

Table 2. Included Sterility Studies and Key Results

STUDY	YEAR	SURGICAL MARKING PEN	NON-SURGICAL MARKING PEN	METHOD	RESULT
Contamination					
Cullan et al.	2007	✓		Observed potential contamination of surgical marking pens on surgical wounds of 30 patients undergoing upper extremity surgery.	The outcome of 60 cultures was negative for bacterial growth 72 hours after inoculation on blood agar plates.
Tenenhaus et al.	2006	✓	✓	Observed potential contamination of surgical and nonsurgical marking pens taken from preoperative holding areas and operating rooms from three medical facilities.	All cultures were negative for bacterial growth after observations every 48 hours for a 1 week period.
Cronen et al.	2005	✓		Observed potential contamination of surgical marking pen on 20 volunteers.	All cultures were negative for bacterial growth 72 hours after inoculation on chocolate, blood, and MacConkey agar plates.
Cross-Contamination					
Ballal et al.	2007		✓	Observed potential for cross-contamination of nonsurgical marking pens on 24 patients, including 4 patients with methicillin-resistant <i>Staphylococcus aureus</i> - (MRSA-) positive ulcers, undergoing various elective surgeries.	<p>Cultures were positive for bacterial growth:</p> <ul style="list-style-type: none"> ■ 0 minutes following inoculation <ul style="list-style-type: none"> —96% of dry white-board markers —29% of permanent markers ■ 3 minutes following inoculation <ul style="list-style-type: none"> —100% dry white-board markers —17% permanent markers ■ 10 minutes following inoculation <ul style="list-style-type: none"> —100% dry white-board markers —0% permanent markers <p>MRSA:</p> <ul style="list-style-type: none"> ■ 0 minutes following inoculation <ul style="list-style-type: none"> —100% dry white-board markers —100% permanent markers ■ 3 minute following inoculation <ul style="list-style-type: none"> —8% dry white-board markers —8% permanent markers ■ 10 minutes following inoculation <ul style="list-style-type: none"> —8% dry white-board markers —0% permanent markers
Wilson et al.	2006	✓	✓	Observed potential for cross-contamination of MRSA between patients. A line from each surgical and nonsurgical pen was drawn onto bacteriologic plates containing MRSA. Each pen was then used to draw an arrow onto blood agar plates at various intervals after inoculation.	MRSA did not survive after 3 weeks from inoculation on the surgical marking pens nor did it survive after 15 minutes from inoculation of the nonsurgical marking pens

Sources: Cullan D, Wongworawat M. Sterility of the surgical site marking between the ink and the epidermis. *J Am Coll Surg* 2007 Aug;205(2):319-21; Tenenhaus M, Bhavsar D. Do marking inks pose an infection risk? A surgeon's perspective. *Surg Inf* 2006 Oct 1;7(5):481-3; Cronen G, Ringus V, Sigle G, et al. Sterility of surgical site marking. *J Bone Joint Surg Am* 2005 Oct;87-A(10):2193-5; Ballal MS, Shah N, Ballal M, et al. The risk of cross-infection when marking surgical patients prior to surgery—review of two types of marking pens. *Ann R Coll Surg* 2007 Apr;89(3):226-8; Wilson J, Tate D. Can pre-operative skin marking transfer methicillin-resistant *Staphylococcus aureus* between patients? A laboratory experiment. *J Bone Joint Surg Br* 2006 Apr;88(4):541-2.