Samenwerkingsverband Richtlijnen Infectiepreventie

Verantwoording literatuuronderzoek

Module Speelgoed/domotica

Inhoudsopgave

Uitgangsvraag
Onder welke voorwaarden mag speelgoed/domotica worden toegelaten bij cliënten in isolatie?

Methode
Onderzoeksvraag
Voor het beantwoorden is een systematische literatuurzoekopdracht verricht met de volgende onderzoeksvraag:

What role do toys have in the transmission of infectious diseases between patients?

P	Toys and patients in healthcare setting
I	Detection and identification of micro-organism (Culture, PCR, typing)
C	Not applicable
O	Outbreaks, transmission

Relevant outcome measures
The guideline development group considered outbreaks and transmission as a critical outcome measure for decision making.

A priori, the working group did not define the outcome measures listed above but used the definitions used in the studies.

Search and select (Methods)
The databases Medline (via OVID) and Embase (via Embase.com) were searched with relevant search terms until 9 June 2022. The systematic literature search resulted in 210 hits. Studies were selected based on the following criteria: systematic reviews, randomized controlled trials, or observational studies where detection and identification of micro-organisms on toys and patients from the same healthcare setting was performed. 56 studies were initially selected based on title and abstract screening. After reading the full text, 55 studies were excluded, and 1 study was included. The summary of literature, results, and evidence and exclusion tables are included in Bijlage 5 Literatuursamenvatting module 2.3 Speelgoed/domotica.

Results
One study was included in the analysis of the literature (Buttery, 1998). Important study characteristics and results are summarized in the evidence table.

Summary of literature

Description of studies
Buttery (1998) described a nosocomial multiresistant Pseudomonas aeruginosa outbreak associated with toys in a pediatric oncology ward, in Australia in 1997. A case-control study was carried out to assess possible risk factors for infection. All patients of the outbreak were included (n=8), as well as 24 disease-matched controls. Cases were defined as patients with clinical infections with the outbreak strain. Controls were matched for underlying disease as close as

possible. Cases and controls were compared on age, sex, peripheral white blood cell count, neutrophil count, use of antibiotics, use of topical agents, duration of stay and place of stay in the hospital, and use of bath and bath toys. Environmental surfaces, including bath water and toys were sampled. Bacterial DNA fingerprinting was performed by pulsed-field gel electrophoresis. Univariate analysis was performed.

Results

Outbreaks
The outbreak occurred between January 24 and May 4, 1997. Nine patients were diagnosed with clinical infections caused my multiresistant P. aeruginosa. One patient was excluded based on PFGE and aminoglycoside MIC testing which suggested infection by a different P. aeruginosa strain. The remaining eight patients (five males, three females; mean age 4.5 years) were identified as index patients. No other additional infection prevention measures were described to contain the outbreak. One of the cases, and two of the controls remained in isolation.

Transmission
P. aeruginosa was isolated from 3 bath toys (duck, turtle, nail brush) and from toy box water and showed identical PFGE strains. None of the other environmental samples were positive for P. aeruginosa. Further analysis showed that 7/8 cases (88%) used bath toys compared to 7/24 (29%) of controls. The odd ratio was 17 (95% CI: 2.2 - ∞, p=0.004). There were no significant differences for locations in the ward (use of room 1 to 3) and use of specific bathrooms. On day 78 of the 91-day outbreak the bath toys and toy box were destroyed to eliminate the potential transmission source of the outbreak.

Level of evidence of the literature
Due to observational nature of the studies, pooling of data could not be performed. Therefore, grading of the level of evidence using GRADE could not be applied.

Conclusions
Due to observational nature of the studies, pooling of data could not be performed. Therefore, grading of the level of evidence using GRADE could not be applied.

