The Institute for Safe Medication Practices Canada (ISMP Canada) is an independent national nonprofit agency established for the collection and analysis of medication error reports and the development of recommendations for the enhancement of patient safety.

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Heparin-Induced Thrombocytopenia — Effective Communication Can Prevent a Tragedy

An otherwise healthy 63-year-old patient was admitted to hospital for elective mitral valve replacement surgery. Unfractionated heparin (UFH) was administered according to protocol during the surgical procedure, and full-dose UFH was administered intravenously for several days afterward, until a therapeutic international normalized ratio (INR) was attained with oral warfarin. The platelet count was 96 x 10^9/L (normal range 150-400 x 10^9/L) immediately after surgery and rose to 142 x 10^9/L by the fifth postoperative day. Over the next two days the platelet count fell to 54 x 10^9/L. Because of the decline in the platelet count, the physician ordered an assay to detect for the presence of the antibody responsible for heparin-induced thrombocytopenia (HIT). On the following day, the positive results of the HIT antibody assay were posted in the laboratory section of the electronic patient record (EPR). As well, a paper copy of the laboratory report was sent to the ward; however, the patient had been discharged earlier that day, and the report was placed with other materials to be sent to the health records department for filing.

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Approximately one week later, the patient presented to the emergency department of the same hospital complaining of shortness of breath. The differential diagnosis included pleural effusion and pulmonary embolus. Although the patient had been taking warfarin, the INR was subtherapeutic, and a decision was made to initiate UFH intravenously. The platelet count at that time was 233 x 10^9/L. The physician in the emergency department was unaware of the positive results of the HIT antibody assay and was not alerted to this result when checking the EPR. The patient and family were also unaware of the positive HIT antibody assay result and its implications for future treatment with UFH. The patient was given a bolus of UFH intravenously and, within minutes, suffered cardiorespiratory arrest and a stroke. Although the patient was resuscitated, severe sequelae from the stroke rendered the patient totally dependent and in need of long-term care.

HIT is an antibody-mediated adverse effect of heparin that is characterized by thrombocytopenia and thromboembolic sequelae, including venous thrombosis, peripheral arterial thrombosis, myocardial infarction, and stroke. HIT occurs in approximately 3% of patients who receive UFH and less than 1% of patients who receive low-molecular-weight heparin (LMWH). The diagnosis is based on the following three criteria: (i) current or recent exposure to heparin, (ii) unexplained fall in platelet count (usually a fall of 50% or more, even if the platelet count nadir remains above 150 x 10^9/L) with or without thrombosis, and (iii) laboratory evidence of HIT antibodies. The fall in platelet count usually begins 5 to 10 days after heparin is initiated but may occur more abruptly in patients with recent exposure to heparin. When HIT is diagnosed (or strongly suspected), all heparin must be discontinued, including UFH and LMWH by any route. In addition, the use of an alternative, HIT-safe anticoagulant (e.g., argatroban, lepirudin, or danaparoid) should be carefully considered.

The devastating case of HIT described above illustrates some of the problems that can ensue when there is no coordinated system to ensure communication and documentation of critical test results and drug allergy information. Although this patient received appropriate platelet count monitoring and detection of HIT antibodies during the original hospital admission, the failure to adequately communicate and document this information led to inappropriate re-administration of UFH, with a catastrophic outcome.

The following contributing factors were identified by the hospital:

- Lack of a standard protocol to ensure that critical laboratory values are communicated to the "most responsible physician," so that appropriate action can be taken.
- Inadequate flagging and lack of segregation of critical laboratory values in the EPR.
- Lack of communication to patients, families, and community caregivers about critical laboratory values and new drug allergies that are identified in hospital.
- No process for identifying and following-up on discharged patients who have abnormal or critical laboratory results.
- Lack of drug allergy documentation in the EPR, with drug allergies being documented and archived only in the pharmacy computer system.

- Absence of a linkage between the EPR and pharmacy computer systems.

The hospital reporting the incident is implementing the following actions to safeguard patients from similar events:

- A standardized telephone communication protocol that captures accountability for information transfer and action. Specifically, in the event of a positive assay result for HIT antibody, the laboratory technologist is responsible for calling the attending physician and/or resident and documenting that the results were communicated. As well, the laboratory technologist is responsible for informing the pharmacy so that the patient can be identified as "HIT assay positive" and "heparin allergic" in the pharmacy computer system. The pharmacist and physician are then responsible for ensuring that all UFH or LMWH (by any route of administration) is discontinued and alternative anticoagulation initiated as warranted.
- An improved system for flagging critical and/or life-threatening laboratory values in the EPR.
- Development of a linkage between the EPR and pharmacy computer systems to allow transfer of information regarding laboratory values that have implications for drug therapy.
- Central documentation of drug allergy information in the EPR and not just in the pharmacy computer system. This will allow all health care professionals with EPR access to view new and archived drug allergy information.
- Development of a pharmacist-based counselling program to ensure that all patients with a positive result on HIT antibody assay are informed that they are "allergic to heparin" and that they should obtain a Medic-Alert™ bracelet indicating that they have experienced thrombocytopenia with heparin. As well, this program ensures that notification is sent to the family physician (and any other relevant physician) regarding the development of HIT while in hospital.

This incident also raised general awareness of HIT and the importance of the following strategies within the institution:

- Ongoing review of protocols for platelet count monitoring during heparin therapy to ensure that current recommendations are implemented.[1]
- Hospital-wide review of heparin use with the intent of (i) eliminating patient exposures to heparin in situations where the drug has not been proven beneficial and (ii) limiting the duration of exposure in situations where heparin use is necessary.

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References:

1. Warkentin TE, Greinacher A. Heparin-induced thrombocytopenia: recognition, treatment, and prevention: the Seventh ACCP Conference on Antithrombotic and Thrombolytic Therapy. Chest 2004;126:311S-337S.

Med-E.R.R.S. Seeks Input from Canadian Health Care Professionals

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ISMP Canada is a national voluntary medication incident and 'near miss' reporting program founded for the purpose of sharing the learning experiences from medication errors. Implementation of preventative strategies and system safeguards to decrease the risk for error-induced injury and thereby promote medication safety in healthcare is our collaborative goal.

To report a medication error to ISMP Canada: (i) visit our website www.ismp-canada.org, or (ii) e-mail us at info@ismp-canada.org, or (iii) phone us at 416-480-4099. ISMP Canada guarantees confidentiality and security of information received. ISMP Canada respects the wishes of the reporter as to the level of detail to be included in our publications.

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