

CRAIG GILLIAM

Step by step: A systematic approach to reducing catheter-related bloodstream infections in pediatric intensive care units

NARRATOR: In a conversation with Craig Gilliam, Director of Epidemiology and Infection Control at the Arkansas Children's Hospital, we'll explore for the first time on Knowledge Is Infectious the measures that can be taken to prevent catheter-related bloodstream infections in children. Craig and his team spent more than seven years developing and implementing techniques for reducing bloodstream infections at the Arkansas Children's Hospital in Little Rock, Ark., and he and Dr. Adnan Bhutta co-authored an influential *British Medical Journal* article on their program and its results.

INTERVIEWER: What do you need to consider when you put in place an infection control program, specifically for pediatric wards?

C. GILLIAM: You must have someone within the unit, an intensivist, a physician champion that says: This is important. We are going to do it the right way. We are going to use evidence-based. We are going to monitor it, and we are going to work continually on these interventions to make sure they are effective.

This is not a six-week project. This is something we do from now on because ultimately we are trying to provide our children with a safe patient environment.

I mean, the fact that my child didn't stay an extra six or seven days in the pediatric intensive unit is a real plus for me as a parent.

INTERVIEWER: Walk us through each of the measures you took to reduce bloodstream infection associated with catheters.

C. GILLIAM: We have the individual that is going to insert the catheter scrub as they would for a surgical procedure. We have them wear gown, glove, mask and head cover, and then we drape the child as if it is a surgical procedure.

Our second intervention was actually led by one of the other intensivists who looked at a *New England Journal of Medicine* article in 1999 that suggested the use of an

antibiotic-impregnated catheter with minocycline and rifampin could also have a beneficial effect on reducing bloodstream infection. So, we started using that, and we realized that we were kind of some of the first units to begin using that.

We started an annual campaign of having a hand washing initiative. We would do observations in which we would have trained observers sit in the intensive care unit, watch that individual actually disinfected their hands or washed their hands appropriately. Then we always gave feedback to the unit to say, "This is how well you are doing." The other thing we wanted to do is develop kind of an acronym or logo for this, so one of the nurses came up with the idea of "friction rubs out germs": FROG. So we made a little emblem with a frog on it standing on a bar of soap, and it said, "I washed my hands, did you?"

In 2003 we moved into a new pediatric intensive care unit. Initially in our old unit, it was a 19-bed unit that had five private rooms, and 10 hand washing and 10 alcohol stations. In the new unit we moved to a 26-bed unit, so it was only about a third larger, but it had 22 private rooms. At that time it had 45 alcohol stations and 40 hand washing stations. So we quadrupled the number of hand-disinfection places we had, and we also had about twice the number of square footage that we had had originally. The advantage of having the additional square footage meant that the things that we would use, such as a cart that would have all of our supplies when we would insert a central line, could all be moved inside the room, as opposed to placing it outside the room and having people walk back and forth. That was a huge impact. It also allowed us to give the patient more privacy when lines were being placed. We didn't have as many what we would call open ward-type settings.

INTERVIEWER: How much did it cost to implement your program?

C. GILLIAM: When we introduced this, the concern is always going to be, "Is this going to be too expensive?" because we are going to spend more money on catheters, more money on maximum barrier precautions, more on skin antisepsis. But from multiple studies published in the pediatric literature, the cost of a catheter bloodstream infection is anywhere from \$39,000 to \$46,000 per episode. What we can demonstrate in our own facility is that if we prevent and decrease our rate of infection by a third to even half, we are going to pay for five to six years of

catheters, or skin disinfection and things like that. So it is cost effective to do this, because if you just look at dollars and cents, these are expensive infections, and they extend the stay in the pediatric intensive-care unit.

INTERVIEWER: What was the outcome of your efforts?

C. GILLIAM: Over a period of about five to seven years, we were able to decrease our bloodstream infection rate by 75 percent.

INTERVIEWER: How did you change behaviors so that these procedures become habits?

C. GILLIAM: We know from a behavioral standpoint what is aseptic technique. We know there is a tremendous amount of technology out there that says, "I can reduce, and this can reduce, the incidents of bloodstream infection." But the idea is, when you talk about changing culture, a few years ago the idea was, "Well, we can prevent some infections, but some infections are going to occur regardless." About two to three years ago a lot of people in infection control began to look, and when we got some initial success, said, "You know, we are asking ... or we are making the wrong statement. What we should be saying is, can we eliminate or get to the irreducible minimum? As opposed to, let's hit the benchmark, let's be below the 50th percentile, because half the people will be not as good as us."

And it is the kind of attitude that not only will I reduce infections, but I can eliminate them. For many of us, we would challenge you: Show us the patient that we can't prevent an infection in now, rather than saying, "Well, that is an expected event." No, it's not anymore. That is the real change, not only for physicians and nurses, but infection control and administration that, "No, we don't expect your child to develop an infection no matter how sick they are, no matter how premature they are, no matter how bad their trauma is. We can give them a safe environment for their stay in our intensive care unit."