Bijlage 1. Studie karakteristieken geselecteerde studies

Study reference	Study characteristics	Patient characteristics [2]	Intervention (I)	Follow-up	Outcome measures and effect size [4]
Buttery, 1998	Type of study: case control study Setting and country: oncology ward in Australia Funding and conflicts of interest: not reported	Cases: patients with clinical infections with outbreak strain Controls: matched for underlying disease, without infection with outbreak N total at baseline: Cases: 9 (8 incl) Control: 24 Important prognostic factors[2]: age: I: 4.5 C: 8.3 Sex: I: 5M/3F C: 15M/9F Cases were significantly younger	Describe intervention (treatment/procedure/test): Pulsed-field gel electrophoresis was performed to identify strains MIC to gentamicin and tobramycin were determined by E test (AB Biodisk, Stockholm, Sweden) Environmental samples were inoculated onto selective Pseudomonas agar (Pseudosel® agar; BBL, Becton Dickinson, Baltimore, MD)	Length of follow-up: Not applicable Loss-to-follow-up: Incomplete outcome data: Cases: N (%): 1 (11%) Reasons (describe): mutated outbreak strain was detected 0 genetically unrelated. Therefore excluded. Control: 0 (0%)	Outcome measures and effect size (include 95%CI and p-value if available): Univariate analysis on: (bubble) bath use, bath toys use, length of stay in hospital, days receiving antibiotics, blood counts (neutrophils and white blood cells) P. aeruginosa was isolated from 3 bath toys (duck, turtle, nail brush) and from toy box water and showed identical PFGE strains. None of the other environmental samples were positive for P. aeruginosa. Further analysis showed that 7/8 cases (88%) used bath toys compared to 7/24 (29%) of controls. The odd ratio was 17 (95% CI: 2.2 - ∞, p=0.004). There were no significant differences for locations in the ward (use of room 1 to 3) and use of specific bathrooms. On day 78 of the 91-day outbreak the bath toys and toy box were destroyed to eliminate the potential transmission source of the outbreak.

Notes:

1. Prognostic balance between treatment groups is usually guaranteed in randomized studies, but non-randomized (observational) studies require matching of patients between treatment groups (case-control studies) or multivariate adjustment for prognostic factors (confounders) (cohort studies); the evidence table should contain sufficient details on these procedures
2. Provide data per treatment group on the most important prognostic factors [(potential) confounders]
3. For case-control studies, provide sufficient detail on the procedure used to match cases and controls
4. For cohort studies, provide sufficient detail on the (multivariate) analyses used to adjust for (potential) confounders

