Supplementary File 3: Key characteristics of included studies

AUTHOR, YEAR	SETTING	STUDY DESIGN	SAMPLE SIZE*	MICROBIOLOGICAL SAMPLING	OUTCOME MEASURE(S)	INTERVENTION DESCRIPTION (IF ANY)
ALBRECHT 2013	10 clinical wards, Germany	Prospective comparative analysis	10 iPads	Culture media with contact plates taken from 13 contact points on the iPad (front and back)	Total bacterial load	Isopropanol wipes using the 6-step disinfection process guided by the deBac-app. Devices in control arm cleaned with a cloth, without any liquid cleaning agents, as recommended in the iPad manufacturer instructions.
AL-HAMAD 2008	Nurse station areas in a hospital UK	Pre/Post	Unknown number of keyboards	Variety of hand-touch surfaces randomly sampled before and immediately after cleaning, prior to admission of a new patient. Surfaces in the common nurse station areas, where cleaning policy was not strictly followed, sampled randomly on two different occasions. Wards sampled 4 times: twice before cleaning and twice after. A subset of surfaces were sampled to determine the total aerobic count.	Total aerobic count (CFU)	
ALI 2015	Teaching hospital in UK	Cross Sectional	Unknown number of keyboards	Sampled by using either a contact plate or by wiping the entire test area (in a left-to-right motion, followed by wiping at 45° and 90° angles; the process was repeated 3 times) using a 25-cm2 sponge swab pre-moistened with neutralizing solution	Detection of C. diff	
ANASTASIADES 2009	ICUs at Academic Hospital South Africa	Repeated cross sectional, 2x	14 keyboards and 14 mice	Moistened sterile swabs taken by student researchers trained by experienced medical technologist, taken at baseline and again 6 months later because initial sampling detected unexpectedly low S. aureus rates	Detection of CNS, Gram-positive bacilli, micrococci, fungi and S. aureus	
BURES 2000	ICU, USA	Repeated cross sectional, 2x/week for 2 months	10 keyboards	Moistened swab from letter keys, space bar and enter key taken over 8 collection periods (2 nonconsecutive days of 2 nonconsecutive weeks for 2 months)	Total bacterial load	
CATANO 2012	Tertiary hospital, Colombia	Cross Sectional	30 keyboards	Surfaces randomly sampled with moistened swabs during weekdays.	Total bacterial load	

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CHOI 2014	Endoscopy rooms of 2 tertiary hospitals Korea	Cross sectional	Unknown number of keyboards	Moistened cotton tipped swabs were taken from all surfaces after endoscopy was performed, one time each in the morning and afternoon	Total bacterial load (CFU)	
CIRAGIL 2006	Patient and exam rooms, OR, offices, non-clinical areas, Turkey	Cross Sectional	56 keyboards in clinical areas	Moistened swabs collected from entire surface of keyboard	Total bacterial load	
CODISH 2015	Internal medicine wards and ICU, Israel	Cluster RCT	81 keyboards + 81 mice	Sampling done with Eswab. Culture specimens taken from keyboards and mice prior to the intervention and 2 weeks after intervention began.	Total bacterial load	MEDIWIPES (alcohol based) vs. TriGene (quaternary ammonium based). Each device decontaminated 3 times a day.
CORDEIRO 2015	ICU Brazil	Pre-post	6 keyboards	Sterile swabs taken by the researchers, 2 swabs from each device (once before applying the cleaning/ disinfection product and another one right after the equipment was dried, without a pre-established waiting time)	Total bacterial load	Computer keyboards were cleaned on a daily basis with a brush for removing dust.
DANCER 2008	2 acute surgical wards at a teaching hospital UK	Repeated cross sectional, 1x week for 6 months per ward	2 keyboards, 1 per ward	Dip slides were used for sampling by an unspecified person. Screening was conducted in each ward for a 6 month period, first on ward B, then 6 months on ward A. Sampling done after routine cleaning and taken once weekly.	Hygienic failure was considered a site with ACC greater than 2.5 CFU/cm2 or any site demonstrating the presence of MSSA or MRSA	
DANCER 2009	2 Surgical wards with endemic MRSA, UK	Prospective Cross-over	2 keyboards	Dip slides used for sampling keyboards	Hygienic failure was considered a site with ACC greater than 2.5 cfu/cm2 or any site demonstrating the presence of MSSA or MRSA	Enhanced cleaning: additional cleaner added to ward and trained to clean hand-touch sites 1-3 times per day depending on location Monday to Friday.

