

# Injectable Diabetic Medications Throughout Transitions of Care

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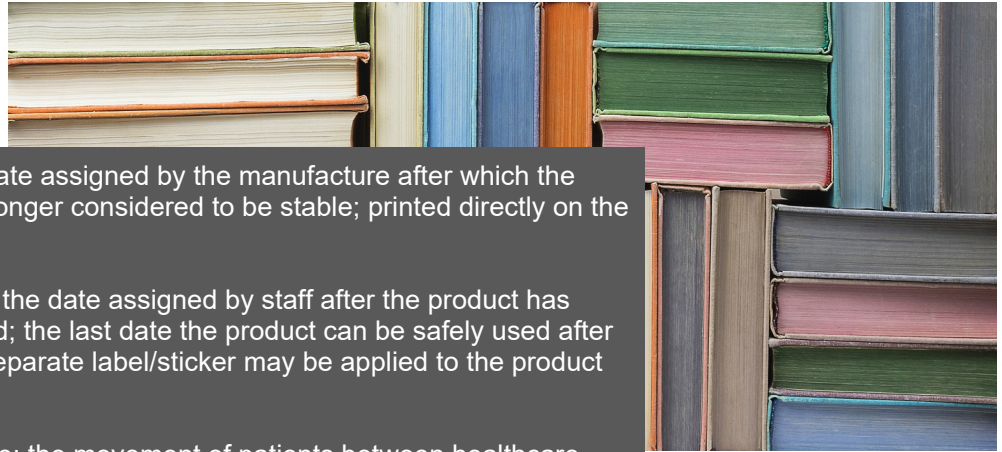
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## Learning Objectives

1. Discuss proper storage of injectable diabetic medications
2. Discuss proper disposal of injectable diabetic medications and/or their supplies
3. Discuss the implications of inpatient vs outpatient injectable diabetic medications during the transitions of care
4. Discuss how to build relationships with software vendors to offer diabetic patients support during transitions of care

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## Definitions



Expiration date: date assigned by the manufacture after which the medication is no longer considered to be stable; printed directly on the product

Beyond use date: the date assigned by staff after the product has been opened/used; the last date the product can be safely used after being altered; a separate label/sticker may be applied to the product to show this date

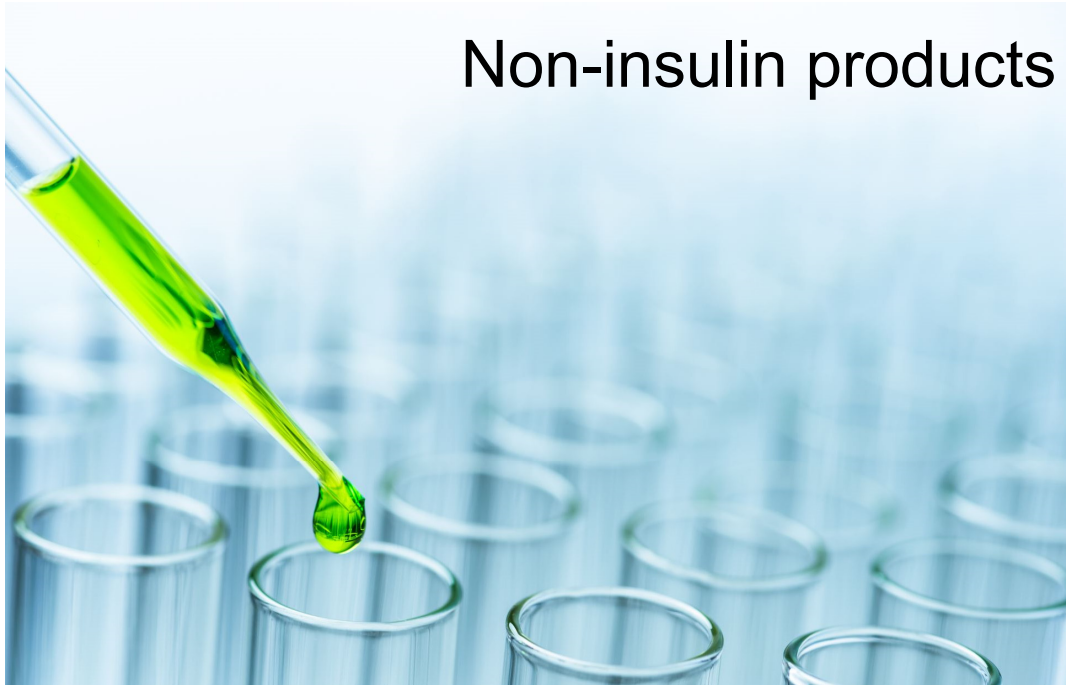
Transitions of Care: the movement of patients between healthcare settings and home and the changes in their care needs

T1DM: Type 1 diabetes mellitus

T2DM: Type 2 diabetes mellitus

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## Non-insulin products



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## Symlin (pramlintide)



- **Storage instructions:** unused pens should be kept in the refrigerator; after first use can be kept at room temperature or in refrigerator and used within 30 days; do NOT use if frozen
- **Proper disposal technique:** used pen needles and SymlinPen should be disposed of in an FDA-cleared sharps container
- **Supplies needed:** SymlinPen 60 or SymlinPen 120 pen-injector, compatible pen needle (29, 30, or 31 gauge), alcohol swab, sharps container
- **Pack size**
  - **SymlinPen 60:** two 1.5 mL multidose pens, 1000mcg/ml
  - **SymlinPen 120:** two 2.7 mL multidose pens, 1000mcg/ml

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## Symlin (pramlintide)



- **Dosing**
  - **T1DM (SymlinPen 60):** 15 mcg prior to major meals initially, titrated by 15 mcg every 3 days to goal 30-60 mcg prior to major meals
    - If goal is 30 mcg, one package will last 34 days; if goal is 45 mcg, one package will last 23 days; if goal is 60 mcg, one package will last 17 days
  - **T2DM (SymlinPen 120):** 60 mcg prior to major meals initially, increase to 120 mcg prior to major meals after 3 days if tolerated
    - If goal is 60 mcg, one package will last 30 days; if goal is 120 mcg, one package will last 15 days
- **Converting to inpatient:** no other amylin mimetics on market, will have to d/c therapy while in the hospital or have provider place a non-formulary order