Bijlage 2. Table of excluded studies

Reference	Reason for exclusion
Akhter J, al-Hajjar S, Myint S, Qadri SM. Viral contamination of environmental surfaces on a general paediatric ward and playroom in a major referral centre in Riyadh. Eur J Epidemiol. 1995 Oct;11(5):587-90. doi: 10.1007/BF01719313. PMID: 8549735.	wrong outcome (no typing of micro-organism)
Akhter J, al-Hajjar S, Myint S, Qadri SM. Viral contamination of environmental surfaces on a general paediatric ward and playroom in a major referral centre in Riyadh. Eur J Epidemiol. 1995 Oct;11(5):587-90. doi: 10.1007/BF01719313. PMID: 8549735.	dubbel
Aleksejeva V, Dovbenko A, Kroiča J, Skadiņš I. Toys in the Playrooms of Children's Hospitals: A Potential Source of Nosocomial Bacterial Infections? Children (Basel). 2021 Oct 14;8(10):914. doi: 10.3390/children8100914. PMID: 34682179; PMCID: PMC8534795.	wrong outcome (no information on infections)
Ariza L, Walter B, Worth C, Brockmann S, Weber ML, Feldmeier H. Investigation of a scabies outbreak in a kindergarten in Constance, Germany. Eur J Clin Microbiol Infect Dis. 2013 Mar;32(3):373-80. doi: 10.1007/s10096-012-1752-1. Epub 2012 Sep 28. PMID: 23052985.	wrong setting (kindergarten)
Avila-Aguero ML, German G, Paris MM, Herrera JF; Safe Toys Study Group. Toys in a pediatric hospital: are they a bacterial source? Am J Infect Control. 2004 Aug;32(5):287-90. doi: 10.1016/j.ajic.2003.10.018. PMID: 15292894.	wrong outcome (no information on infections)
Boretti VS, Corrêa RN, dos Santos SS, Leão MV, Gonçalves e Silva CR. Perfil de sensibilidade de Staphylococcus spp. e Streptococcus spp. isolados de brinquedos de brinquedoteca de um hospital de ensino [Sensitivity profile of Staphylococcus spp. and Streptococcus spp. isolated from toys used in a teaching hospital playroom]. Rev Paul Pediatr. 2014 Sep;32(3):151-6. doi: 10.1590/0103-0582201432301. Epub 2014 Oct 3. PMID: 25479842; PMCID: PMC4227333.	wrong publication type (article in Portoguese)
Bradwell HL, Johnson CW, Lee J, Winnington R, Thill S, Jones RB. Microbial contamination and efficacy of disinfection procedures of companion robots in care homes. PLoS One. 2020 Aug 26;15(8):e0237069. doi: 10.1371/journal.pone.0237069. PMID: 32845891; PMCID: PMC7449478.	wrong outcome (no information on infections)
Davies MW, Mehr S, Garland ST, Morley CJ. Bacterial colonization of toys in neonatal intensive care cots. Pediatrics. 2000 Aug;106(2):E18. doi: 10.1542/peds.106.2.e18. PMID: 10920174.	included in systematic review
Ekanem EE, DuPont HL, Pickering LK, Selwyn BJ, Hawkins CM. Transmission dynamics of enteric bacteria in day-care centers. Am J Epidemiol. 1983 Oct;118(4):562-72. doi: 10.1093/oxfordjournals.aje.a113661. PMID: 6637983.	wrong setting (daycare)
Enserink R, Mughini-Gras L, Duizer E, Kortbeek T, Van Pelt W. Risk factors for gastroenteritis in child day care. Epidemiol Infect. 2015 Oct;143(13):2707-20. doi: 10.1017/S0950268814003367. Epub 2015 Jan 16. PMID: 25592679; PMCID: PMC9151052.	wrong outcome, toys as risk factor, no cultures
Fleming K, Randle J. Toys--friend or foe? A study of infection risk in a paediatric intensive care unit. Paediatr Nurs. 2006 May;18(4):14-8. PMID: 16719036.	wrong outcome (no information on infections)
Franz RD, Hergt R, Protze A. Probleme der Spielzeugdesinfektion in Kindereinrichtungen [Problems of toy disinfection in nurseries]. Z Gesamte Hyg. 1980;26(10):699-701. German. PMID: 7008383.	wrong publication type (article in German)