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DE GROOD 2012	Medical, surgical, ICU units in 4 urban hospitals, Canada	Cross sectional + nested Pre/Post	240 keyboards	Conventional keyboards cultured 3 times using moistened sterile applicators: 1) in the morning pre cleaning, 2) approximately 2 hours following the initial swabs (after routine cleaning), and 3) post cleaning with a "CaviWipe". Later, 10 "Cleankeys" keyboards were placed on hospital ward in selected high usage areas of a Medical Centre and cultured pre-, after 2 hours, and post-cleaning using methods as above.	Total bacterial load	"CaviWipes" (a quaternary ammonium compound) with isopropanol)
DEVINE 2001	Nurse stations in 2 district hospitals' acute medical and surgical wards, UK	Cross Sectional	25 terminals (keyboard, mouse, mouse pad)	Swabs taken from entire keyboards, mouse, and mouse mat by same individual	Detection of MRSA	
DUMFORD 2009	Patient rooms, physician and nurse work areas, portable equipment, 3 wards, USA	Pre/Post	32 computers in initial survey, 25 computers and 1 mouse in follow up survey	Moistened swabs taken from entire keyboard surface	Detection of C. diff	Disinfection with bleach
DUSZAK 2014	outpatient radiology workstations in 2 hospitals, USA	Cross Sectional + Pre/Post at 2 hospitals	7 mice	Samples taken using direct contact with sterile plates	Total bacterial load	"Chlorascrub" pads (chlorhexidine gluconate and isopropyl alcohol)
ENGELHART 2008	Non-clinical and clinical areas of a University Hospital, Germany	Cross Sectional	77 computer terminals in clinical areas (keyboard, mouse)	Samples taken by direct contact using Rodac plates from the enter key, space bar, and mouse by trained investigator	Total bacterial load	

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FAIRES 2012	3 community hospitals, Canada	Repeated cross sectional at 4 time points	Unknown number of keyboards	Samples taken with dry electrostatic cloths, once per week for 4 consecutive weeks, prior to daily cleaning	Detection of MRSA or C. Diff	
FAIRES 2013	2 Medical wards and 1 surgical ward Canada	Repeated cross sectional, 6 times over 15 weeks	Unknown number of keyboards	Sterile electrostatic cloths were used for sampling, done by the investigator. Half the surface with one cloth and the other half with another. Sampling was conducted once a week for 3 consecutive weeks during weeks 1–3 and weeks 13–15, prior to cleaning.	Detection of MRSA or C. Diff	
FELLOWES 2006	General clinical hospital areas, UK	Cross Sectional	44 keyboards	Swabs taken from enter key and spacebar	Detection of MRSA or MSSA	
FARIAS 2017	Renal Transplant ward Portugal	Repeated cross sectional, over 3 months	1 keyboard	Samples were always collected at the end of the morning and during lunch time, after the medical visits and treatments, collected over a 3 month period. Swabs were used to sample an area of 10x10 cm of each surface.	Total bacterial load	
FUKADA 2008	OR, ICU, consulting room, outpatient reception area, Japan	Pre/Post	Unknown number of keyboards	Moistened swabs taken from all keys before and after cleaning	Total bacterial load	Cotton cellulose sheet dampened with ethyl alcohol
GERBA 2016	Hospital, USA	Cross sectional	17 computer touch screens	Samples taken from computer touch screens over course of one day using a sterile sponge stick	Coliform bacterial growth	
GOSTINE 2016	ICU, USA	Pre/Post with various exposure frequencies	40 keyboards	Samples collected at 6AM, before cleaning. eSwab liquid based collection and transport system kit used for sampling	Total bacterial load	UV Angel Desktop lamps, set to 3-, 5-, 6-, and 10-minute cycle lengths
GRABSCH 2012	Hospital, Australia	Pre/Post	Unknown number of keyboards	Moistened swabs taken monthly during program periods B1 and B2 (not performed regularly during period A)	Detection of VRE	Hospital wide program including 'Bleach-Clean': replaced surface cleaners with sodium hypochlorite solution plus Chloradet detergent; install cleaner dispensing stations, employment of cleaning