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## Bydureon (exenatide extended-release)



- **Storage instructions:** unused device should be kept flat in the refrigerator, but can be kept at room temperature for up to 28 days
- **Proper disposal technique:** used device should be disposed of in a sharps container
- **Supplies needed:** device tray (contains needle), alcohol swab, sharps container
- **Pack size:** four 2 mg single-dose auto-injectors
- **Dosing:** 2 mg once weekly without regard to meals
  - Each package will last 28 days
- **Converting to inpatient:** can convert from ER to IR formulations (Byetta)

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## Byetta (exenatide immediate release)



- **Storage instructions:** unused pens should be kept in the refrigerator; open pens can be kept at room temperature for up to 30 days
- **Proper disposal technique:** used pen and pen needles should be disposed of in a sharps container
- **Supplies needed:** pen, pen needle (29, 30, or 31 gauge), alcohol swab, sharps container
- **Pack size**
  - **5 mcg/dose pen:** one 1.2 mL pen, 250mcg/ml
  - **10 mcg/dose pen:** one 2.4 mL pen, 250mcg/ml
- **Dosing:** 5 mcg bid prior to morning and evening meals, may increase to 10 mcg bid if needed to achieve glycemic control
  - Each pen contains 60 doses to last 30 days
- **Converting to inpatient:** can convert from IR to ER formulation (Bydureon)

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## Victoza (liraglutide)



- **Storage instructions:** unused pens should be kept in the refrigerator; open pens can be kept at room temperature or in the refrigerator for up to 30 days
- **Proper disposal technique:** used pen and pen needles should be disposed of in a sharps container
- **Supplies needed:** pen, pen needle (NovoFine 32 gauge recommended), alcohol swab, sharps container
- **Pack size**
  - **2 pen pack:** two 18 mg/3 mL multidose pens, 6mg/ml
  - **3 pen pack:** three 18 mg/3 mL multidose pens, 6mg/ml

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## Victoza (liraglutide)



- **Dosing:** 0.6 mg once daily for one week, then increase to 1.2 mg once daily, can increase to 1.8 mg once daily if glycemic control is not achieved after 1 week
  - **2 pen pack:** 30 days of 1.2 mg dosing
  - **3 pen pack:** 30 days of 1.8 mg dosing
- **Converting to inpatient:** if switching from liraglutide to weekly GLP-1 agonist, first dose of new GLP-1 should be administered the following day after last liraglutide dose

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Name \_\_\_\_\_  
Address \_\_\_\_\_ Date \_\_\_\_\_

Victoza

#2 pens

0.6 mg SQ qd for one week,

then 1.2 mg SQ qd

2 pens x 3 mL = 6 mL

6 mL x 18 mg/3 mL = 36 mg per package

Initiation:

0.6 mg x 7 days = 4.2 mg (first week of tx)

36 mg - 4.2 mg = 31.8 mg left

31.8 mg / 1.2 mg daily = 26.5 days

7 days + 26.5 days = 33.5 days supply

Maintenance:

36 mg / 1.2 mg daily = 30 day supply

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## Trulicity (dulaglutide)



- **Storage instructions:** refrigeration recommended, but each pen can be stored at room temperature for up to 14 days
- **Proper disposal technique:** used pen should be placed in a sharps container
- **Supplies needed:** pen, alcohol swab, sharps container
- **Pack size**
  - **0.75 mg/0.5 mL:** four 0.5 mL single-use pens
  - **1.5 mg/0.5 mL:** four 0.5 mL single-use pens
  - **3 mg/0.5 mL:** four 0.5 mL single-use pens
  - **4.5 mg/0.5 mL:** four 0.5 mL single-use pens
- **Dosing:** 0.75 mg once weekly, can increase to 1.5 mg after 4-8 weeks, max dose 4.5 mg once weekly
  - Each package will last 28 days
- **Converting to inpatient:** must convert to other GLP-1 agonist or DC

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## Adlyxin (lixisenatide)



- **Storage instructions:** unused pen should be kept in the refrigerator; open pens can be kept at room temperature for up to 14 days
- **Proper disposal technique:** used pen and pen needle should be disposed of in sharps container
- **Supplies needed:** pen, pen needle, alcohol swab, sharps container
- **Pack size**
  - **Kit carton:** one 50 mcg/mL 3 mL pen and one 100mcg/ml 3 mL pen
  - **Maintenance carton:** two 3 mL pens, 100mcg/ml
- **Dosing:** 10 mcg once daily, on day 15 increase to 20 mcg once daily
  - Each carton will last 28 days
- **Converting to inpatient:** must convert to other GLP-1 agonist or DC

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## Ozempic (semaglutide)



- **Storage instructions:** unused pen should be stored in the refrigerator; open pen can be kept at room temperature or in the refrigerator for up to 56 days
- **Proper disposal technique:** used pen and pen needle should be discarded in a sharps container
- **Supplies needed:** pen, pen needle (NovoFine Plus 32 g included), alcohol swab, sharps container
- **Pack size**
  - **0.25 or 0.5 mg dose:** one 2mg/1.5 mL multidose pen, 1.34mg/ml
  - **1 mg dose:** two 2mg/1.5 mL multidose pens, 1.34mg/ml
  - **1 mg dose:** one 4mg/3 mL pen, 1.34mg/ml

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## Ozempic (semaglutide)



- **Dosing:** 0.25 mg once weekly for four weeks, then increase to 0.5 mg once weekly, can increase to max 1 mg once weekly to achieve glycemic control
  - 0.25 or 0.5 mg dose pen will last 28 days of 0.5 mg dosing
  - 1.5 mL 1 mg dose pen will last 28 days
  - 3 mL 1 mg dose pen will last 28 days
- **Converting to inpatient:** oral semaglutide available or can convert to other GLP-1 agonist or DC

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## Insulin products



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## Admelog SoloStar, Humalog U-100 KwikPen (insulin lispro pen-injector)



- **Storage instructions:** unused pens should be kept in the refrigerator; open pens should be kept at room temperature for up to 28 days
- **Proper disposal technique:** used pen and pen needles should be disposed of in sharps container
- **Supplies needed:** pen, pen needle (BD Ultra-Fine, Clickfine, or UniFine Pentips recommended), alcohol swab, sharps container
- **Pack size:** five 3 mL multidose pens, 100 units/ml

