Guidewires Unintentionally Retained During Central Venous Catheterization

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Abstract

Background: *A number of mechanical complications can occur during the insertion of a central venous catheter (CVC), including breakage or loss of the wire and unrecognized failure to remove the wire. Complications related to retention of a guidewire can be serious or fatal.*

Methods: *Incident reports on retained CVC guidewires entered into the University HealthSystem Consortium (UHC) Safety Intelligence Patient Safety Organization (PSO) database (Chicago, IL) over a 5-year period were reviewed to improve our understanding of their circumstances, causes, and related patient outcomes.*

Findings: *A total of 42 events that involved retention of a whole guidewire or a fragment of a wire were found in the UHC Safety Intelligence PSO database from 2008 through 2012. Although one-third of these events were discovered during or at the end of the CVC insertion procedure, retained CVC guidewires were commonly discovered days to years after the procedure and on imaging tests performed for unrelated reasons or during other subsequent care. Managers who reviewed the events commonly recommended education and training to prevent retained CVC guidewires, but factors contributing to these events such as distractions and emergency situations also suggest the need for a device design that prevents the occurrence.*

Conclusions: *Efforts to prevent the loss of CVC guidewires should include clinician education and the development of a device design that prevents inadvertent guidewire loss and alerts clinicians when the end of the guidewire is near.*

Keywords: *central line, central venous catheter, complication, retained guidewire*

Introduction

As many as 6 million central venous catheters (CVCs) are inserted into patients every year for hemodialysis; to monitor central venous pressure; and to administer fluids, medications, and nutrition support that cannot be safely administered peripherally.[1] A number of mechanical complications can occur during the insertion of a CVC, such as inadvertent cannulation of an artery, perforation of vessels or cardiac chambers, pneumothorax, hemothorax, catheter entrapment, breakage/fracture of the wire, recognized loss of the guidewire during the procedure, and unrecognized failure to remove the guidewire during the procedure (Figure 1).[2-15] The retention of a guidewire can result in an arrhythmia, vascular damage, thrombosis, embolism, infection, cardiac perforation, and tamponade.[4,9,11,13] Complications related to retention of a guidewire can be serious and have been reported to be fatal in up to 20% of cases.[9]

Objectives

The objective of our analysis was to review patient event reports on retained CVC guidewires entered into the University

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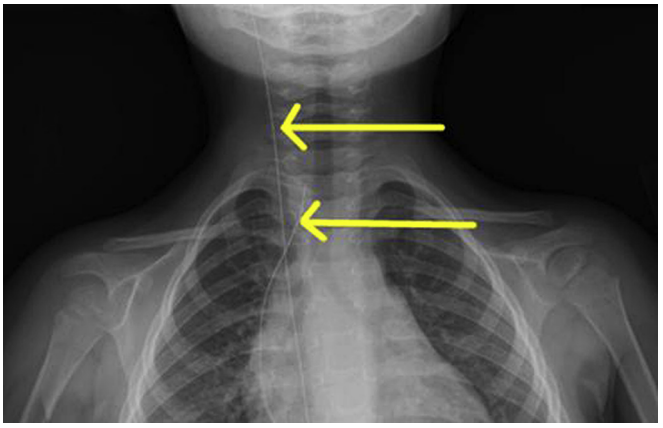

Figure 1. Radiograph of a guidewire unintentionally retained during central venous catheterization. Reprinted with permission.

HealthSystem Consortium (UHC) Safety Intelligence Patient Safety Organization (PSO) database (Chicago, IL). More than 40 organizations in the United States participate in the UHC Safety Intelligence PSO, including academic medical centers, community and specialty hospitals, community health centers, group practices, and clinics. UHC Safety Intelligence PSO participants use a comprehensive, common taxonomy for event classification, and event reports are compliant with the Agency for Healthcare Research and Quality Common Formats. Our analysis highlights the occurrence of retained central line guidewires, describes common causes, and identifies system improvements that could help prevent these errors.

Methods

A search of events entered into the UHC Safety Intelligence database by PSO members from January 1, 2008, through December 31, 2012, was conducted. The text field that contains the reporter's description of the event was searched for the words *central line, central venous catheter, CL, CVL, CVC,* and **wire**. In addition, all events entered in the UHC Safety Intelligence database under the event type "guidewire accidentally left in patient" were included in the review. The annual rate of retained CVC guidewires per 1,000 staffed beds was calculated.

Findings

Of the 137 events that met the search criteria, 95 were excluded because they did not involve a retained guidewire or fragment of a guidewire, leaving 42 events that were included in this analysis. Of these, 31 (74%) involved an entire guidewire accidentally left in a patient, whereas in the remaining 11 (26%) only a fragment of the wire was retained.

Trend in Reporting

The rate of reported CVC guidewire retention events per 1,000 staffed beds increased in 2011 and 2012 compared with 2008-2010 (Figure 2). This increase may be related to a 2011 update to UHC's taxonomy to include the event type "guidewire accidentally left in patient," which made such events easier to report accurately.

Site of Insertion

Information on the site of insertion was available for 25 of 42 reported events (60%). The most common access site involved was the femoral vein (52%), followed by a peripheral vein (24%), the internal jugular vein (16%), and the subclavian vein (8%).

Discovery of Event and Length of Retention

In about one-third of the 42 events, the retained guidewire was discovered during or at the end of the procedure and action was taken to retrieve the wire. However, the retained guidewire often went unnoticed at the end of the procedure. In most of these cases, the retained guidewire was discovered during hospitalization on imaging tests performed for unrelated reasons; during assessment, provision of treatment, or change or discontinuation of the CVC; or through lack of

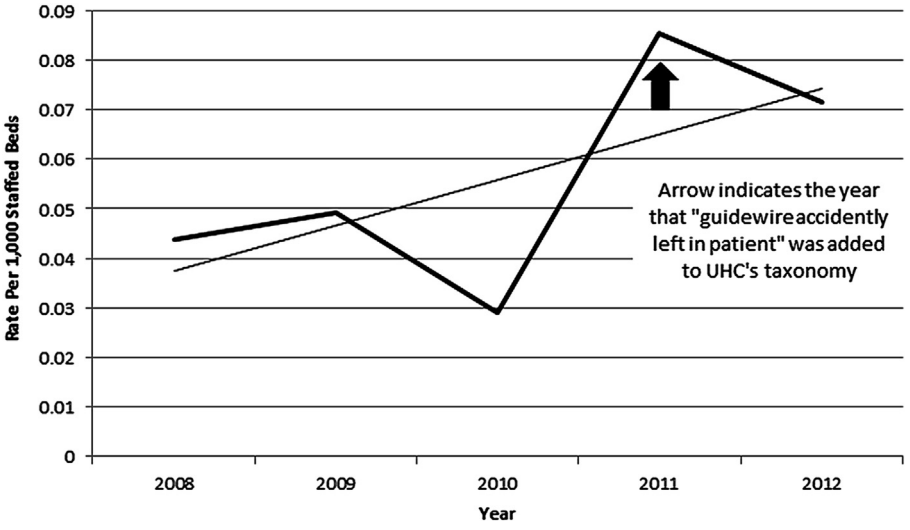

Figure 2. Trend in reporting of retained central venous catheter guidewires in the University HealthSystem Consortium (UHC) Safety Intelligence database (Chicago, IL), January 2008-December 2012. Reprinted with permission from UHC.