In the study "CPOE Implementation in ICUs" (AHRQ R01 HS15274, PI: Carayon), we spent a considerable amount of time and effort in defining a medication order for the sake of the research on medication safety. This document describes the definition.

1. What is a medication?

For the sake of our study, a medication could be any drug or fluid that appears on the medication administration record (MAR) at the research hospital. These included intravenous fluids and albumin. They did not include blood products (e.g., packed red blood cells, fresh frozen plasma, platelets, factors), nitric oxide and oxygen, inhaled helium (heliox) or IV flush.

2. What is an ICU medication order?

Our research counted orders starting with admission or transfer orders to the ICU until
1. Transfer orders were written and the patient was physically transferred out of the ICU.
2. The patient died or was discharged from ICU.
3. It was determined that the patient had physically moved to another unit although transfer orders were not present.
4. Transfer orders were activated in the ICU.

Some orders written while the patient was in the ICU were excluded.
1. Transfer orders for care outside of the ICU, unless the order was implemented in the ICU
2. Discharge orders
3. Drug serum levels
4. Orders (placed and/or carried out) in the operating room or emergency department or orders meant for the post anesthesia care unit (PACU).

3. How were groups or sets of orders counted?

a. For <u>tapering medications</u>, each change was considered an individual order. For example, "Prednisone 60mg daily x 3 days then 40mg daily x 3 days" was counted as two orders.
b. For <u>sliding scale Potassium and Magnesium orders</u>, the group of orders was considered one order. For example, "If K+ > 4.0, no K+; If K+ 3.8 – 4.0, then give KCL 20meq IV/po x 1; If K+ 3.5-3.7, then give KCL 40meq IV/po x 1; If K+ less than 3.4, call H.O." was counted as one order.
c. For <u>patient controlled analgesia orders</u> (IV or epidural), each of the following were considered individual orders: the basal rate, the patient initiated dose, the nurse-administered bolus, and orders to increase the patient dose as needed.
    i. For example, "Morphine PCA: Basal 1mg/hour, PID 1 mg every 10 minutes max 5 mg / hour, RN bolus 2 mg every hour prn" was counted as three orders. Any additional order to raise PCA dose as needed for pain was counted individually.

ii. At the research hospital, preprinted epidural orders included orders for 1) medication and concentration, 2) basal rate infusion, 3) nursing service raise basal dose max, and 4) patient controlled epidural dose (PCEA). If all were checked on the order set, the epidural was counted as a total of four orders.

d. For <u>heparin pre-printed orders,</u> the initial bolus was ordered separately from the infusion and titration. These were therefore counted as two orders

e. For <u>sliding scale insulin orders</u>, the group of orders was considered one order.
   i. For example, a regular insulin scale "if B.S. 150-200, give 2 units insulin; If B.S. 201-250, give 4 units insulin; if B.S. 251-300, give 6 units insulin; if > 300, call H.O" was counted as one order.

f. For <u>orders with more than one route</u> listed, each ordered route was considered a separate order.
   i. For example, "Acetaminophen 500mg po q 6 hours prn, if unable to take po give acetaminophen 500mg per rectum every 6 hours prn OR acetaminophen 500mg po/pr every 6 hours prn each" was counted as two orders.

g. <u>Range orders</u>: medication orders with a range of doses was counted as one order.
   i. For example, "Morphine 1-4 mg IV q2 hours prn" was counted as one order.
   ii. If a medication order included "may repeat x 1," it was counted as one order.
   iii. Exception: if a range order was included as part of the admin instructions for a med, e.g., "Morphine 1 mg IV q2 hours prn pain, may increase to Morphine 2-4 mg IV q2 hours prn" the order was counted as two orders.

h. For <u>scheduled medication orders with different dose amounts</u>, each different dose was considered a separate medication order.
   i. For example, a scheduled insulin order with different doses for morning, afternoon and evening was counted as three orders.
   ii. For example, "Tylenol 325 mg in am and 500mg in pm" was counted as two orders.
   iii. However, "Metoprolol 50 mg in am and 50 mg in pm" was counted as one order because the doses are the same.

i. <u>Titration orders</u> for pressors or other titratable meds without a specified pre-printed order set for titration were considered separate orders.
   i. For example, "Dopamine drip start at 5 mcg/kg/min and titrate up to 20 mcg/kg/min to keep MAP > 50" was counted as two orders.
   ii. For example, "Norepi drip 0.3 mcg/kg/min. Titrate to off to keep SBP > 90" was counted as two orders.

j. <u>Diluent orders: or</u>ders for intravenous medications that have both a diluent (base) and an electrolyte/drug (additive) as part of the order were counted as one order.