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## Admelog SoloStar, Humalog U-100 KwikPen (insulin lispro pen-injector)



- **Dosing**
  - **T1DM:** 0.4-1 units/kg/day in divided doses
    - One pen will last 6 days assuming 45 units/day
    - One package will last 33 days, assuming 45 units/day usage
  - **T2DM:** 4-5 units once daily before the largest meal of the day
    - One pen lasts **only until BUD date**
    - One package will last 140 days
  - **Converting to inpatient:** can switch to vials, can be converted unit-to-unit to any other rapid-acting insulin (aspart or glulisine), generic available for Humalog KwikPen

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## Admelog, Humalog (insulin lispro vial)



- **Storage instructions:** unused vial should be kept in the refrigerator; open vials should be kept at room temperature for up to 28 days
- **Proper disposal technique:** used vial and syringes should be disposed of in sharps container
- **Supplies needed:** vial, U-100 insulin syringe, alcohol swab, sharps container
- **Pack size**
  - One 3 mL vial, 100units/ml
  - One 10 mL vial, 100units/ml

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## Admelog, Humalog (insulin lispro vial)



- **Dosing**
  - **T1DM:** 0.4-1 units/kg/day in divided doses
    - One 3 mL vial will last 6 days, assuming 45 units/day dosing; one 10 mL vial will last 22 days, assuming 45 units/day dosing
  - **T2DM:** 4-5 units once daily before the largest meal of the day
    - One 3 mL vial will last **until BUD**
- **Converting to inpatient:** can switch to other insulin lispro pen-injectors (Humalog KwikPen) or vials with no conversion, can be converted unit-to-unit to any other rapid-acting insulin (aspart or glulisine)

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## Humalog Dosing Example for Days Supply

Patient = 90 kgs  
Dose= 0.5 units/kg/day  
in 3 divided doses  
0.5 units x 90kgs = 45  
units/day (15 units three  
times daily)

3 ml vial (100 units/ml) =  
300 units per vial  
300 units / 45 units per  
day =  
6.66 days supply



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## Humalog U-200 KwikPen (insulin lispro pen-injector)



- **Storage instructions:** unused pens should be kept in the refrigerator; open pens should be kept at room temperature for up to 28 days
- **Proper disposal technique:** used pen and pen needles should be disposed of in sharps container
- **Supplies needed:** pen, pen needle (Beckton, Dickinson, and Company recommended), alcohol swab, sharps container
- **Pack size:** two 3 mL multidose pens, **200units/ml**

High alert: concentrated  
insulin



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## Humalog U-200 KwikPen (insulin lispro pen-injector)



- **Dosing**
  - **T1DM:** 0.4-1 units/kg/day in divided doses
    - One pen will last 13 days, assuming 45 units/day usage
    - One package will last 26-27 days, assuming 45 units/day usage
  - **T2DM:** 4-5 units once daily before the largest meal of the day
    - One pen will last **until BUD**
    - One package will last 56 days
- **Converting to inpatient:** can switch to other insulin lispro pen-injectors (Admelog SoloStar) or vials with no conversion, can be converted unit-to-unit to any other rapid-acting insulin (aspart or glulisine)

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## Apidra SoloStar (insulin glulisine pen-injector)



- **Storage instructions:** unused pens should be kept in the refrigerator; open pens should be kept at room temperature for up to 28 days
- **Proper disposal technique:** used pen and pen needles should be disposed of in sharps container
- **Supplies needed:** pen, pen needle (Beckton, Dickinson, and Company, Ypsomed, or Owen Mumford recommended), alcohol swab, sharps container
- **Pack size:** five 3 mL multidose pens, 100units/ml

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## Apidra SoloStar (insulin glulisine pen-injector)



- **Dosing**
  - **T1DM:** 0.4-0.5 units/kg/day in divided doses
    - One pen will last 6 days, assuming 45 units/day usage
    - One package will last 33 days, assuming 45 units/day usage
  - **T2DM:** 4-5 units once daily before the largest meal of the day
    - One pen will last **only until BUD**
    - One package will last 140 days
- **Converting to inpatient:** can be converted unit-to-unit to any other rapid-acting insulin (aspart or lispro)

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## Apidra (insulin glulisine vial)



- **Storage instructions:** unused vial should be kept in the refrigerator; open vial should be kept at room temperature for up to 28 days
- **Proper disposal technique:** used vial and syringes should be disposed of in sharps container
- **Supplies needed:** pen, U-100 insulin syringe, alcohol swab, sharps container
- **Pack size:** one 10 mL vial, 100units/ml
  - **T1DM:** 0.4-1 units/kg/day in divided doses
    - One vial will last 22 days, assuming 45 units/day usage
  - **T2DM:** 4-5 units once daily before the largest meal of the day
    - One vial will last **only until BUD**
- **Converting to inpatient:** can switch to pen-injector or can be converted unit-to-unit to any other rapid-acting insulin (aspart or lispro)

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## Novolog FlexPen, Fiasp FlexTouch (insulin aspart pen injector)



- **Storage instructions:** unused pens should be kept in the refrigerator; open pens should be kept at room temperature for up to 28 days
- **Proper disposal technique:** used pen and pen needles should be disposed of in sharps container
- **Supplies needed:** pen, pen needle (NovoFine Plus, NovoFine, NovoFine® Autocover, and NovoTwist recommended), alcohol swab, sharps container
- **Pack size:** five 3 mL multidose pens, 100units/ml

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## Novolog FlexPen, Fiasp FlexTouch (insulin aspart pen injector)



- **Dosing**
  - **T1DM:** 0.4-0.5 units/kg/day in divided doses
    - One pen will last 6 days, assuming 45 units/day usage
    - One package will last 33 days, assuming 45 units/day usage
  - **T2DM:** 4-5 units once daily before the largest meal of the day
    - One pen will last **only until BUD**
    - Once package will last 140 days
- **Converting to inpatient:** can convert to vial, can be converted unit-to-unit to any other rapid-acting insulin (glulisine or lispro)

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## Novolog, Fiasp (insulin aspart vial)