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						supervisors and training program for cleaning staff, performance appraisals, modify protocols for managing VRE-colonized patients, thrice annual schedule of "super clean disinfection"
GRAY 2007	Emergency Northern Ireland	Repeated cross sectional, 3x over one year	7 computer mice	Sampling was performed on three occasions over a 1 year period and performed unannounced by one of the authors. Moistened bacteriology swab used on the palm rest and left click button. A swab was also taken from the plastic edging surrounding the keyboard as a control	Total bacterial load	
HARDY 2014	All wards in 3 hospitals UK	Repeated cross sectional, over a 22 month period	Unknown number of keyboards and computers on wheels	Once a period of increased incidence of C. diff was identified, all wards had ATP sampling undertaken on a weekly basis in the afternoon by an infection control nurse.	RLU levels over 1,000 considered to be unacceptable (red code). A result between 500 and 1,000 RLU was given an intermediate rating or amber code	
HARTMANN 2004	ICU, Germany	Repeated cross sectional over 3 months	Unknown number of keyboards and mice	Keyboards and mice sampled with a moistened swab during 2 periods of 3 months each on 8 nonconsecutive days.	Potentially pathogenic microorganisms (2+ CFU)	
HASSAN 2014	Staff rooms, computer labs, internet centers in a teaching hospital, Iraq	Cross Sectional	150 keyboards and 100 mice	Sterile swabs taken of keyboards and mice	Total bacterial load	
HIRSCH 2014	University department of pharmacy	Cross Sectional	30 iPads	5 swabs taken once (4 wet and 1 dry), 6 months following iPad distribution	Total bacterial load	

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	practice, USA					
HONG 2012	Emergency dept of 3 teaching hospitals South Korea	Cross sectional	112 computer items (56 keyboards and 56 mice)	A single sterile moistened swab was wiped over the keyboard and electronic mouse surfaces by one of the authors wearing sterile gloves. Keyboards were sampled by moving the sterile swab over the all keys over 60 seconds. The areas tested on each mouse were the palm rest, left and right click buttons of the mouse, and a standard 6 cm^2 area was swabbed.	Total bacterial load	
JONES 2015	ICU, UK	Controlled Trial	8 keyboards for controlled study + 24 keyboards for intervention	Daily samples obtained using moistened swabs from entire keyboard and all keys at 4-6h and 24h of clinical use, daily for 16 days.	Total bacterial load	CHG spray (2% chlorhexidine gluconate-70% isopropyl alcohol) vs. TF spray (chlorine dioxide-based)
JUNGNICKEL 2014	Several clinical departments and wards at a Medical School, Germany	Pre/Post	5 iPads	Sampling using contact plates done before and after disinfection intervention	Total bacterial load	Isopropanol wipes using the 6-step disinfection process guided by the deBac-app.
KARBASIZADE 2014	Medical wards of various hospitals Iran	Cross sectional	65 keyboards	A sterile swab which had been dampened by Trypticase soy agar, was applied on the entire keyboard.	Total bacterial load	
KEERASUNTO-NGPONG 207	General medical wards, ICU Thailand	Cross sectional	26 keyboards	A sterile cotton swab, moistened with sterile normal saline solution, was rolled over the F and J keys, the number 4 and 5 keys, and the enter key and space bar	Total bacterial load	
KHAN 2015	2 large academic institution medical centers, USA	Cross Sectional	106 portable electronic devices (93 were iPads/ tablet)	Moistened swabs taken of house officers' and attending physicians' carrying devices. Separate swabs were used for the screen, cover, and keyboard if applicable.	Total bacterial load	
KIEDROWSKI 2013	Hospital, USA	Cross Sectional	20 iPads	iPad screens swabbed.	Detection of C.diff, MRSA	

