

WATAG Advisory Note

Western Australian Medication Safety Group

Strategies to reduce insulin-related medication errors

Insulin incidents continue to be represented in the top 5 medication incident types. WAMSG reviewed all insulin-related incidents notified into Datix CIMS in 2015. This advisory note summarises the key strategies to reduce insulin related medication errors recommended by WAMSG.

Suggested strategies to reduce insulin incidents include:

Key points

- It is important to ensure the correct insulin therapy is clarified before prescribing due to the high risk of confusion between preparations. Where insulin is prescribed on the National Inpatient Medication Chart, the word “units’ must be written in full after the prescribed dose (as opposed to “U” which has contributed to 10 fold dose errors).
- Include all insulin management in clinical handover – shift to shift and transfer of patient care
- For EVERY patient on insulin therapy ALWAYS handover their most recent BGL (Blood Glucose Level), and planned insulin doses at EVERY shift change and transfer of care
- Ensure that all self-administered insulin doses are observed and signed by a nurse and recorded appropriately using (S) symbol. Patients may not always make the correct choices regarding dose when administering insulin while in hospital
- Use the **50/20** rule: Check the dose with another nurse if ≥ 50 units of basal insulin or ≥ 20 units bolus insulin.
- Do NOT withhold basal insulin (Examples: Protaphane®, Lantus®, Levemir®) unless under strict medical advice.
- It is important to check the BGL before administering insulin to determine whether supplemental insulin is required.
- Dilutions used for intravenous insulin therapy vary between sites. Some hospitals have more than one dilution of insulin available depending on the indication for use of the insulin infusion (i.e. post-operative management or diabetes ketoacidosis). All staff should double check that the dilution prescribed is used with the correct nomogram for rate changes.
- Most insulin infusions require concurrent administration of dextrose/glucose (usually 5% glucose). Check with the doctor if not prescribed.
- Check the correct insulin infusion protocol is used for the patient’s diagnosis.

Background

Common mix-ups to watch out for:

- NovoMIX 30® and NovoRAPID®
- Humalog® and Humalog Mix®
- Levemir® and Lantus®
- NovoMix 30® and Humalog Mix 25®
- HumuLIN® and HumaLOG®
- NovoRAPID® and Lantus®

Selection error due to Look-alike, Sound-alike preparations

- confusion between basal and bolus insulin

- In addition to regular insulin orders, supplemental subcutaneous insulin orders were a frequent cause of incidents. Supplemental insulin is a ‘top up’ dose and it should be given in response to Blood Glucose levels (BGL) as prescribed by the doctor when routine bolus insulin is required with meals. Not all patients are prescribed supplemental insulin. The majority of clinical incidents reported involved doses which were not administered, but were required as indicated by the BGL range in the supplemental insulin order section of the Subcutaneous Insulin Order and Blood Glucose Monitoring Chart.
- Intravenous insulin therapy is associated with risk of 10x rate errors, which can be fatal. Depending on local hospital protocol, different dilutions of neutral insulin in sodium chloride 0.9% (most commonly 50 units in 50mL, or 50 units in 500mL), the difference in rate of administration would be a potential 10 fold error if the dilutions are confused. Management of diabetes ketoacidosis may require the use a different dilution and rate adjustment nomogram to the regular intravenous insulin infusion chart.

Statewide Clinical Incident Review – Insulin-related Incidents

(Notified 1 January – 31 December 2015)

Since February 2014 WA Health has used the Datix Clinical Incident Management System (CIMS) to report and manage clinical incidents involving health services. This report is based on incidents classified under the Datix Tier 1 category “Medication/Biologics/Fluids” and the date of notification of the incident was used to determine whether the incident was included in this data set.

Data was extracted from Datix CIMS on 22 January 2016 for clinical incidents notified between 1 January 2015 and 31 December 2015 that contained the text “insulin” in the drug involved field. Inactive incident records were excluded (i.e. those where the workflow status was set to “inactive”).