- **Storage instructions:** unused vial should be kept in the refrigerator; open vials should be kept at room temperature for up to 28 days
- **Proper disposal technique:** used vial and syringes should be disposed of in sharps container
- **Supplies needed:** pen, U-100 insulin syringe, alcohol swab, sharps container
- **Pack size:** one 10 mL vial, 100 units/ml
  - **T1DM:** 0.4-1 units/kg/day in divided doses
    - One vial will last 22 days, assuming 45 units/day usage
  - **T2DM:** 4-5 units once daily before the largest meal of the day
    - One vial will last **only until BUD**
- **Converting to inpatient:** can switch to pen-injector or can be converted unit-to-unit to any other rapid-acting insulin (glulisine or lispro)

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Name \_\_\_\_\_  
 Address \_\_\_\_\_ Date \_\_\_\_\_

*Novolog vial*  
*10 mL*  
*15 units tid ac*

$$10 \text{ mL} \times 100 \text{ units/mL} = 1000 \text{ units}$$

$$1000 \text{ units} / (15 \text{ units/dose} \times 3 \text{ doses}) = 22.2 \text{ days}$$

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## Novolin R FlexPen (insulin regular pen-injector)



- **Storage instructions:** unused pens should be kept in the refrigerator (until expiration date) or at room temperature (for up to 28 days); open pens should be kept at room temperature for up to 28 days
- **Proper disposal technique:** used pen and pen needles should be disposed of in sharps container
- **Supplies needed:** pen, pen needle (NovoFine Plus, NovoFine, NovoFine® Autocover, and NovoTwist recommended), alcohol swab, sharps container
- **Pack size:** five 3 mL multidose pens, 100units/ml

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## Novolin R FlexPen (insulin regular pen-injector)



- **Dosing**
  - **T1DM:** 0.4-1 units/kg/day in divided doses
    - One pen will last 6 days, assuming 45 units/day usage
    - One package will last 33 days, assuming 45 units/day usage
  - **T2DM:** 4-5 units once daily before the largest meal of the day
    - One pen will last **only until BUD**
    - One package will last 140 days
- **Converting to inpatient:** can be converted to any rapid-acting insulin unit-to-unit, can be converted to vial

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## Humulin R (insulin regular vial)



- **Storage instructions:** unused vial should be kept in the refrigerator (until expiration date) or at room temperature (for up to 31 days), open vial should be kept at room temperature for up to 31 days
- **Proper disposal technique:** used vial and syringes should be disposed of in sharps container
- **Supplies needed:** vial, U-100 insulin syringe, alcohol swab, sharps container
- **Pack size:** one 10 mL vial
  - **T1DM:** 0.4-1 units/kg/day in divided doses
    - One vial will last 22 days, assuming 45 units/day usage
  - **T2DM:** 4-5 units once daily before the largest meal of the day
    - One vial will last 200-250 days; **only until BUD**
- **Converting to inpatient:** can be converted to any rapid-acting insulin unit-to-unit

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## Novolin R (insulin regular vial)



- **Storage instructions:** unused vial should be kept in the refrigerator (until expiration date) or at room temperature (for up to 42 days), open vial should be kept at room temperature for up to 42 days
- **Proper disposal technique:** used vial and syringes should be disposed of in sharps container
- **Supplies needed:** U-100 insulin syringe, alcohol swab, sharps container
- **Pack size:** one 10 mL vial
  - **T1DM:** 0.4-1 units/kg/day in divided doses
    - One vial will last 22 days, assuming 45 units/day usage
  - **T2DM:** 4-5 units once daily before the largest meal of the day
    - One vial will last **only until BUD**
- **Converting to inpatient:** can be converted to any rapid-acting insulin unit-to-unit, can be converted to pen injector

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## Humulin R U-500 KwikPen (insulin regular U-500 pen-injector)



- **Storage instructions:** unused pens should be kept in the refrigerator (until expiration date) or at room temperature (for up to 28 days); open pens should be kept at room temperature for up to 28 days
- **Proper disposal technique:** used pen and pen needles should be disposed of in sharps container
- **Supplies needed:** pen, pen needle (Beckton, Dickinson, and Company recommended), alcohol swab, sharps container
- **Pack size:** two 3 mL multidose pens, **500units/ml**



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## Humulin R U-500 KwikPen (insulin regular U-500 pen-injector)



- **Dosing**
  - **T1DM and T2DM:** Only for use in patients with VERY HIGH insulin requirements
  - Very high risk medication, requires meticulous dosing and conversion
- **Converting to inpatient:** can be converted to any rapid-acting insulin unit-to-unit, can be converted to vial

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## Humulin R U-500 (insulin regular U-500 vial)



- **Storage instructions:** unused vial should be kept in the refrigerator (until expiration date) or at room temperature (for up to 40 days); open vial should be kept at room temperature for up to 40 days
- **Proper disposal technique:** used vial and syringes should be disposed of in sharps container
- **Supplies needed:** pen, **U-500 insulin syringe** (do not use U-100), alcohol swab, sharps container
- **Pack size:** one 20 mL vial, **500 units/ml**
  - **T1DM and T2DM:** Only for use in patients with VERY HIGH insulin requirements
  - Very high risk medication, requires meticulous dosing and conversion
- **Converting to inpatient:** can be converted to any rapid-acting insulin unit-to-unit, can be converted to pen-injector



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## Humulin N KwikPen (insulin NPH pen-injector)



- **Storage instructions:** unused pens should be kept in the refrigerator (until expiration date) or at room temperature (for up to 14 days); open pens should be kept at room temperature for up to 14 days
- **Proper disposal technique:** used pen and pen needles should be disposed of in sharps container
- **Supplies needed:** pen, pen needle (NovoFine Plus, NovoFine, NovoFine® Autocover, and NovoTwist recommended), alcohol swab, sharps container
- **Pack size:** five 3 mL multidose pens, 100 units/ml
- **Dosing**
  - **T1DM:** 0.4-1 units/kg/day in divided doses
    - One package will last 33 days, assuming 45 units/day usage
  - **T2DM:** 10 units/day administered at bedtime or two divided doses
    - One package will last 150 days
- **Converting to inpatient:** can be converted to insulin detemir unit-to-unit or to insulin glargine unit-to-unit if given once daily or at 20% reduction if given twice daily, or to vial

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## Humulin N (insulin NPH vial)