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LINK 2016	OR, USA	Cross sectional with control	Unknown number of keyboards and mice	Samples obtained over a 3 week period, pre- and post-procedure and before cleaning. Samples taken with a sponge stick.	Total bacterial load	
LU 2009	All ward stations of university hospital, Taiwan	Cross Sectional	282 stations (keyboard and mouse)	Moistened swabs taken from keyboards and mice	S. aureus, Pseudomonas sp, and Acinetobacter sp	
MALTA 2016	Dental radiology clinic at public educational institution, Brazil	Repeated cross sectional at 2 time points	Unknown number of keyboard and mice on radiological equipment	Sterile moistened swab samples collected over 3 nonconsecutive random days at 2 different times: in the morning, before attending patients, and at end of day after appointment hours and before cleaning and disinfection procedures.	Total bacterial load	
MAN 2002	Nurse stations, patient bed bays in multiple wards, UK	Cross Sectional	85 keyboards + 80 mice + 44 mouse pads	Sterile moist swabs taken of the entire surface of every key and crevice of each keyboard, mouse, and mouse pad	Total bacterial load	
MARTIN 2011	ICU and ER in pediatric hospital, USA	Randomized double blind cross-over trial	72 terminals (keyboards/ mouse/pad): 24 Vioguard keyboards, 24 control keyboards, 24 existing keyboards	Moistened swabs taken from the mouse pad, mouse buttons, and the ‘‘F,’’ ‘‘M,’’ ‘‘Enter,’’ and ‘‘Space’’ keys, sampled with a single swab	Total bacterial load	Keyboards with “Vioguard” UV light irradiation with identical control keyboards not exposed to UV light irradiation.
MESSINA 2013 (A)	4 different medical units, Italy	Pre/Post	27 keyboards	A first swab taken from one half of the surfaces before cleaning with the putty and a second sample from other half of surfaces after cleaning. Sides were alternated.	Total bacteria count of: Staphylococcus spp, Pseudomonas spp, E. coli, total coliform bacteria, C.diff, Acinetobacter spp,	A putty cleaning compound (ethanol 29%) with malleable-elastic consistency, designed to adhere to surfaces, remove dirt and disinfect

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MESSINA 2013 (B)	Various units within 3 hospitals, Italy	Pre/Post	50 keyboards	A first swab taken from one half of each keyboard before cleaning, and a second sample from other half after cleaning. Samples obtained by swabbing almost all the keys and also going between/under the keys with cotton sterile pads.	Total bacterial load	A putty cleaning compound (ethanol 29%) with malleable-elastic consistency, designed to adhere to surfaces, removing dirt and disinfect
MOORE 2013	ICU and GI surgical wards, UK	Repeated cross sectional over 17 weeks	Unknown number of keyboards	Sampling conducted on variety of surfaces using direct contact methods (blood agar contact plates). 33 samples taken over 17 weeks.	Aerobic colony counts	
MORTER 2011	Ward rooms, UK	Cross sectional Post-intervention	10 keyboards + 8 mice	All surfaces in rooms where NoV infected patients stayed were cleaned with Actichlor solution. Then, moistened swabs taken from variety of surfaces, including keyboards/mice. Two wards on which NoV was detected on environmental surfaces after cleaning were subjected to second clinical clean and tested again.	Detection of Norovirus	Actichlor plus solution
MOTTA 2007	Undergrad dental school clinic, Brazil	Repeated cross sectional at 1/mo over 1 year	4 keyboards	3 samples (moistened swabs) taken bimonthly during a 1 year period - before, during, and after clinical procedure hours.	Detection of S. aureus	
NEELY 1999	Burn Hospital, USA	Pre/Post	Unknown number of keyboards	Not specified	Detection of Acinetobacter species	Enhanced cleaning policy: All personnel required to wear gloves before using computer and removed before leaving the room. Also, housekeeping staff given a defined daily cleaning procedure for cleaning the plastic keyboard covers
OGUZKAYA-ARTAN 2015	ER, Turkey	Cross Sectional	14 keyboards + 5 desktop surfaces	Swab samples taken from keyboards	Detection of S. aureus	
OIE 2005	Dermatology ward, Japan	Cross Sectional	1 keyboard	Samples taken of entire surface of keyboards with moistened sterile gauze swab. For the items showing contamination by 100 CFU or more MRSA or MSSA in at least one of the repeated examinations, half the area of each	Detection of S. aureus	

