There are several calculators online that help healthcare providers calculate insulin dosages for their patients and the number of insulin pens a patient may need when prescribed pen. However, I have been unable to locate any calculators that calculate the number of pen needles patients need to administer their daily doses of insulin.

It is rare that I see insulin dosages that the insulin pen will divide into evenly. Meaning, a patient may be prescribed a number of units of insulin where one pen will deliver a number of dosages with a remainder of units that are insufficient to provide an entire dose. When this happens, the patient can either split the dose and administer what is left in the pen and use a second pen to administer what is needed to complete the dose, or they can discard the remainder and administer the full dose with a new pen. In the first scenario, the patient will require more pen needles than the number of doses prescribed since some doses will be split between two pens. In the second scenario, the patient will waste insulin which can be rather expensive.

In an effort to reduce waste, this calculator aims to inform healthcare providers how many pen needles should be ordered for their patients using insulin pens as their insulin delivery system. Pen needles are not as expensive as the insulin pens, but for an individual on a fixed-income or low-income, every dollar counts.

For this calculation the following information would be needed:

1. Number of units of insulin per pen
2. Number of pens per box
3. Number of doses administered per day
4. Number of units per dose
5. Days Supply (how many days’ worth of insulin)
6. Use within X days (use\_within\_days)
7. Maximum deliverable dose (max\_del\_dose)

Items 1, 2, 6 and 7 can be retrieved by:

1. Asking the user to enter this information – the benefit of this method is the user can enter product information for any product, including new products that may not be in the database. Additionally, the user can enter exactly what they want.
2. Maintaining a database of insulin pen products with this information and have the user enter the product – the benefit of this is the prevention of user entry errors.

Items 3, 4 and 5 would be entered into the program by the user.

Item 4 would have to be asked separately for each dose since doses are not always divided equally if they use multiple doses daily. Additionally, insulin pens have a maximum deliverable dose. If one dose exceeds the maximum deliverable doses, the dose must be split into two injections, requiring an additional pen needle.

If dose1/max\_del\_dose > 1, then add ceil(dose1/max\_del\_dose) to needle\_count

Item 6 is necessary because insulin pens are good for a certain number of days once they are in use. It is possible the patient will have to discard an in-use insulin pen despite there still being insulin left. In this case, split dosing would not be necessary.

If total daily units < floor(units\_per\_pen/use\_within\_days), then display “patient will discard pen with insulin remaining”

The program should output the number of pens needed, the number of boxes of pens needed and the number of pen needles needed. These are the necessary bits of information for the healthcare provider.

Additional output the program could provide is whether the patient should expect to discard insulin pens with insulin still in the pen. Also, for the provider’s benefit, the program can show how much insulin waste is avoided by providing enough pen needles.