- **Storage instructions:** unused pens should be kept in the refrigerator (until expiration date) or at room temperature (for up to 31 days); open pens should be kept at room temperature for up to 31 days
- **Proper disposal technique:** used vial and syringe should be disposed of in sharps container
- **Supplies needed:** vial, syringe, alcohol swab, sharps container
- **Pack size:** one 10 mL vial, 100 units/ml

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## Humulin N (insulin NPH vial)



- **Dosing**
  - **T1DM:** 0.4-1 units/kg/day in divided doses
    - One vial will last 23 days, assuming 45 units/day usage
  - **T2DM:** 4-5 units once daily before the largest meal of the day
    - One package will last 200-250 days
- **Converting to inpatient:** can be converted to insulin detemir unit-to-unit or to insulin glargine unit-to-unit if given once daily or at 20% reduction if given twice daily

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## Novolin N FlexPen (insulin NPH pen-injector)



- **Storage instructions:** unused pens should be kept in the refrigerator (until expiration date) or at room temperature (for up to 28 days); open pens should be kept at room temperature for up to 28 days
- **Proper disposal technique:** used pen and pen needles should be disposed of in sharps container
- **Supplies needed:** pen, pen needle (NovoFine Plus, NovoFine, NovoFine® Autocover, and NovoTwist recommended), alcohol swab, sharps container
- **Pack size:** five 3 mL multidose pens, 100 units/ml

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## Novolin N FlexPen (insulin NPH pen-injector)



- **Dosing**
  - **T1DM:** 0.4-1 units/kg/day in divided doses
    - One package will last 33 days, assuming 45 units/day usage
  - **T2DM:** 4-5 units once daily before the largest meal of the day
    - One package will last 150 days
- **Converting to inpatient:** can be converted to insulin detemir unit-to-unit or to insulin glargine unit-to-unit if given once daily or at 20% reduction if given twice daily, or to vial

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## Novolin N (insulin NPH vial)



- **Storage instructions:** unused pens should be kept in the refrigerator (until expiration date) or at room temperature (for up to 42 days); open pens should be kept at room temperature for up to 42 days
- **Proper disposal technique:** used vial and syringe should be disposed of in sharps container
- **Supplies needed:** vial, U-100 syringe, alcohol swab, sharps container
- **Pack size:** one 10 mL vial, 100 units/ml
- **Dosing**
  - **T1DM:** 0.4-1 units/kg/day in divided doses
    - One vial will last 22 days, assuming 45 units/day usage
  - **T2DM:** 4-5 units once daily before the largest meal of the day
    - One vial will last **only until BUD**
- **Converting to inpatient:** can be converted to insulin detemir unit-to-unit, can be converted to insulin glargine unit-to-unit if given once daily or at 20% reduction if given twice daily

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## Basaglar KwikPen, Lantus SoloStar (insulin glargine pen-injector)



- **Storage instructions:** can be stored in the refrigerator (until expiration date) or at room temperature (for up to 28 days); open pen should be kept at room temperature for up to 28 days
- **Proper disposal technique:** used pen and pen needles should be disposed of in sharps container
- **Supplies needed:** pen, pen needle, alcohol swab, sharps container
- **Pack size:** five 3 mL multidose pens, 100 units/ml
- **Dosing**
  - **T1DM:** 0.4-1 units/kg/day in divided doses
    - One package will last 33 days, assuming 45 units/day usage
  - **T2DM:** 10 units/day administered once daily
  - One package will last 150 days
- **Converting to inpatient:** can be converted to other long-acting insulin unit-to-unit, may need higher dose if given twice daily, can convert to vial (Lantus SoloStar only)

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Name \_\_\_\_\_  
Address \_\_\_\_\_ Date \_\_\_\_\_

Lantus SoloStar

#5 pens

45 units qhs

$$5 \text{ pens} \times 3 \text{ mL} = 15 \text{ mL}$$

$$15 \text{ mL} \times 100 \text{ units/mL} = 1500 \text{ units}$$

$$1500 \text{ units} / 45 \text{ units/day} = 33.3 \text{ day supply}$$

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## Lantus (insulin glargine vial)




- **Storage instructions:** can be stored in the refrigerator (until expiration date) or at room temperature (for up to 28 days), open pen should be kept at room temperature for up to 28 days
- **Proper disposal technique:** used vial and syringe should be disposed of in sharps container
- **Supplies needed:** vial, U-100 syringe, alcohol swab, sharps container
- **Pack size:** one 10 mL multidose vial
- **Dosing**
  - **T1DM:** 0.4-1 units/kg/day in divided doses
    - One vial will last 23 days, assuming 45 units/day usage
  - **T2DM:** 10 units/day administered once daily
    - One vial will last 100 days
- **Converting to inpatient:** can be converted to other long-acting insulin unit-to-unit, may need higher dose if given twice daily, can convert to pen-injector

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## Toujeo SoloStar (insulin glargine U-300 pen-injector)




- **Storage instructions:** can be stored in the refrigerator, open pen should be kept at room temperature for up to 56 days
- **Proper disposal technique:** used pen and pen needles should be disposed of in sharps container
- **Supplies needed:** pen, pen needle (BD, Ypsomed, or Owen Mumford recommended), alcohol swab, sharps container
- **Pack size:** three 1.5 mL multidose pens, **300 units/ml** 
- **Dosing**
  - **T1DM:** 0.4-1 units/kg/day in divided doses
    - One package will last 30 days, assuming 45 units/day usage
  - **T2DM:** 10 units/day administered once daily
  - One package will last 135 days
- **Converting to inpatient:** can be converted to other long-acting insulin unit-to-unit, may need higher dose if given twice daily

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## Toujeo Max SoloStar (insulin glargine U-300 pen injector)



- **Storage instructions:** can be stored in the refrigerator open pen should be kept at room temperature for up to 56 days, expiration date printed on label
- **Proper disposal technique:** used pen and pen needles should be disposed of in sharps container
- **Supplies needed:** pen, pen needle (BD, Ypsomed, or Owen Mumford recommended), alcohol swab, sharps container
- **Pack size:** two 3 mL multidose pens, **300 units/ml** 
- **Dosing**
  - **T1DM:** 0.4-1 units/kg/day in divided doses
    - One package will last 40 days, assuming 45 units/day usage
  - **T2DM:** 10 units/day administered once daily
  - One package will last 180 days
- **Converting to inpatient:** can be converted to other long-acting insulin unit-to-unit, may need higher dose if given twice daily