Gayretli Aydın ZG, Büyükcam A, Kara A, Karbuz A, Soysal A, Aktaş Tapısız A, et al. Epidemiology of sepsis in neonates: microbiological profile and antibiotic susceptibility. J Pediatr Inf 2019;13(4):e141-e146.	wrong outcome (no information on toys)
Gonzalez F, Vielot NA, Reyes Y, Toval C, Paniagua M, Bowman NM, Vinje J, Bucardo F, Becker-Dreps S. Natural history of sapovirus infection in a nicaraguan birth cohort: The sapovirus-associated gastroenteritis [SAGE] study. AMERICAN JOURNAL OF TROPICAL MEDICINE AND HYGIENE. 2018 - Vol. 99, No. 4, pp. 162-162	wrong publication type (conference abstract)
Hanrahan KS, Lofgren M. Evidence-based practice: examining the risk of toys in the microenvironment of infants in the neonatal intensive care unit. Adv Neonatal Care. 2004 Aug;4(4):184-201, quiz 202-5. doi: 10.1016/j.adnc.2004.05.002. PMID: 15368211.	systematic review, wrong inclusion criteria
Hardy A, Sabatier V, Rosello O, Salauze B, Barbut F, Vialle R. More than just teddy bears: Unconventional transmission agents in the operating room. Arch Pediatr. 2018 Oct;25(7):416-420. doi: 10.1016/j.arcped.2018.08.003. Epub 2018 Sep 13. PMID: 30220524.	wrong outcome (no information on toys)
Held M, Mignemi M, O'Rear L, Wise M, Zane G, Murphy Zane MS, Schoenecker JG. Stuffed Animals in the Operating Room: A Reservoir of Bacteria With a Simple Solution. J Pediatr Orthop. 2015 Dec;35(8):e110-2. doi: 10.1097/BPO.0000000000000468. PMID: 25851680.	wrong outcome (no information on toys)
Hughes WT, Williams B, Williams B, Pearson T. The nosocomial colonization of T. Bear. Infect Control. 1986 Oct;7(10):495-500. doi: 10.1017/s0195941700065115. PMID: 3640737.	wrong outcome (no information on transmission or outbreaks)
Ibfelt T, Andersen L. Occurence of pathogenic bacteria in Danish child care centres. Clin Microbiol. Infect. 2012, April, 223-224	wrong publication type (conference abstract)
Ibfelt T, Engelund EH, Permin A, Madsen JS, Schultz AC, Andersen LP. Presence of Pathogenic Bacteria and Viruses in the Daycare Environment. J Environ Health. 2015 Oct;78(3):24-9. PMID: 26591334.	wrong setting (daycare)
Iskersky V, Henning A, Geddes K, Pittard WB 3rd. Placing toys, pictures, and colorful objects in the isolettes with premature infants. J Perinatol. 1988 Fall;8(4):396. PMID: 3236115.	wrong publication type (letter to editor)
Ivany A, LeBlanc C, Grisdale M, Maxwell B, Langley JM. Reducing infection transmission in the playroom: Balancing patient safety and family-centered care. Am J Infect Control. 2016 Jan 1;44(1):61-5. doi: 10.1016/j.ajic.2015.07.036. Epub 2015 Sep 1. PMID: 26341403.	wrong outcome (no information on toys)
Kqnecke K. Hygienic measures at a physiotherapy practice. Journal of Cystic Fibrosis 2011 10 (S67) SUPPL. 1	wrong publication type (conference abstract)
Ledwaba SE, Becker P, Traore-Hoffman A, Potgieter N. Bacterial Contamination of Children's Toys in Rural Day Care Centres and Households in South Africa. Int J Environ Res Public Health. 2019 Aug 13;16(16):2900. doi: 10.3390/ijerph16162900. PMID: 31412661; PMCID: PMC6720433.	wrong setting (daycare)
Lee L, Tin S, Kelley ST. Culture-independent analysis of bacterial diversity in a child-care facility. BMC Microbiol. 2007 Apr 5;7:27. doi: 10.1186/1471-2180-7-27. PMID: 17411442; PMCID: PMC1853100.	wrong setting (daycare)
Little K, Cutcliffe S. The safe use of children's toys within the healthcare setting. Nurs Times. 2006 Sep 19-25;102(38):34-7. PMID: 17017580.	wrong publication type (narrative review)

