Think Twice Before Using This Abbreviation

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CE Earn Up to 7.5 Hours. See page 108.

A patient with slurred speech and a facial droop presented to an emergency department late in the evening on a weekend. After rapid assessment, a probable diagnosis of stroke was made and alteplase was quickly prescribed. In this emergency department, this drug was commonly referred to as "t-PA." Approaching the automated dispensing cabinet (ADC), the nurse typed "t" and "tenecteplase" appeared on the selection screen; he selected this drug and removed it from the cabinet. The Pharmacy and Therapeutics Committee of this hospital approved the use of tenecteplase (TNKase) for ST segment elevation myocardial infarction (STEMI) because it was less expensive than alteplase (Activase) for myocardial infarctions (MIs). However, alteplase was also available in the ADC for immediate use in the emergency department when indicated for stroke and pulmonary embolism. A pharmacist typically was part of the stroke alert team that would prepare these medications, but because the hospital pharmacy was not open 24 hours a day on the weekend, the pharmacist was no longer present. Knowing that he was on his own to calculate and prepare the dose of a high-alert medication, the nurse asked a second nurse to confirm the dose calculations. Unfortunately, this check by the second nurse did not include a visualization of the actual medication removed from the ADC. Because of a mis-selection at the ADC, a dose of tenecteplase (TNKase) was then administered at the alteplase (Activase) rate. Although tenecteplase is not approved for stroke, the tenecteplase dose that was inadvertently administered was about 60% higher than the approved STEMI dosing for this drug. A pharmacist noticed the error the next day when reviewing the orders and notified the emergency department along with the hospital where the patient was transferred. Fortunately, the patient fully recovered and no adverse effects from the overdose of tenecteplase were identified.[1]

Upon investigation of the event, the ED nurse said he had the "t" in t-PA on his mind while obtaining the medication from the ADC. Nomenclature on the ADC screen listed generic and then brand names, and the "t" in t-PA led the nurse to select the tenecteplase (TNKase). The ADC screen did not offer any support for diagnosis or indication, and the typical bar code scanning process at the patient was bypassed because of the urgency of the request.[1]

Activase is a tissue plasminogen activator that was approved by the Food and Drug Administration (FDA) in 1987 for use in the management of acute MI; it was later approved for other indications including acute ischemic stroke and pulmonary embolism. Tenecteplase (TNKase), which is also a tissue plasminogen activator, was approved by the FDA later in 2000, but it is only indicated for the management of acute MI. As noted by the FDA, "Because Activase was the first tissue plasminogen activator approved, it has commonly been referred to as "t-PA" or "TPA" by healthcare providers."[2] The dose of alteplase for ischemic stroke (0.9 mg/kg) is often higher than the maximum labeled dose allowed for acute MI. An overdose of tenecteplase when selected in error may increase the risk of an intracranial hemorrhage or a retroperitoneal bleed leading to extended hospitalization and possible death.[2]

Unfortunately, the routine use of the abbreviations "t-PA" or "TPA" has led to frequent and long-standing confusion with the use of "TNK" for TNKase, leading to wrong drug errors. More than a decade ago, a similar event was described in this same column when a patient arrived at the emergency department with strokelike symptoms and was verbally prescribed "t-PA 8 mg IV followed by 73 mg over 1 hour." In this case, an inexperienced practitioner thought that they were both the same product from different manufacturers; this practitioner obtained and administered 8 mg of tenecteplase. (Computerized

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prescriber order entry [CPOE] and bar code scanning capabilities were not available to be used at that time in this facility.) A neurologist who was asked to see the patient discovered the error before the 1-hour dose could be administered, but it was believed that the mix-up could have contributed to the patient's poor outcome.[3]

Confusion associated with the use of the term "t-PA" has also led to confusion and wrong drug errors outside of the emergency department. In 2008, the Institute for Safe Medication Practices (ISMP) received a report of a wrong drug mix-up for a patient receiving care in an interventional radiology department. When the patient undergoing a procedure experienced a cardiopulmonary arrest, the physician in charge requested "alteplase 100 mg IV." A pharmacist attending the code called the pharmacy and asked then to urgently "prepare t-PA." Because the call came from radiology and the prescribed dose and indication were not communicated, the pharmacist believed it was for the restoration of central venous catheter function, because calls from radiology were often for this purpose, so he dispensed a 2 mg/2 mL syringe of alteplase (Cathflo Activase) instead of the needed 100-mg dose. Upon receiving the syringe in radiology, the physician and associated resident staff assumed it was the correct dose to treat a pulmonary embolism, so it was administered. Sadly, the patient could not be resuscitated.[4]

More than a decade after these earlier reports, the ISMP and FDA continue to see these mix-ups resulting in preventable error. We highly encourage ED personnel to take the time to review their procedures for management of tissue plasminogen activators relative to emergent patient scenarios and consider implementation of the following strategies to prevent errors and possible patient harm:

- Because Activase, TNKase, and reteplase (Retavase) are all tissue plasminogen activators, *never* use/accept drug name abbreviations, and in particular, eliminate the use of the term "t-PA" in verbal, written, and electronic communications. Apply this principle not only in the emergency department but throughout the facility to avoid confusion.[2] The potential for mix-up is great, and the outcome is potentially lethal. For a full listing of error-prone abbreviations to avoid, see http://www.ismp.org/recommendations/error-prone-abbreviations-list.[5]
- Because alteplase is used for the management of ischemic stroke and pulmonary embolism and TNKase (tenecteplase) is not, prescribers should be required to state or select an indication as part of the complete communication of the order.[2,4,6,7]
- Consider the use of alerts in CPOE systems and ADCs to assist with selection mix-ups. For example, in the tenecteplase screen, consider messages such as "Warning: Frequently confused with alteplase (Activase); verify the correct drug for the appropriate indication"[2] or "STEMI ONLY."[1]
- Use technologies such as prebuilt indication-based order sets in the CPOE and profiled ADCs to support accurate drug selection. Also, as much as possible, use bedside bar code scanning and smart infusion push libraries with dose error reduction software to help catch errors before they reach the patient.[8]
- When technologies are unavailable, and because these are high-alert medications, consider involving others at the bedside to validate proper drug selection and dose.
- Share these stories with your ED colleagues and discuss prevention strategies at your next safety huddle. Consider viewing the FDA video entitled *t-PA and TNK Mix-Ups: Clearing Up the Confusion,* which is available at https://www.medscape.com/viewarticle/850514.[9] Although education alone is considered a low leverage error reduction strategy, increasing awareness about this abbreviation risk is a necessary step in creating a safer environment for care.

Take the time to address these risks and challenges *before* the next time you are asked to grab some "t-PA." The safety of your patients depends on it.

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