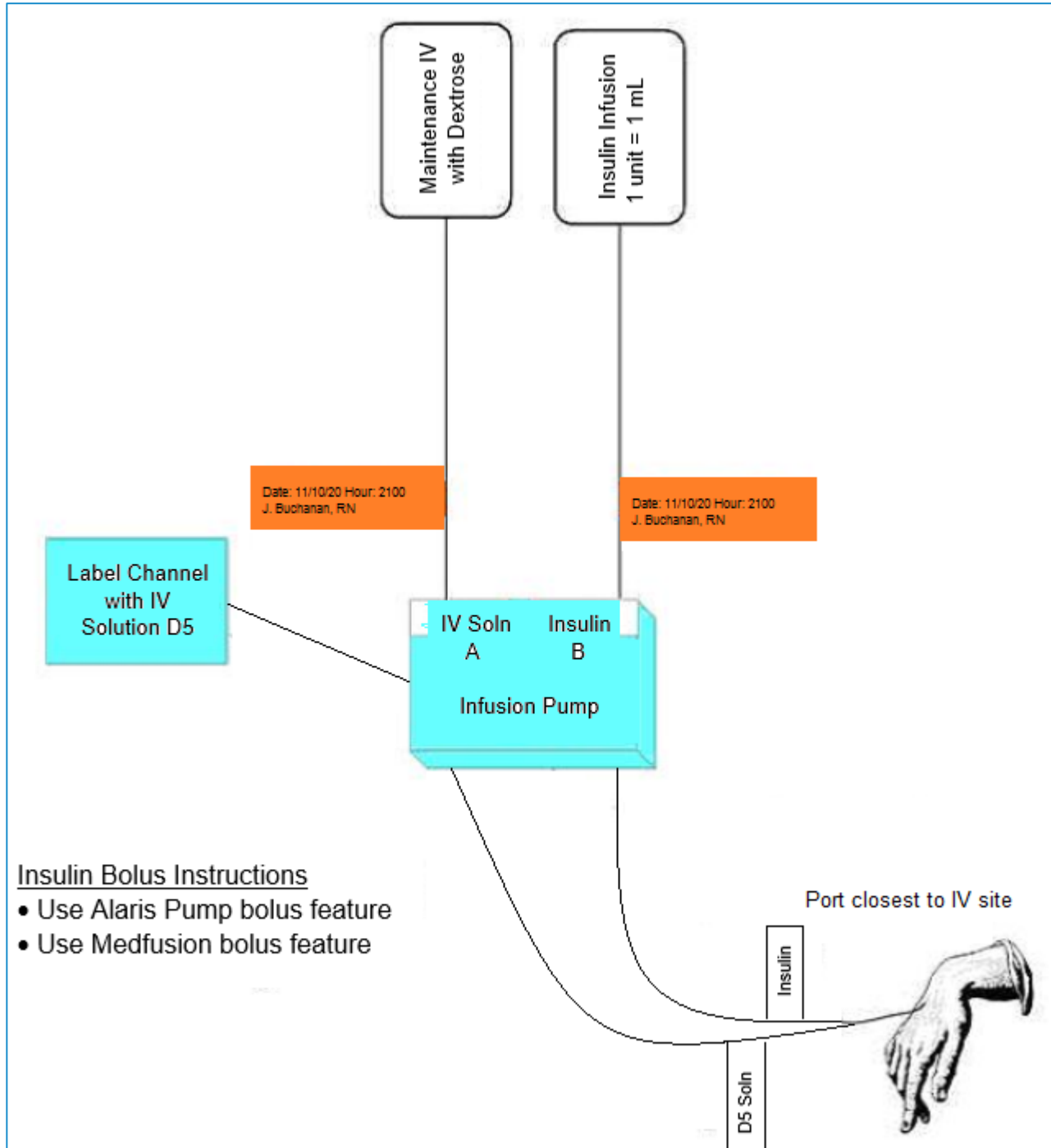
Insulin Infusion, Continuous, Intravenous (Regular Insulin) for patients > 2.5 kg (*continued*)

Procedure History

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Insulin Infusion, Continuous, Intravenous (Regular Insulin) for patients > 2.5 kg (*continued*)

Appendix A: Insulin Infusion Set-Up with Insulin Bolus Instructions



TITLE (*continued*)

Appendix B: Medfusion Syringe Pump Minimum Rates

B-D Syringe Size	Minimum Rate
20 mL, 30 mL, 60 mL	0.1 mL/hr
10 mL	0.07 mL/hr
5 mL	0.03 mL/hr
3 mL	0.02 mL/hr
1 mL	0.01 mL/hr