McKay I, Gillespie TA. Bacterial contamination of children's toys used in a general practitioner's surgery. Scott Med J. 2000 Feb;45(1):12-3. doi: 10.1177/003693300004500104. PMID: 10765527.	wrong outcome (no information on infections)
Merriman E, Corwin P, Ikram R. Toys are a potential source of cross-infection in general practitioners' waiting rooms. Br J Gen Pract. 2002 Feb;52(475):138-40. PMID: 11885823; PMCID: PMC1314220.	wrong outcome (no information on infections)
Moore D. Infection control in paediatric office settings. Paediatr Child Health. 2008 May;13(5):408-35. doi: 10.1093/pch/13.5.408. PMID: 19412374; PMCID: PMC2532878.	wrong study design (position statement, review)
Nzeako BC, Al Daughari H, Al Lamki Z, Al Rawas O. Nature of bacteria found on some wards in Sultan Qaboos University Hospital, Oman. Br J Biomed Sci. 2006;63(2):55-8. doi: 10.1080/09674845.2006.11732720. PMID: 16871995.	wrong outcome (no information on toys)
Odeniyi F, Santos J, Hanley S, Faerber J, Localio R, Metlay J, Coffin S, Feemster K. Scratching the surface: Detecting the presence of viral pathogens in pediatric primary care clinics. Open Forum Infectious Diseases 2017 4 Supplement 1 (S161-)	wrong publication type (conference abstract)
Pappas DE, Hendley JO, Schwartz RH. Respiratory viral RNA on toys in pediatric office waiting rooms. Pediatr Infect Dis J. 2010 Feb;29(2):102-4. doi: 10.1097/inf.0b013e3181b6e482. PMID: 20135827.	wrong outcome (no information on infections)
Pickering LK, Bartlett AV, Woodward WE. Acute infectious diarrhea among children in day care: epidemiology and control. Rev Infect Dis. 1986 Jul-Aug;8(4):539-47. doi: 10.1093/clinids/8.4.539. PMID: 3529310.	wrong setting (daycare)
Pijnacker R, Mughini-Gras L, Vennema H, Enserink R, VAN DEN Wijngaard CC, Kortbeek T, VAN Pelt W. Characteristics of child daycare centres associated with clustering of major enteropathogens. Epidemiol Infect. 2016 Sep;144(12):2527-39. doi: 10.1017/S0950268816001011. PMID: 27483376; PMCID: PMC9150454.	wrong outcome, toys as risk factor, no cultures
Posfay-Barbe KM, Zerr DM, Pittet D. Infection control in paediatrics. Lancet Infect Dis. 2008 Jan;8(1):19-31. doi: 10.1016/S1473-3099(07)70310-9. PMID: 18156087.	wrong publication type (narrative review)
Raginel T, Bigoin-Dupont M, Aguelon V, Fines-Guyon M, Guillemin MG. Audit << Les jouets et les couveuses en néonatologie >> [Audit "Toys and incubators in neonatology"]. Arch Pediatr. 2009 Aug;16(8):1202-7. French. doi: 10.1016/j.arcped.2009.05.002. Epub 2009 Jun 16. PMID: 19535231.	wrong publication type (article in French)
Ramos SR. Brinquedos em brinquedotecas como uma fonte de microrganismos patogênicos para as infecções hospitalares [Toys from hospital playrooms as a source of pathogens in nosocomial infections]. Rev Paul Pediatr. 2014 Sep;32(3):149-50. doi: 10.1590/0103-0582201432321. Epub 2014 Oct 3. PMID: 25479841; PMCID: PMC4227332.	wrong publication type (article in Portoguese)
Randle J, Fleming K. The risk of infection from toys in the intensive care setting. Nurs Stand. 2006 Jun 14-20;20(40):50-4. doi: 10.7748/ns2006.06.20.40.50.c4180. PMID: 16802590.	wrong outcome (no numbers given)
Rogers M, Weinstock DM, Eagan J, Kiehn T, Armstrong D, Sepkowitz KA. Rotavirus outbreak on a pediatric oncology floor: possible association with toys. Am J Infect Control. 2000 Oct;28(5):378-80. doi: 10.1067/mic.2000.109908. PMID: 11029139.	dubbel
Rogers M, Weinstock DM, Eagan J, Kiehn T, Armstrong D, Sepkowitz KA. Rotavirus outbreak on a pediatric oncology floor: possible association with toys. Am J Infect Control. 2000 Oct;28(5):378-80. doi: 10.1067/mic.2000.109908. PMID: 11029139.	wrong publication type (brief report)