These data were then manually reviewed to exclude any duplicates or incidents that occurred outside of WA Health hospitals. Each incident was manually reviewed to determine the type and cause of incident. This resulted in some incidents being re-classified, and some incidents being identified as having multiple causal factors.

A total of 320 incidents were identified relating to insulin over the period 1 January to 31 December 2015. Insulin was the drug involved in approximately 5% of medication-related clinical incidents during this period (320/6511 incidents classified under the Datix Tier 1 category “Medication/Biologics/Fluids”).

Figure 1: SAC Rating for Insulin Incidents 2015

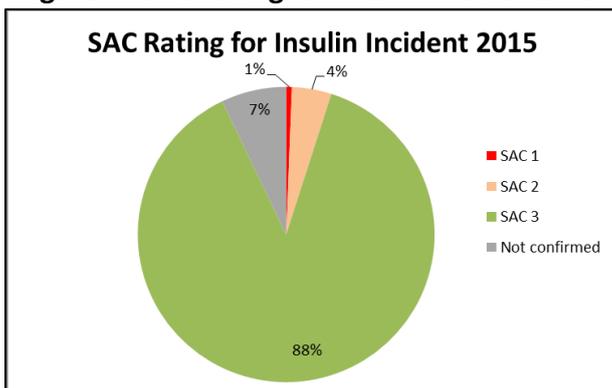
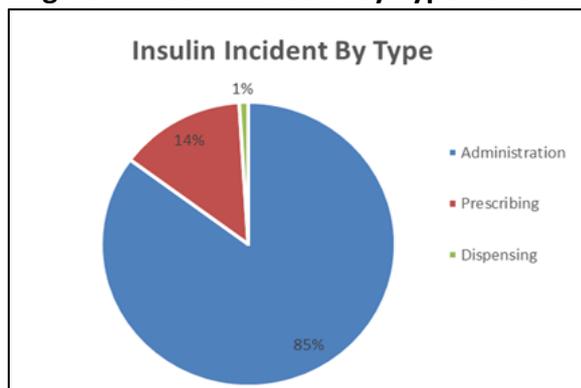


Figure 2: Insulin Incident by Type 2015



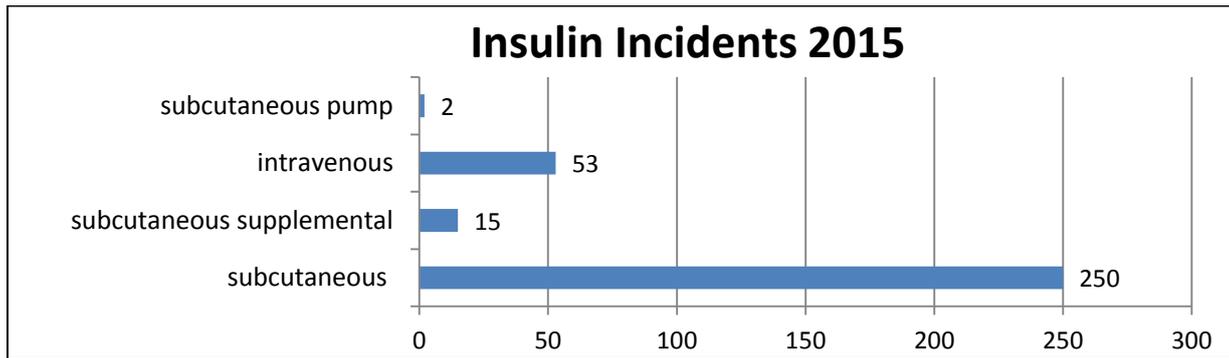
The Severity Assessment Code (SAC) is the assessment of the actual or potential consequences associated with a clinical incident. The SAC rating (1, 2 or 3) is used to determine the appropriate level of analysis, action and escalation.