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				surface was examined for S. aureus contamination. Subsequently, entire surface disinfected and the other half area was examined for contamination.		
OTTER 2011	Hospital emergency department and an outpatient HIV clinic US	Cross sectional	Unknown number of keyboards	Cotton-tipped moistened sterile swabs used. Surfaces swabbed 100 cm^2 areas by standardized swabbing in two directions at right angles.	Detection of MRSA	
PATEL 2010	2 student study areas and 2 patient clinics in a dental hospital, UK	Cross sectional + nested Pre/Post	8 keyboards	Keyboards swabbed using swab moistened with sterile distilled water by a single investigator. Keyboards sampled 3 times each: by running the tip of the swab from left to right over the entire length covering the tops of all the keys and then turning the swab and returning over the same surface. Later, 2 keyboards in clinical and study areas disinfected twice a day using isopropanol wipes. After 5 days, they were swabbed again.	Total bacterial load	70% isopropanol wipes vs. Virkon (dipotassium peroxodisulphate)
PHUMISANTIPHONG 2009	Hospital patient rooms and nurse station, Thailand	Cross Sectional	30 computer terminals (keyboards/ mice)	Not specified	Detection of CRAB	
PUGLIESE 2011	ER, USA	Cross Sectional	72 keyboards	Keyboards sampled by moist swab, taken from all keys except the function keys	Total bacterial load	
RASTOGI 2012	NICU, USA	Repeated cross sectional, biweekly for 1 yr	3 keyboards	Samples taken using moistened swabs biweekly for 1 year by a culture swab and transport company	Total bacterial load	
REEM 2014	Exam and imaging rooms, common areas in an ophthalmolo	Repeated cross sectional, quarterly for 1 year	16 keyboards	Sampling conducted on quarterly basis for 1 year. Collected at the end of day, prior to daily cleaning by a trained personnel wearing clean clothing covers and gloves. (Unclear if keyboard sampling done using electrostatic cloth or moistened swabs.)	Detection of MRSA/MSSA isolates	

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	gy clinic, USA					
RICHARD 2017	Orthopedic OR, USA	Cross Sectional	6 keyboards	On a given day, surfaces in 6 different orthopedic surgery operating rooms tested before surgery with ATP bioluminescence swabs	Total bacterial load, measured in RLUs	
RUTALA 2006	Burn ICU, cardiothoracic ICU, nursing units, USA	Cross Sectional	25 keyboards	Single sterile swab wiped over entire surface of keyboards	Total bacterial load	
SAITO 2015	Six ORs, Japan	Cross Sectional	12 keyboards and 6 touch screens	Contamination assessed using an ATP test and bacterial culture using moistened swabs	mean ATP value (log10 RLU) for microbial count: log10 CFU	
SCHULTZ 2003	VA hospital: areas close to patients in acute care, ambulatory care, and long term care, USA	Cross Sectional	100 keyboards	During 4 week period, samples taken using moistened swabs from all over keyboard surfaces	Total bacterial load	
SENOK 2015	ICU nursing stations, Saudi Arabia	Cross Sectional	Unknown number of keyboards and mice	ATM moistened swabs taken of environmental surfaces during an outbreak of multi-drug resistant A. baumannii (MRAB)	Detection of A. baumannii isolates	
SHAIKH 2016	Unknown hospital setting, USA	Pre/Post with various exposure frequencies	25 keyboards in current use but unclear setting	One half of the keyboard sampled with a moistened swab before use of the UV device, and the other half sampled after decontamination.	Total bacterial load	UV Angel system
SMITH 2006	Medical, surgical, family practice programs of tertiary hospital, USA	Pre/Post	60 notebooks (keys and grips)	Samples taken over approximately 8 days over several-month period. Sampling done with moistened swab wiped over space key and enter key. An identical protocol used for 17 devices looking specifically for C. difficile but did not test for spores.	Total bacterial load	Clorox disinfecting wipes

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				For general comparison, swabs were taken from 23 hospital hallway desktop computers on all patient care floors and units. Following the culture collection, medical residents were instructed to disinfect their notebooks 3 times per day with Clorox disinfecting wipes. Three days after the protocol was introduced, the devices were randomly swabbed again.		
STAMBAUGH 2009	Dental office, USA	Pre/Post with stratified groups	88 keyboards or mice	Keyboards/mouse devices, which had never been cleansed or disinfected, sampled with a single sterile moistened swab over the entire keyboard and mouse. Then, keyboards were divided in 3 groups and evaluated for contamination over a period of 4 months.	Detection of Multidrug-resistant organisms	Disinfectant wipes (ammonium chloride and isopropyl alcohol)
SWEENEY 2009	Various clinical wards, A&E, UK	Pre/Post	68 computer terminals (keyboards/ mice)	Samples taken on different sides of keyboard and mouse using dip slides coated with nutrient and Baird parker agars. After sampling, keyboard/mouse exposed to UV device and resampled.	Total bacterial load	Astroplast Nano-UV disinfectant light scanner
SYKES 2006	Unknown clinical setting, UK	Repeated cross sectional over 3 months	5 ultrasound machine keyboards	5 machines sampled randomly on different days of the week and at different times over a period of 3 months (total of 15 times). Sampled using moistened swab by person wearing sterile gloves.	Total bacterial load	
TAN 2013	2 open wards in a 800 bed acute care hospital, Singapore	Cross sectional	Unknown number of keyboards	Sampling carried out over a 2-month period. Neither cleaning nor ward staff were informed about the sampling, which was performed at random intervals (equally during morning and afternoon periods) during the routine working day by non-ward-based technologists. Keyboards were sampled by moving a sterile flocked nylon moistened swab over the letter keys.	Presence of MRSA, E. coli and K. pneumoniae resistant to third-generation cephalosporins, CRAB and VRE.	
TROCHESSET 2012	School of Dental Medicine US	Repeated cross sectional, 8 times over 62 weeks	Unknown number of keyboards and mice	Sampling conducted 8 times over a 62-week period (not clear if all surfaces were sampled all 8 times). Sampling dates were at least one month apart. Done between 1 p.m. and 2 p.m., when patient care was not being delivered, in-between patients. One researcher immersed	Detection of S. aureus	

