PRINCIPLES OF DESIGNING A MEDICATION LABEL FOR INTRAVENOUS PIGGYBACK MEDICATION FOR PATIENT SPECIFIC, INPATIENT USE
The risk of medication error can occur when labels are poorly designed. Based on analysis of actual medication errors reported, a survey and a review of pharmacy-generated labels produced by a number of systems, ISMP offers the following recommendations as a basic approach toward the prevention of error related to label misinterpretation.

1. **Bold patient name, generic drug name and patient specific dose** on all labels.

2. List all products by generic name using lower-case letters as the primary drug nomenclature (unless employing tall man letters as a safety strategy), ensuring that each matches FDA-approved nomenclature. As appropriate, list associated brand names in a requisite field using all upper case letters (e.g. LASIX) to differentiate them from generic names (e.g. furosemide) ensuring that all product labels match the way the drug appears on the original order and medication administration record. Trademark symbols should not be used (e.g., TM or [r]).

   For medications that contain multiple ingredients, use the brand name to provide clarification to reduce the risk of error.

3. Use “tall-man” letters (e.g., VinBLAStine and VinCRIStine) to help distinguish look-alike products on screens and reports to minimize the risk of selecting the wrong product when medication names appear alphabetically in look-up/pick lists. Establish and disseminate a list of products for which tall man letters are used, specifying which letters are affected, to ensure standard application for all uses. [http://www.fda.gov/Drugs/DrugSafety/MedicationErrors/ucm164587.htm](http://www.fda.gov/Drugs/DrugSafety/MedicationErrors/ucm164587.htm).

4. Do not include the salt of the chemical when expressing a generic name unless there are multiple salts available (e.g., penicillin G potassium and penicillin G sodium). If the salt is listed as part of the name (e.g., chemical symbols such as K, Na, HBr, and HCl), it should follow the drug name, not precede it (e.g., penicillin G potassium not potassium penicillin G).

5. If state law prohibits printing the BRAND name when the specific BRAND is not dispensed then the term “used for” may be inserted before the BRAND name.

6. Allow for a field or fields for the manual or electronic use of initials that would indicate preparation and/or checking of the product.

7. Frequency of the medication order may be displayed if available and desirable. In this case it would appear as non-bolded 10 font characters.

8. Use san serif fonts, such as Arial or Verdana, for all text and numbers.

9. The minimum font size for patient name, generic drug name and patient specific dose should be 12 point or equivalent.
10. Allow for text wrap and continuation on an additional label (expandable label stock) to accommodate large number of characters for drug names, patients or doses. Parameters would need to be set so that breaks in patient names or medications were intelligible. When possible place each ingredient on a separate line.

11. Set comments field with a minimum of 250 characters. The printing of order comments must support carriage returns within the note to allow formatting of tabular type data including dosing nomograms. The minimum font size should be 10 or equivalent.

12. Use a white background color for labels for better visualization of text and bar codes (when applicable). Use black for all bar codes. If a different color label is needed to highlight certain classes of high-alert drugs (e.g., chemotherapeutic agents), use yellow label stock.

13. Avoid confusion by always providing a space between them (e.g., propranolol20 mg has been misread as 120 mg and 10Units has been misread as 10 Units).

14. Provide adequate space for items in data fields used to communicate drug names, dosing units, routes of administration, and frequencies. Two or three character fields force use of potentially dangerous abbreviations [QD for daily – often misread as QID; QOD for every other day – often misread as QID; U for units – often misread as a zero or four]. Visualizing dangerous abbreviations in electronic formats may encourage practitioners to use them. Fields for routes of administration and fields for frequency should contain a sufficient number of characters to allow for clear communication of the intended route and frequency.

15. Ensure that the application and printer support both upper and lower case fonts and any characters which drop below the lower line (example lower case y, g). This would include the ability to use mixed cases within a line or format to support tallman lettering, when indicated, or metered square dosing (100 mg/m2).

16. Avoid the use of all potentially dangerous abbreviations and dose expressions (see http://www.ismp.org/Tools/errorproneabbreviations.pdf) including the following:

   a) Do not use trailing zeros (present as 5 mg, never 5.0 mg).

   b) Use leading zeros for doses less than one measurement unit (0.3 mg, never .3 mg).

   c) Spell out the word Units. Never use U, which easily can be mistaken as a zero, causing a 10-fold overdose.

   d) Abbreviate International Units as “units”.

   e) Include properly spaced commas for dose numbers expressed in thousands (e.g., 5,000 units). Avoid using M as an abbreviation for thousands (e.g., 5 M units), which has been mistaken as million. Use the word thousand for larger doses in the hundreds of thousands (e.g., 150 thousand rather than 150,000). Use the word million for doses...
expressed in millions (e.g., 1 million units) to avoid possible misplacement of commas and misreading the dose if the commas are not seen correctly with such large numbers.

f) Express weights and measures in a standard fashion and use USP standard abbreviations for dosage units as follows:

- m (lower case) = meter
- kg = kilogram
- g = gram
- mg = milligram
- mcg = microgram
  (do not use the Greek letter µ as µg which has been misread as mg)
- L (upper case) = liter
- mL (lower/upper case) = milliliter
  (do not use cc which has been misread as U or the number 4)
- mEq = milliequivalent
- mmol = millimole

17. Consideration must be given to the role that symbols and certain letter characters may play in creating errors during electronic communication. For example, slash marks and hyphens have been misread as the number one, and symbols for more and less than (< and >) are frequently misinterpreted the opposite from the intended meaning. Also, the letter O can be misread as a zero (0), the letter z as the number 2, and a lower case L (l) as the number 1 or the letter i (I).

18. To avoid confusion, do not abbreviate drug names (e.g., MTX for methotrexate has been misunderstood as mitoxantrone; MSO4 for morphine sulfate has been misinterpreted as magnesium sulfate). The field for drug names should contain a sufficient number of characters to preventing truncating drug names whether single entity or multi-ingredient.

19. Combination products – All combination products should include the BRAND name on the label. If a product contains two ingredients they should both appear in the generic name field. When the drug name, patient dose, dosage units and dosage form appear together, list the generic name first, followed by brand name, patient dose, dosage units and route of administration, e.g., amphotericin B and hydrocortisone.
20. Label Format – See below for an example label which incorporates the principles of this recommendation for use in an acute care setting.

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Mary Jones        Room 3727
MR#2345678

amphotericinB  ____ mg
(FUNGIZONE)

hydrocortisone ____ mg
(SOLU-CORTEF)

In D5W           IVPB

Total Volume     _____mL

Bar code
Exp: 12-31-2010 space for RPh initials
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a) **Patient name 48 character field –bolded 12 point font**

b) **Location 12 character field –12 point font**

c) **Second identifier 10 character field (Date of birth, financial #, Encounter #, Medical Record #) – 10 font**

d) **Generic name –40 character field –bolded 12 point font**

e) **BRAND name –18 character field –12 point font**

f) **Patient dose –20 character field –bolded 12 point font**

g) **Route –12 character field –12 point font (this may wrap to the next line as needed)**

h) **Patient specific dose with the corresponding number of mL –30 characters –10 point font.**

i) **Concentration of the solution per mL –30 characters –10 point font**

j) **Bar code –placed vertically or horizontally to allow for the best readability on a flat surface**

k) **Pharmacist initials (handwritten), if needed/desired, indicating that the product has been checked**

l) **Expiration Date as needed in a MM/DD/YYYY format –10 point font**

m) **Other information as required by State or Federal Law**

n) **Pharmacy information if required should be at the bottom of the label**

o) **Comments –10 point font**