- SAC 1 includes all clinical incidents/near misses where serious harm or death is/could be specifically caused by health care rather than the patient’s underlying condition or illness.
- SAC 2 includes all clinical incidents/near misses where moderate harm is/could be specifically caused by health care rather than the patient’s underlying condition or illness.
- SAC 3 includes all clinical incidents/near misses where minimal or no harm is/could be specifically caused by health care rather than the patient’s underlying condition or illness.

Figure 1 shows the breakdown of clinical incidents relating to insulin by confirmed SAC rating.

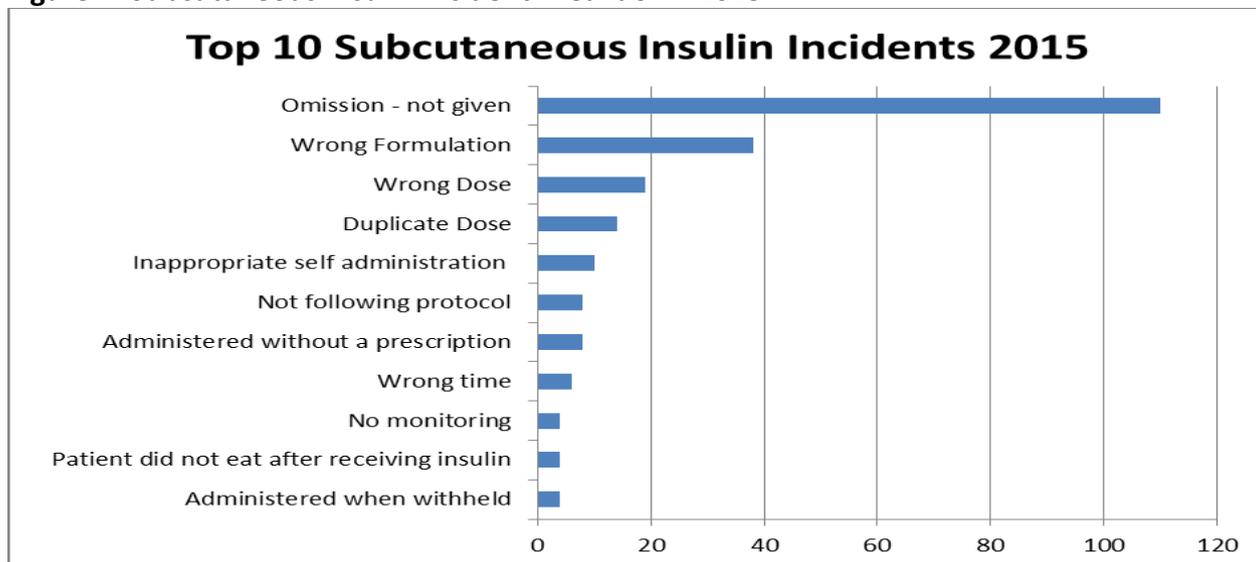
Each individual incident was reviewed to determine if it was related to administration, prescribing or dispensing (supply) of insulin (Figure 2). In reviewing a number of the incidents it was observed that a proportion of dispensing incidents were actually administration incidents (where the word ‘dispense’ was interpreted as giving/administering the insulin to the patient as opposed to the supply or labelling function undertaken by the pharmacist) and a number of administration incidents were as result of prescribing incidents. This discrepancy was also noted when filtering incident data by route and formulation. Manual review determined which route of administration the incident was classified under in Figure 3.

Figure 3: Insulin Administered Route 2015



The majority of clinical incidents involving insulin in 2015 were administered subcutaneously (n=267) which includes routine insulin injection (250); supplemental insulin (15); and subcutaneous infusion pump (2). Fifty three incidents involved intravenous insulin administration.

