"THE WORST PAIN I'VE EVER HAD"
ANSWERS

1. What factors (root causes) contributed to this clerical error?

Patient identification errors occurred at the time the pickup slip was generated and at the time of administration when the identity of the patient and blood component should have been compared.

At the time of this reaction the hospital policy required a check of the patient identity printed on a tag attached to the unit to the patient's identity by two individuals, but it did not explicitly say that nurses at the hospital were to do so at the bedside. In practice, two nurses frequently checked the paperwork arriving with the unit, the Transfusion Administration Record (TAR), against the tag attached to the unit away form the patient's bedside, usually at the nursing station counter. This practice simply duplicated the issue process that had occurred in the blood bank, in which the identity of the TAR, the unit tag, and the pickup slip from the floor were compared. After this reaction the policy and procedure was changed to require that the identity check occur at the bedside by two individuals and focused the process on identification of the patient, both verbally and by inspecting the wristband.

The bedside identification process should have detected the error initiated when a pickup slip was sent for Smythe rather than Smith. Note however that such situations often result from concatenated errors, and generation of a pickup slip for the wrong patient started the error chain in this case. It was many years later that the hospital began to seriously address the process for generating pickup slips.

In addition to the systematic problems with the procedures for establishing patient identity at the time of blood administration and generation of the pickup slip, root causes for this reaction include the similarity of the patient's names, and the high nursing workload the night of the reaction. Transfusion reactions frequently involve patients with similar name, so it is essential that the hospital have a second, unique identification number for patients in addition to the name. To address workload problems, the blood administration procedure must be segregated from other procedures so that there can be a sole focus on the transfusion process. Computer supported patient identification systems promise to reduce such clerical errors, and with the use of bar-coded patient wristbands and blood component labels, automated specimen label printing and compatibility testing, the possibility of "closing the loop" of patient identification is within sight.

2. What is the pathogenesis of the various manifestations of this transfusion reaction? What other manifestations of an immediate hemolytic reaction (IHTR) can be seen?

Manifestations of an IHTR in this case included a severe lumbar pain, a rigor, dyspnea, and fever. The exact cause of back pain is not known, but it may be due to stretching of the renal capsule in response to changes in the kidney induced by the hemolytic reaction. The rigor and fever are thought to be due to the release of cytokines that occurs as part of the systemic inflammatory response induced by injection of incompatible A and B RBC antigens. For a perspective on the potential severity of an IHTR, consider the difference in the amount of antigen involved in a transfusion reaction to that involved in a drug reaction. Fever is the most common manifestation of incompatible blood transfusion. Dyspnea due to transfusion may caused by release of anaphylotoxins generated when the complement system is activated.

A transfusion reaction should be suspected whenever any new symptoms or signs occur during or soon after transfusion. Severe phlebitis may be the initial manifestation of an IHTR, occurring as soon as the blood enters a peripheral vein of a conscious patient and prompting immediate discontinuation of the transfusion. Anesthetized patients sometimes present with hemoglobinuria noted in the bag draining a urinary catheter intra-operatively. This patient did develop hemoglobinuria. Shock, renal failure, and DIC are the most feared manifestations of an IHTR, their severity depending in part on the amount of incompatible RBCs that are administered before the reaction is discovered. There are tremendous, poorly understood differences between individuals with regard to the severity with which they react to incompatible transfusion.

3. If RBCs were randomly chosen off of the refrigerator shelves, without regard to ABO group, how often would the units be incompatible? (Show your calculations.)

Recipient group	*Donor Group*	*Incompatible?*	*Likelihood*
O	*O*	□ *Yes* √*No*	
	A	√ *Yes* □ *No*	*0.45 X 0.40 = 0.1800*
	B	√ *Yes* □ *No*	*0.45 X 0.10 = 0.0450*
	AB	√ *Yes* □ *No*	*0.45 X 0.05 = 0.0225*
A	*O*	□ *Yes* √*No*	
	A	□ *Yes* √*No*	
	B	√ *Yes* □ *No*	*0.40 X 0.10 = 0.0400*
	AB	√ *Yes* □ *No*	*0.40 X 0.05 = 0.0200*
B	*O*	□ *Yes* √*No*	
	A	√ *Yes* □ *No*	*0.10 X 0.40 = 0.0400*
	B	□ *Yes* √*No*	
	AB	√ *Yes* □ *No*	*0.10 X 0.05 = 0.0050*
AB	*O*	□ *Yes* √*No*	
	A	□ *Yes* √*No*	
	B	□ *Yes* √*No*	
	AB	□ *Yes* √*No*	
Total likelihood of ABO incompatible transfusion (this papulation			*0.3525 ~* ***35%***

4. What is the rationale for the treatment given in this case? Should any other treatment be given?

The diphenhydramine and corticosteroid given to the patient probably did not help, but did not harm her either. The patient's pain and rigor can both be treated with opiates, in this case meperidine (Demerol). The saline diuresis was initiated in order to maintain the patient's renal function, and is one of the most important interventions after an IHTR is discovered. In patients in whom DIC occurs and results in bleeding, replacement of platelets and coagulation factors may be required. Some have advocated early use of heparin to interrupt DIC when large volumes of incompatible RBCs have been administered but the patient has not yet developed overt coagulopathy.