

Reducing access related blood stream infections (AR-BSI) in the hemodialysis unit by monitoring and intervention

Ilana Gross, Michal Dranitzki Elhalal, Carmela Schwartz, Mali Razon, Larisa Lipkin, Allon E Moses, Shmuel Benenson

Infection control unit, Department of Clinical Microbiology and Infectious Diseases; Hemodialysis unit, Nephrology and Hypertension department
Hadassah-Hebrew University Medical Center, Jerusalem, Israel

Introduction

- Access related blood stream infections (AR-BSI) in dialysis patients are a significant cause for morbidity and mortality.
- The risk of infection is higher among patients using vascular catheters (Figure 1) than in patients using arteriovenous fistulas or grafts as dialysis access.
- In January 2009 we established an ongoing intervention program in the 44-patients dialysis unit of Hadassah Medical Center in order to reduce AR-BSIs and to improve quality of care.
- The basic component of the intervention is ongoing monitoring of AR-BSI rate.

Methods

- A dedicated dialysis nurse prospectively collects infection data using a pre-prepared data collecting form as part of the daily routine.
- Detailed information is recorded concerning dialysis patients with positive blood cultures, hospitalizations and new antibiotic treatments.
- Supposed cases of AR-BSI are discussed monthly with an infection prevention nurse and an infectious diseases physician, and AR-BSIs are defined according to CDC surveillance definitions.
- Feedback of AR-BSI rate per 100 patient months is sent quarterly to the chairman of the unit and head nurse and to the hospital administration.
- Meetings with the unit staff to discuss the findings are taking place routinely.
- We updated the guidelines for the processes of patient connection to the dialysis machine, dressing exchange and disconnection and prepared a new kit containing all the needed equipment, organized according to the order of use.
- In the beginning of 2015, observations during patient care, conducted routinely by the unit nurses, were implemented.

Results

- During the intervention the behavior of the staff according to the guidelines for AR-BSI prevention has improved.
- Due to a growing number of severe and complicated patients over the study years, the mean proportion of patients dialysed through vascular catheters increased during the intervention period from 23% to 41% ($p < 0.001$) (Table 1).
- The rate of AR-BSI per 100 patient months, among patients dialysed through catheters, decreased gradually from 13.3% during 2009 to 2.5% during 2015 ($p = 0.001$) (Table 2, Figure 2).
- Overall, the total rate of AR-BSI decreased over the study period from 3% during 2009, to 0.8% during 2015 ($p = 0.019$).

Figure 1: Dialysis's catheter

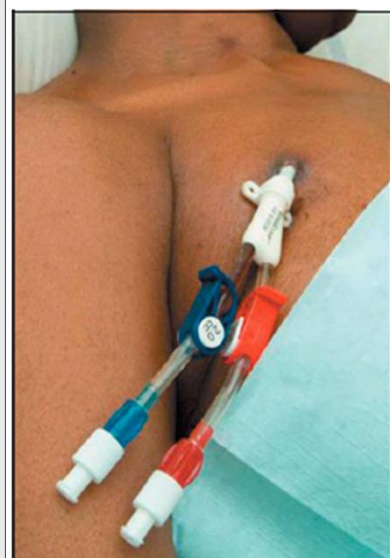


Table 1: Number of patient months stratified according to type of access, 2009-2015

| Year | Patient months No (%) | | | |
|-------|--------------------------|----------|---------|----------|
| | Total | Fistula | Graft | Catheter |
| 2009 | 502 | 318 (63) | 71 (14) | 113 (23) |
| 2010 | 514 | 311 (61) | 68 (13) | 135 (26) |
| 2011 | 478 | 281 (59) | 65 (13) | 132 (28) |
| 2012 | 435 | 219 (50) | 39 (9) | 177 (41) |
| 2013 | 465 | 256 (55) | 36 (8) | 173 (37) |
| 2014 | 503 | 268 (53) | 32 (6) | 203 (40) |
| 2015* | 476 | 259 (55) | 20 (4) | 197 (41) |

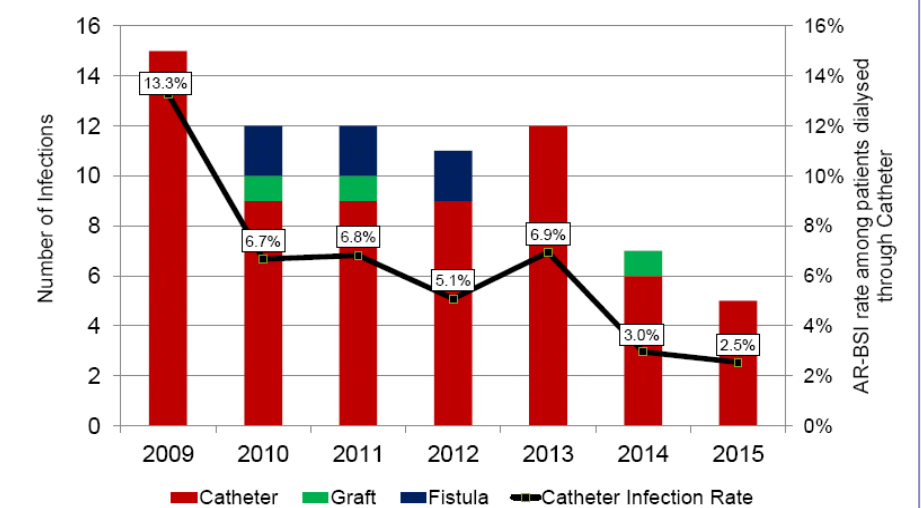
*until October 2015

Table 2: Access-related BSI (AR-BSI) rates by type of access, 2009-2015

| Year | Access-related BSI rates No (% of patient months) | | | |
|-------|--|---------|---------|-----------|
| | Total infections | Fistula | Graft | Catheter |
| 2009 | 15 (3.0) | 0 (0.0) | 0 (0.0) | 15 (13.3) |
| 2010 | 12 (2.3) | 2 (0.6) | 1 (1.5) | 9 (6.7) |
| 2011 | 12 (2.5) | 2 (0.7) | 1 (1.5) | 9 (6.8) |
| 2012 | 11 (2.5) | 2 (0.9) | 0 (0.0) | 9 (5.1) |
| 2013 | 12 (2.6) | 0 (0.0) | 0 (0.0) | 12 (6.9) |
| 2014 | 7 (1.4) | 0 (0.0) | 1 (3.1) | 6 (3.0) |
| 2015* | 4 (0.8) | 0 (0.0) | 0 (0.0) | 4 (2.5) |

*until October 2015

Figure 2 : Number and rate of AR-BSI at the Hadassah Hospital Dialysis Unit according to type of access, 2009-2015



Conclusions

- The intervention resulted in an improvement in staff behavior according to the guidelines and led to a significant decrease in AR-BSI rate, even though the proportion of patients dialysed through catheters increased.
- Ongoing surveillance and feedback, leading to behavioral change among staff members, were the central components of the intervention in our dialysis unit.