



Strategies for Ensuring Safe Transitions of Care

Involving Insulin Regular U-500 and Other Newer Concentrated Insulin Pens

✓ **Medication reconciliation on admission relies on an accurate medication history.**

- Let's look at this home medication list.....
 - *insulin glargine 22 units at bedtime*
 - *insulin lispro 6 units three times daily with meals*
- What exactly is the patient taking? Is the glargine the U-100 brand, either in vial form or pen, or is it the concentrated U-300 pen brand? Is the lispro U-100 or U-200?

Providing education and a detailed insulin product list to clinicians involved in this process may help identify when clarification is needed.

✓ **100, 200, 300, 500 on home medication list, eMAR, discharge prescription.....dose or concentration?**

- In different scenarios, these may be confused and lead to overdose.
 - For example, if the medication list for a patient looks like this...

Insulin Lispro, Human, 100 UNIT/ML SQ Solution Pen-injector
inject 8 Units into the skin 3 times daily with meals

Insulin Degludec 200 UNIT/ML SQ Solution Pen-injector
inject 26 Units into the skin once daily..
 - When viewing this patient's prior-to-admission medication list, a prescriber may incorrectly order insulin concentration (i.e., 100 and 200) as the dose instead of the actual dose (i.e., 8 and 26, respectively).
 - Similarly, a nurse may misread the insulin concentration on the eMAR as the patient's dose.

If possible, eMARs and prior-to-admission and discharge medication lists should be formatted so the first line prominently contains the drug name, patient-specific dose, and directions, and the second line includes concentration. To accomplish this, it may be necessary to work with the electronic health record vendor.

✓ **Pens should not be used as a multidose vial because air can be introduced into the pen cartridge and result in accurate dose delivery. Further, use of a syringe to withdraw from concentrated insulin pen like a vial may lead to overdose.**

- Outpatient scenario
 - Patient using insulin glargine U-100 vial and syringe switched to insulin glargine U-300 pen. Trying to avoid being "wasteful," patient uses leftover U-100 syringes to draw up "100 unit" dose from pen cartridge. Result: 300 units given; hypoglycemia and hospitalization
- Inpatient scenario
 - Nurse unfamiliar with pen use or without pen needles.....possible that he or she use "familiar" U-100 syringe to draw up dose?

Supply pen needles, educate patients and clinical staff, reinforce, monitor.

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- ✓ **In patients admitted on U-500 insulin, the role of the pharmacist remains critical.**
 - Even with introduction of the U-500 pen and U-500 specific insulin syringes, it is possible that patients may continue to use U-100 insulin and tuberculin syringes used for measuring U-500 insulin for a period of time.
 - Pharmacist-patient interview upon presentation to the hospital setting
 - Confirm if pen or vial/syringe is in use at home
 - If vial, confirm dose and measurement method (recommendation: have the patient explain and demonstrate)
 - Confirm the inpatient order is consistent with the home regimen
 - Because leftover supplies of U-100 insulin and tuberculin syringes could remain in use by frugal patients, or those requiring very large doses above 250 units or 300 units who want to reduce the number of injections needed, a table like the one that follows should be used by pharmacists responsible for verifying a patient's home U-500 insulin dose and method of administration.
 - On the left, in green are the patient's U-500 insulin dose and new pen and syringe options for measuring that dose.
 - On the right, in orange are U-100 syringe and tuberculin syringes that require assessment and conversion.

U-500 Dose (Actual Units)	U-500 Pen (Actual Units)	U-500 Syringe (Actual Units)	U-100 Syringe (U-100 Unit Markings)	Tuberculin Syringe (mL)
25	25	25	5	0.05
50	50	50	10	0.10
75	75	75	15	0.15
100	100	100	20	0.20
125	125	125	25	0.25
150	150	150	30	0.30
175	175	175	35	0.35
200	200	200	40	0.40
225	225	225	45	0.45
250	250	250	50	0.50
275	275	--	55	0.55
300	300	--	60	0.60
325	--	--	65	0.65
350	--	--	70	0.70
375	--	--	75	0.75
400	--	--	80	0.80
425	--	--	85	0.85
450	--	--	90	0.90
475	--	--	95	0.95
500	--	--	100	1.00

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✓ **Take advantage of the resources on www.onepenonepatient.org to ensure that policies and procedures are reinforced by well-thought out, safe system design.**

- A policy and procedure for safe inpatient use of U-500 insulin may include
 - Segregated storage of the vial in pharmacy (i.e., controlled substance fridge)
 - Only permitting pharmacy to purchase U-500 insulin syringes (not hospital purchasing)
 - Required pharmacy and endocrine consults to help manage patients
 - Dispensing procedures that takes into account pen versus U-500 insulin syringe
 - Incorporating double-checks into the preparation process (if syringe) and on administration.
- System safety measures* to be programmed into the electronic health record may include
 - Order sets or panels
 - Insulin, consults, labs
 - Route, dose, frequency constraints
 - Clinician reminders
 - Transition information
 - Best-practice reminders
 - Discharge patient education

*Much more detail about system safety measures is available within the [ISMP Newsletter Acute Care Edition](#). May 5, 2016. Newsletter content accessible at www.ismp.org or www.onepenonepatient.org.

✓ **Ensure U-500 syringes are prescribed when needed upon discharge.**

- Some institutions may have an order set to facilitate discharge prescribing of diabetes supplies, including pen needles and syringes. This is a good way to ensure patients have the supplies they need to administer their insulin.

Adding the new U-500 insulin syringe into a diabetes supplies discharge order set is strongly encouraged. To reduce possibility of selecting wrong syringe, make sure U-500 insulin syringes are clearly distinguished from U-100 syringes [i.e. "Insulin Syringe (Concentrated U-500) 31G, 6 mm x 0.5 mL"].