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## Soliqua 100/33 (insulin glargine and lixisenatide)



- **Storage instructions:** unused pens should be kept in the refrigerator, open pens should be kept at room temperature for 28 days
- **Proper disposal technique:** used pen and pen needles should be disposed of in a sharps container
- **Supplies needed:** pen, pen needle, alcohol swab, sharps container
- **Pack size:** five 3 mL multidose pens; 100units and 33mcg/ml

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## Soliqua 100/33 (insulin glargine and lixisenatide)



- **Dosing**
  - **Pt naive to GLP-1 agonist or basal insulin, or currently on a GLP-1 agonist, or < 30 units of basal insulin/day:** 15 units once daily
    - One pen will last 20 days
    - One package will last 100 days
  - **Pt currently on 30-60 units of basal insulin, w/wo GLP-1 agonist:** 30 units once daily
    - One pen will last 10 days
    - One package will last 50 days
  - Can titrate to max dose 60 units per day
    - One pen will last 5 days
    - One package will last 25 days
- **Converting to inpatient:** can convert to basal insulin on hospital formulary and equivalent GLP-1 agonist on hospital formulary

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## Levemir FlexTouch (insulin detemir pen-injector)



- **Storage instructions:** can be stored in the refrigerator (until expiration date) or at room temperature (for up to 42 days), open pen should be kept at room temperature for up to 42 days
- **Proper disposal technique:** used pen and pen needles should be disposed of in sharps container
- **Supplies needed:** pen, pen needle (NovoFine, NovoFine Plus, or NovoTwist recommended), alcohol swab, sharps container
- **Pack size:** five 3 mL multidose pens
- **Dosing**
  - **T1DM:** 0.4-1 units/kg/day in divided doses
    - One package will last 34 days, assuming 45 units/day usage
  - **T2DM:** 10 units/day administered once daily
  - One package will last 150 days
- **Converting to inpatient:** can be converted to other long-acting insulin unit-to-unit, may need lower dose, can be converted to vial

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## Levemir (insulin detemir vial)



- **Storage instructions:** can be stored in the refrigerator (until expiration date) or at room temperature (for up to 42 days); open pen should be kept at room temperature or in refrigerator for up to 42 days
- **Proper disposal technique:** used vial and syringe should be disposed of in sharps container
- **Supplies needed:** vial, U-100 syringe, alcohol swab, sharps container
- **Pack size:** one 10 mL vial, 100 units/ml
- **Dosing**
  - **T1DM:** 0.4-1 units/kg/day in divided doses
    - One vial will last 22 days, assuming 45 units/day usage
  - **T2DM:** 10 units/day administered once daily
    - One vial will last **only until BUD**
- **Converting to inpatient:** can be converted to other long-acting insulin unit-to-unit, may need lower dose, can be converted to pen

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## Tresiba U-100 FlexTouch (insulin degludec U-100 pen-injector)



- **Storage instructions:** can be stored in the refrigerator (until expiration date) or at room temperature (for up to 56 days); open pen should be kept at room temperature or in the refrigerator for up to 56 days
- **Proper disposal technique:** used pen and pen needles should be disposed of in sharps container
- **Supplies needed:** pen, pen needle (NovoFine, NovoFine Plus, or NovoTwist recommended), alcohol swab, sharps container
- **Pack size:** five 3 mL multidose pens, 100 units/ml
- **Dosing**
  - **T1DM:** 0.4-1 units/kg/day in divided doses
    - One package will last 33 days, assuming 45 units/day usage
  - **T2DM:** 10 units/day administered once daily
  - One package will last 150 days
- **Converting to inpatient:** can be converted to other long-acting insulin unit-to-unit, can be converted to vial

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## Tresiba (insulin degludec vial)



- **Storage instructions:** can be stored in the refrigerator (until expiration date) or at room temperature (for up to 56 days); open pen should be kept at room temperature or in refrigerator for up to 56 days
- **Proper disposal technique:** used vial and syringe should be disposed of in sharps container
- **Supplies needed:** vial, U-100 syringe, alcohol swab, sharps container
- **Pack size:** one 10 mL vial, 100 units/ml
- **Dosing**
  - **T1DM:** 0.4-1 units/kg/day in divided doses
    - One vial will last 22 days, assuming 45 units/day usage
  - **T2DM:** 10 units/day administered once daily
    - One vial will last **only until BUD**
- **Converting to inpatient:** can be converted to other long-acting insulin unit-to-unit, may need lower dose, can be converted to pen

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## Tresiba U-200 FlexTouch (insulin degludec U-200 pen-injector)



- **Storage instructions:** can be stored in the refrigerator (until expiration date) or at room temperature (for up to 56 days); open pen should be kept at room temperature or in the refrigerator for up to 56 days
- **Proper disposal technique:** used pen and pen needles should be disposed of in sharps container
- **Supplies needed:** pen, pen needle (NovoFine, NovoFine Plus, or NovoTwist recommended), alcohol swab, sharps container
- **Pack size:** three 3 mL multidose pens, **200 units/ml**
- **Dosing**
  - **T1DM:** 0.4-1 units/kg/day in divided doses
    - One package will last 40 days, assuming 45 units/day usage
  - **T2DM:** 10 units/day administered once daily
  - One package will last 180 days
- **Converting to inpatient:** can be converted to other long-acting insulin unit-to-unit, can be converted to vial



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## Humalog Mix 75/25 KwikPen and Humalog Mix 50/50 KwikPen (insulin lispro protamine and insulin lispro pen-injectors)



- **Storage instructions:** unused pens should be kept in the refrigerator; open pens should be kept at room temperature for up to 28 days, expiration date is printed on label
- **Proper disposal technique:** used pen and pen needles should be disposed of in sharps container
- **Supplies needed:** pen, pen needle (Beckton, Dickinson, and Company recommended), alcohol swab, sharps container
- **Pack size:** five 3 mL multidose pens, 100 units/ml

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Humalog Mix 75/25 KwikPen and Humalog Mix 50/50 KwikPen (insulin lispro protamine and insulin lispro pen-injectors)