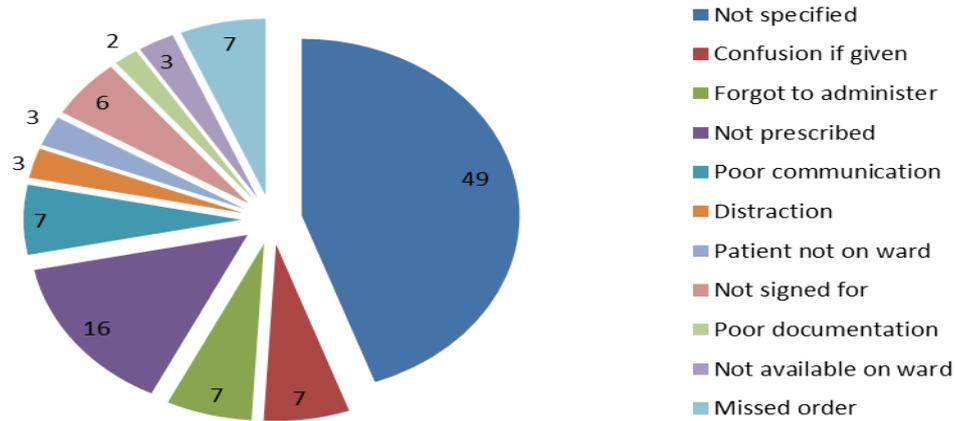
Figure 4: Subcutaneous Insulin Incident Breakdown 2015



The incidents captured as omissions and wrong formulation drilled down further to provide information in Figure 5 and 6.

Figure 5 Contributing Factors of Subcutaneous Insulin Omission Incidents 2015

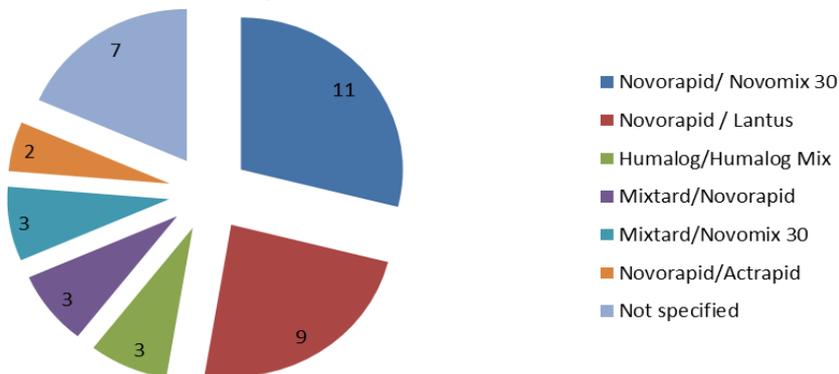
Breakdown of Insulin Omission Incidents



Almost half of the incidents did not provide any contributing factors to the insulin not being administered. Fifteen percent (15%) were due to the insulin not being prescribed for the patient. Poor communication, including not handing over from medical staff to nursing staff that an order had been commenced, as well as nursing handover of insulin administration and confusion if given were also noted a problematic.

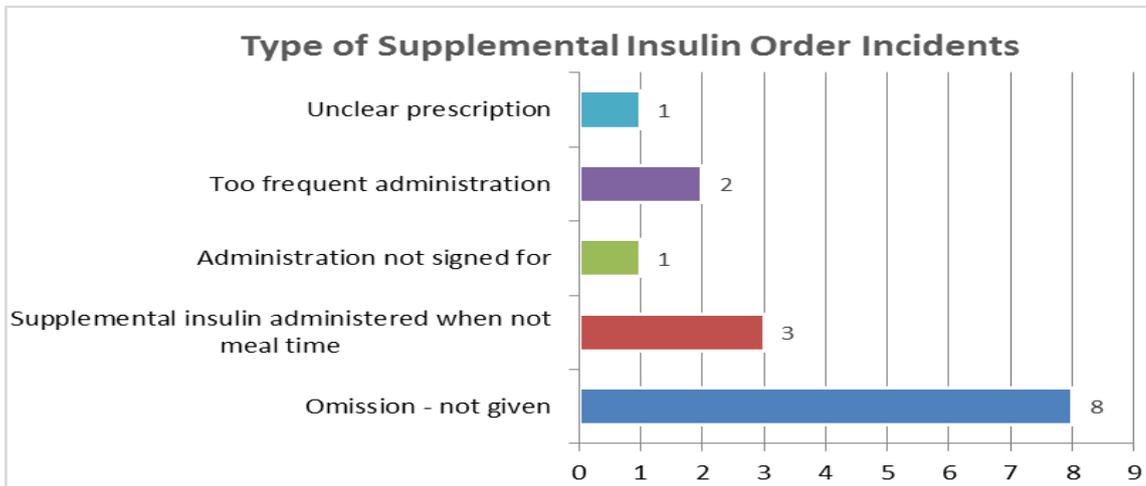
Figure 6 Break down of Subcutaneous Insulin Wrong Formulation Incidents 2015