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				sterile polyester fiber–tipped swabs in sterile saline for 1 second and sampled the surfaces by rubbing the moistened swab over the object for 10 seconds.		
WAGHORN 2005	Various clinical wards, ICU, A&E, OPD, OR, UK	Cross Sectional	48 keyboards	Moistened sterile swabs rubbed over each keyboard surface including any mice	Total bacterial load and degree of growth (including S. aureus, hemolytic streptococci, P. aeruginosa and C. diff)	
WESTERWAY 2017	Ultrasound units in a public hospital and private practice, Australia	Cross Sectional	10 ultrasound keyboards	Keyboards sampled using sterilin transport swabs	Total bacterial load	
WILSON 2006	ICU, UK	Cross Sectional	17 keyboards	51 samples collected using contact plates. Keyboards sampled daily until patients left the bed space.	Total bacterial load	
WILSON 2008	ICU, UK	Controlled Trial	32 keyboards	Sampling conducted on 10 days over a 2-week period (80 samples total) between 11am-12pm each day using contact plates.	Detection of S. aureus and Acinetobacter sp.	Comparison of 3 types of keyboards: Medigenic (gives alarm when cleaning is required), Anonymous brand, and standard keyboards
WILSON 2011	ICU at 2 teaching hospitals, UK	Prospective randomized cross-over	Unknown number of keyboards	Direct contact method was used using dip slides; performed 3 times daily (before cleaning, middle of day, after cleaning) on 3 days per week for 48 weeks	Total aerobic colony count	Enhanced cleaning: extra twice daily cleaning using cloths soaked in a copper-based biocidal formulation
XU 2017	Medical ICU and NICU, China	Pre/Post	Unknown number of keyboards and mice	Sampling was performed by infection control professionals at 10 AM every quarter. Mouse, 10 letter keys and 10 number keys were sampled using neutralizer moistened sterile swabs.	Detection of MRSA	Traditional cotton cloth and bucket system vs. disinfectant wipes
YUN 2012	Patient rooms in burn ICU	Cross sectional	Unknown number of	Two swabs (one for TCM and one for PCR/ESI-TOF-MS) were obtained using a standard rolling	Total bacterial load	

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	and orthopedic ward USA		keyboards and mice	technique from the keyboard and mouse in each of the 20 patient rooms, where available		

*Some studies with sample size "unknown number of keyboards" reported only number of samples taken, not total devices used.

Abbreviations: A. baumannii = Acinetobacter baumannii, ACC = Aerobic Colony Counts, A&E = Accident and Emergency Unit, ATM = Amies transport medium, ATP = Adenosine triphosphate, C. Diff = Clostridium difficile, CFU = Colony forming units, CNS = Coagulase-negative staphylococcus, CRAB = Carbapenem-resistant Acinetobacter baumannii, E. Coli = Escherichia coli, ER = Emergency room, GI = gastrointestinal, ICU = Intensive care unit, K. pneumonia = Klebsiella pneumonia, MRSA = Methicillin-resistant Staphylococcus aureus, MSSA = Methicillin-sensitive Staphylococcus aureus, NICU = Neonatal Intensive Care Unit, NoV = Norovirus, OR = Operating room, OPD = Outpatient Department, P. aeruginosa = Pseudomonas aeruginosa, RCT = Randomized Controlled Trial, RLU = Relative light units, S. aureus = Staphylococcus aureus, TCM = Traditional clinical microbiology, VRE = Vancomycin-resistant Enterococcus