- **Dosing**
  - **T1DM:** 0.4-1 units/kg/day in divided doses
    - One package will last 33 days, assuming 45 units/day usage
  - **T2DM:** 10-12 units/day in divided doses
    - One package will last 125-150 days
- **Converting to inpatient:** outpatient insulin requirements should be administered at the same dosage in two to three divided doses, can switch to equivalent vials with no dose alterations, can be converted to other premixed insulins (Novolin 70/30, Humulin 70/30) unit-to-unit, generic available for 75/25 mix

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Humalog Mix 75/25 and Humalog Mix 50/50 (insulin lispro protamine and insulin lispro vial)



- **Storage instructions:** unused vial should be kept in the refrigerator; open vial should be kept at room temperature for up to 28 days, expiration date is printed on label
- **Proper disposal technique:** used vial and syringes should be disposed of in sharps container
- **Supplies needed:** pen, U-100 insulin syringe, alcohol swab, sharps container
- **Pack size:** one 10 mL vial, 100 units/ml

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## Humalog Mix 75/25 and Humalog Mix 50/50 (insulin lispro protamine and insulin lispro vial)



- **Dosing**
  - **T1DM:** 0.4-1 units/kg/day in divided doses
    - One package will last 23 days, assuming 45 units/day usage
  - **T2DM:** 10-12 units/day in divided doses
    - One package will last **only until BUD**
- **Converting to inpatient:** outpatient insulin requirements should be administered at the same dosage in two to three divided doses, can switch to equivalent pen-injectors with no dose alterations, can be converted to other premixed insulins (Novolin 70/30, Humulin 70/30) unit-to-unit

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## Novolog Mix 70/30 FlexPen (insulin aspart protamine and insulin aspart pen-injector)



- **Storage instructions:** unused pens should be kept in the refrigerator (until expiration date) or at room temperature (for up to 14 days); open pens should be kept at room temperature for up to 15 days
- **Proper disposal technique:** used pen and pen needles should be disposed of in sharps container
- **Supplies needed:** pen, pen needle (NovoFine Plus, NovoFine, NovoFine® Autocover, and NovoTwist recommended), alcohol swab, sharps container
- **Pack size:** five 3 mL multidose pens, 100 units/ml
- **Dosing**
  - **T1DM:** 0.4-0.5 units/kg/day in divided doses
    - One package will last 33 days, assuming 45 units/day usage
  - **T2DM:** 4-5 units once daily before the largest meal of the day
    - One package will last 300-375 days
- **Converting to inpatient:** can convert to vial, can be converted unit-to-unit to other 70/30 premixed insulin

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## Novolog Mix 70/30 (insulin aspart and insulin aspart protamine vial)



- **Storage instructions:** unused vial should be kept in the refrigerator (until expiration date) or at room temperature (for up to 28 days); open vial should be kept at room temperature for up to 28 days
- **Proper disposal technique:** used vial and syringes should be disposed of in sharps container
- **Supplies needed:** pen, U-100 insulin syringe, alcohol swab, sharps container
- **Pack size:** one 10 mL vial
  - **T1DM:** 0.4-1 units/kg/day in divided doses
    - One vial will last 22 days, assuming 45 units/day usage
  - **T2DM:** 4-5 units once daily before the largest meal of the day
    - One vial will last **only until BUD**
- **Converting to inpatient:** can switch to pen, can be converted unit-to-unit to other 70/30 premixed insulin

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## Humulin 70/30 KwikPen (insulin NPH and insulin regular pen-injector)



- **Storage instructions:** unused pens should be kept in the refrigerator (until expiration date) or at room temperature (for up to 10 days); open pens should be kept at room temperature for up to 10 days
- **Proper disposal technique:** used pen and pen needles should be disposed of in sharps container
- **Supplies needed:** pen, pen needle (NovoFine Plus, NovoFine, NovoFine® Autocover, and NovoTwist recommended), alcohol swab, sharps container
- **Pack size:** five 3 mL multidose pens, 100 units/ml
- **Dosing**
  - **T1DM:** 0.4-1 units/kg/day in divided doses
    - One package will last 33 days, assuming 45 units/day usage
  - **T2DM:** 10 units/day administered at bedtime or two divided doses
    - One package will last 50 days **due to BUD**
- **Converting to inpatient:** can be converted to Novolog 70/30 unit-to-unit, can be converted to vial

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## Humulin 70/30 (insulin regular and insulin NPH vial)



- **Storage instructions:** can be stored in the refrigerator (until expiration date) or at room temperature (for up to 31 days); open pen should be kept at room temperature or in refrigerator for up to 31 days
- **Proper disposal technique:** used vial and syringe should be disposed of in sharps container
- **Supplies needed:** vial, U-100 syringe, alcohol swab, sharps container
- **Pack size:** one 10 mL vial
- **Dosing**
  - **T1DM:** 0.4-1 units/kg/day in divided doses
    - One vial will last 22 days, assuming 45 units/day usage
  - **T2DM:** 10 units/day administered once daily
    - One vial will last **only until BUD**
- **Converting to inpatient:** can be converted to Novolog 70/30 unit-to-unit, can be converted to pen

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## Novolin 70/30 FlexPen (insulin regular and insulin NPH pen-injector)

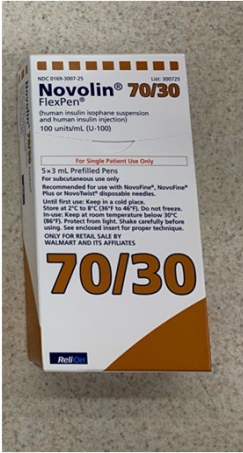


- **Storage instructions:** unused pens should be kept in the refrigerator (until expiration date) or at room temperature (for up to 28 days); open pens should be kept at room temperature for up to 28 days
- **Proper disposal technique:** used pen and pen needles should be disposed of in sharps container
- **Supplies needed:** pen, pen needle (NovoFine Plus, NovoFine, NovoFine® Autocover, and NovoTwist recommended), alcohol swab, sharps container
- **Pack size:** five 3 mL multidose pens, 100 units/ml

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## Novolin 70/30 FlexPen (insulin regular and insulin NPH pen-injector)