Breakdown of Wrong Insulin Formulation Incidents



Three of the wrong insulin formulation incidents were a result of prescribing issues, Novorapid® and Novomix 30® being most problematic.

Figure 7 Supplemental Subcutaneous Insulin Incidents



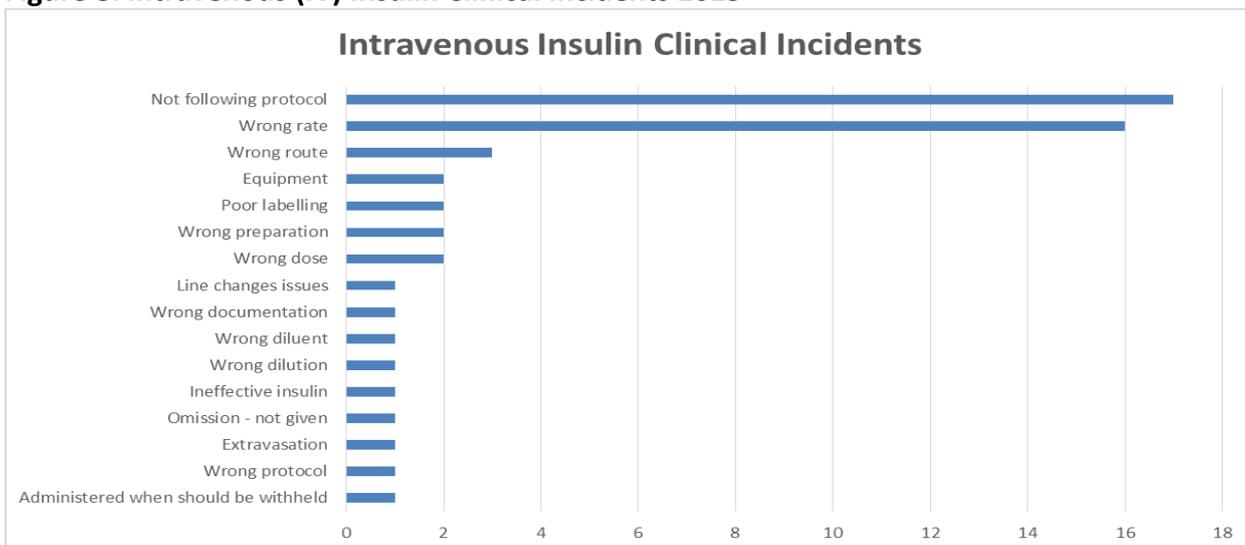
The majority of clinical incidents reported involving supplemental insulin involved doses that were required (as per protocol specifying blood glucose level [BGL] range) and not administered. It is important to check the BGL before administering insulin to determine whether supplemental insulin is required. Not all patients are prescribed supplemental insulin. It is important that supplemental insulin is a 'top up' dose and it should be given when routine insulin is required with meals.

Subcutaneous Insulin Pump Clinical Incidents

Two incidents involving subcutaneous insulin pump use were captured in the 2015 report.