- **Dosing**
  - **T1DM:** 0.4-1 units/kg/day in divided doses
    - One package will last 33 days, assuming 45 units/day usage
  - **T2DM:** 10 units/day administered at bedtime or two divided doses
    - One package will last 150 days
- **Converting to inpatient:** can be converted to insulin detemir unit-to-unit, can be converted to insulin glargine unit-to-unit if given once daily or at 20% reduction if given twice daily, can be converted to vial

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## Novolin 70/30 (insulin regular and insulin NPH vial)



- **Storage instructions:** can be stored in the refrigerator (until expiration date) or at room temperature (for up to 42 days); open vial should be kept at room temperature or in refrigerator for up to 42 days
- **Proper disposal technique:** used vial and syringe should be disposed of in sharps container
- **Supplies needed:** vial, U-100 syringe, alcohol swab, sharps container
- **Pack size:** one 10 mL vial, 100 units/ml

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## Novolin 70/30 (insulin regular and insulin NPH vial)



### ➤ Dosing

- **T1DM:** 0.4-1 units/kg/day in divided doses
  - One vial will last 22 days, assuming 45 units/day usage

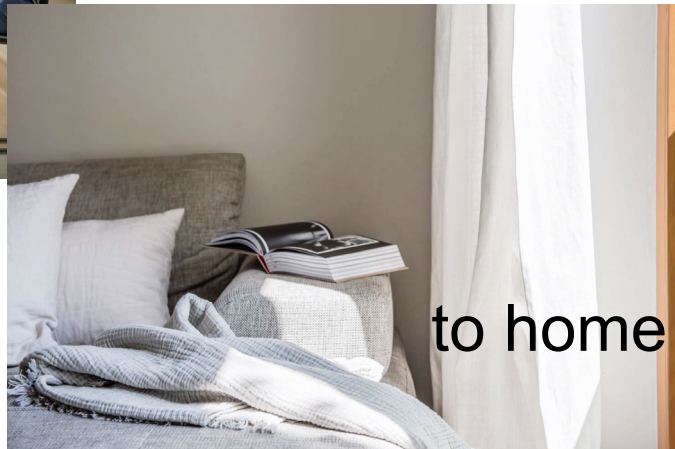
- **T2DM:** 10 units/day administered once daily
  - One vial will last **only until BUD**

- **Converting to inpatient:** can be converted to Novolog 70/30 unit-to-unit, can be converted to pen

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From hospital



to home

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## Hospital-to-home considerations

- Insurance coverage/cost
  - Preferred agents
  - Available generics
  - Calculating the correct days supply at the outpatient pharmacy
- Ease of use for patient or primary caregiver
  - Dexterity concerns
  - Health literacy
  - Fear of needles
- Medication adherence
  - Multiple doses/injections per day
  - Complicated dosing regimens

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## Case #1

AS is being discharged from The Best Community Hospital following admission for DKA. He has been newly diagnosed with T1DM. While admitted, he was being treated with Lantus SoloStar 20 units at bedtime and Humalog KwikPen 12 units three times daily. Because he does not have health insurance, he asks to be discharged on lower-cost insulins.

AS's Lantus SoloStar can be converted to Humulin N. 14 units should be given in the morning and 6 units should be given at bedtime.

His Humalog KwikPen can be converted to Novolin R with a unit-to-unit conversion. AS should take the Novolin R 30 minutes before eating, as opposed to directly before eating.

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## Home-to-hospital considerations

- **Formulary/cost**
  - Preferred agents/P&T approval
  - Current inventory of inpatient pharmacy
  - Forecasting inventory needs based on package sizes
  - Excessive costs of ordering patient-specific meds
  - Drug waste
- **Patient's home meds policies**
  - Many institutions do not allow patients to bring in their own meds
- **Medication administration**
  - Home meds must be converted to similar meds used within the hospital
  - Patient-specific meds vs meds from automated dispensing cabinets
  - Proper labeling of beyond use dates
  - Labeling of high-risk medications

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## Case #2

YM is admitted to Your Hometown Hospital for cellulitis. Her home medications include Victoza 1.2 mg daily and Levemir FlexTouch 30 units at bedtime. Hospital formulary has Trulicity as the preferred GLP-1 agonist and Lantus SoloStar as the preferred basal insulin pen-injector.

Following equivalent dosing recommendations of GLP-1 agonists, YM can be switched to Trulicity 0.75 mg once weekly while admitted. Her first dose of Trulicity should be given 7 days after her last Victoza dose.

YM can be switched to Lantus SoloStar unit-to-unit. A lower daily dose may be needed; blood glucose should be monitored while admitted.

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## Services to offer diabetic patients during transitions of care

- Medication reconciliation upon intake into the hospital
- Medication education at the bedside post-discharge
- Medication reconciliation prior to discharge
- Resolution of medication acquisition roadblocks prior to discharge (insurance coverage, copay concerns, etc.)
- Post-discharge follow-up/outreach: re-education of injection technique, apply teach-back techniques to assure patients are comfortable with their medication regimens, address side effects or adverse drug reactions

Donihi, A.C. Practical Recommendations for Transitioning Patients with Type 2 Diabetes from Hospital to Home. *Curr Diab Rep* 17, 52 (2017). <https://doi.org/10.1007/s11892-017-0876-1>

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## Diabetic support services: buy versus build

- Does your institution have the resources to provide a higher level of support to diabetic patients?
- Does leadership support these initiatives?
- Is there a multi-disciplinary team in place to drive the adoption of such services?
  - Pharmacy
  - Nursing
  - Hospitalists
- Is there room in the budget to create these services in-house?
  - Space
  - Staff
  - Software
- What solutions already exist in the marketplace?
- What questions to ask vendors offering such services:
  - Is their solution customizable?
  - Is it usable out-of-the-box?
  - What integrations need to take place?
  - How are results tracked?
  - Are discounts offered for pilot sites?



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## How one institution implemented post-discharge outreach to improve patient outcomes

- Identified diabetic patients discharged from the hospital with injectable medications
- Utilized APPE pharmacy students from local pharmacy school to provide patient outreach
- Patients were interviewed and re-educated on injection technique, medication storage, sharps disposal, and side effects

### Results:

- 280 patients were discharged on insulin, 140 were reached by the APPE student. Of the 140 patients reached, 73% required some sort of educational intervention
- From May of 2019 - March of 2020, 30-day readmission rates of patients leaving the hospital with insulin decreased from approximately 50% to 30%

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Questions?