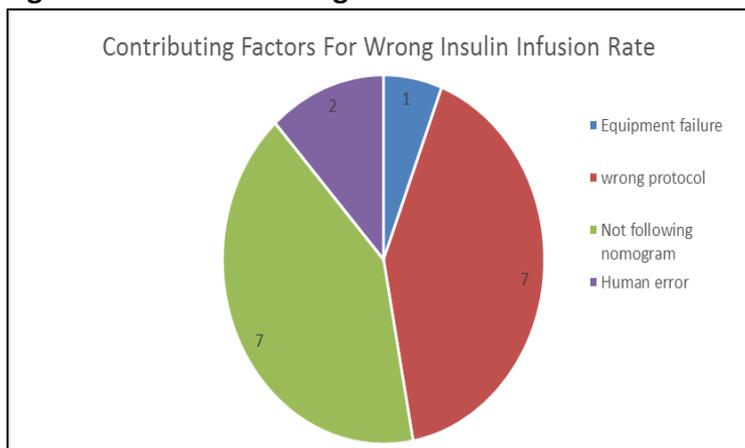
- One involved a supply issue of the insulin required to fill the pump, with a 90 minute delay due to no supply of the vial.
- The second incident involved inappropriate carbohydrate ratio being prescribed for the patient (wrong dose of insulin per carbohydrate ratio).

Figure 8: Intravenous (IV) Insulin Clinical Incidents 2015



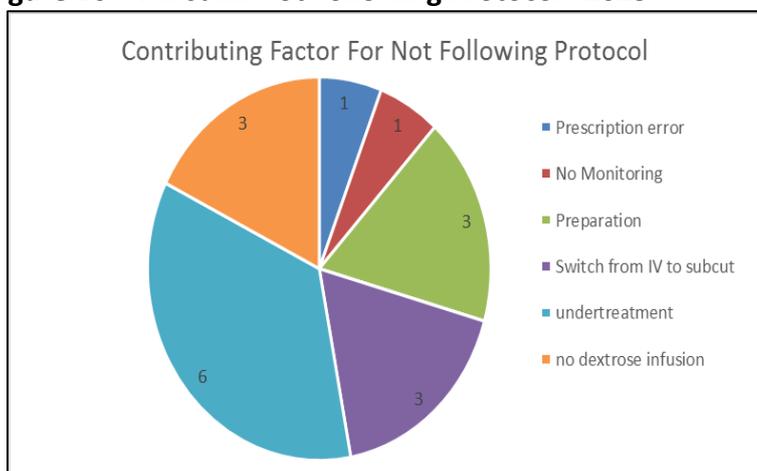
Intravenous insulin infusion incidents were reviewed separately to subcutaneous insulin incidents. Not following protocol and wrong rate predominated the incidents of this subtype.

Figure 9: IV Insulin Wrong Rate 2015



Seven of the 17 incidents involving incorrect rate of insulin infusion involved confusion between the different dilutions available. Some hospitals use both Actrapid® 50 Units in 50mL of sodium chloride 0.9% (for patients with renal impairment) and Actrapid® 50 Units in 500mL sodium chloride 0.9%. This attributed to 10 fold rate incidents, predominantly administering insulin at a higher rate than required. WAMSG recommended that a state intravenous insulin chart be developed using a standard dilution. The WA Endocrine Network will also be consulted during this process.

Figure 10: IV Insulin Not Following Protocol 2015



For intravenous insulin infusion incidents that did not follow protocol, 6 of the 17 involved undertreatment due to the rate not being changed according to the BGL. Other incidents involved not hanging a dextrose/glucose infusion when prescribed, and not initiating subcutaneous insulin therapy in a timely manner post intravenous insulin infusion cessation.

WAMSG and the Quality Improvement and Change Management Unit acknowledge the assistance of the Patient Safety Surveillance Unit in defining the search methodology and reviewing this report.