Roman B. An outbreak of community acquired methicillin-resistant staphylococcus aureus (CA-MRSA) in a pediatric hospital burn unit. American Journal of Infection Control 2010 38:5 (E81-E82)	wrong publication type (conference abstract)
Ruan F, Yang T, Ma H, Jin Y, Song S, Fontaine RE, Zhu BP. Risk factors for hand, foot, and mouth disease and herpangina and the preventive effect of hand-washing. Pediatrics. 2011 Apr;127(4):e898-904. doi: 10.1542/peds.2010-1497. Epub 2011 Mar 21. PMID: 21422083.	wrong outcome (no information on toys)
Ruiz R, Quijandria J, Rojas-Vilca JL, Loyola S. Alta frecuencia de juguetes contaminados con Staphylococcus aureus en hospitalización pediátrica [High number of toys contaminated with Staphylococcus aureus in a pediatric hospitalization service]. Rev Peru Med Exp Salud Publica. 2016 Oct-Dec;33(4):830-832. Spanish. doi: 10.17843/rpmesp.2016.334.2574. PMID: 28327859.	wrong publication type (article in Spanish)
Ruschke R. Kunststoff-Schwimmtiere als Biotope für Mikroorganismen und mögliche Infektionsquellen für Kleinkinder [Swimming plastic toy-animals as biotopes of microorganisms and possible source of infant infections (author's transl)]. Zentralbl Bakteriol Orig B. 1976 Dec;163(5-6):556-64. German. PMID: 828370.	wrong publication type (article in German)
Spratt H, Levine D, Hanks J, Price G, Gentner K, Brunton L, Ledbetter J. Colonization of Environmental Methicillin-Resistant Staphylococcus Aureus in a Newly Constructed Children's Outpatient Clinic. American Journal of Infection Control. 2020; 48(8), S53.	wrong publication type (conference abstract)
Subramanian B, Parsons H, Finner P, Townsend R. Empathy dolls: are they a source of cross-contamination between patients? J Hosp Infect. 2014 May;87(1):50-3. doi: 10.1016/j.jhin.2014.02.004. Epub 2014 Mar 6. PMID: 24661788.	wrong outcome (no information on infections)
Suter P, Kermode T, Clair C, Mueller Y, Senn N. Preventive and protective measures reducing influenza transmission in general practice: a systematic review. BJGP Open. 2019 Oct 29;3(3):bjgpopen19X101657. doi: 10.3399/bjgpopen19X101657. PMID: 31581114; PMCID: PMC6970581.	systematic review, wrong inclusion criteria
Suviste J. Infection control. The toy trap uncovered. Nurs Times. 1996 Mar 6-12;92(10):56-60. PMID: 8710547.	wrong publication type (brief report)
Thapaliya D, Kadariya J, Capuano M, Rush H, Yee C, Oet M, Lohani S, Smith TC. Prevalence and Molecular Characterization of Staphylococcus aureus and Methicillin-resistant S. aureus on Children's Playgrounds. Pediatr Infect Dis J. 2019 Mar;38(3):e43-e47. doi: 10.1097/INF.0000000000002095. PMID: 29746375.	wrong study design (no information on toys)
Van Orden KA, Bower E, Beckler T, Rowe J, Gillespie S. The Use of Robotic Pets with Older Adults during the COVID-19 Pandemic. Clin Gerontol. 2022 Jan-Feb;45(1):189-194. doi: 10.1080/07317115.2021.1954122. Epub 2021 Aug 5. PMID: 34351834.	wrong study design (no information on infections)
Verghese VP, Turnbull L, Fuller J, Rennie R, Forgie SE. Bubble trouble: Investigating the safety of a common hospital toy for children. Canadian Journal of Infectious Diseases and Medical Microbiology 2012 23 SUPPL. SB (28B-)	wrong publication type (conference abstract)
Walters E. Pseudo-outbreak of enteric adenovirus in immunocompromised pediatric patients. American Journal of Infection Control 2016 44:6 (S124-)	wrong publication type (conference abstract)
Wang DY, Zhan F, Liu HL. Study of the changes in immune indexes, pathogenic characteristics and related risk factors in children with viral diarrhea. Transl	wrong outcome, toys as risk factor, no cultures

Pediatr. 2021 Oct;10(10):2544-2551. doi: 10.21037/tp-21-433. PMID: 34765478; PMCID: PMC8578756.	
Wittenberg DF. Gastroenteritis in young children. South African Family Practice 2006 48:4 (20-23)	wrong outcome (no information on toys)
Xie YH, Chongsuvivatwong V, Tan Y, Tang ZhZ, Sornsrivichai V, McNeil EB. Important roles of public playgrounds in the transmission of hand, foot, and mouth disease. Epidemiol Infect. 2015 May;143(7):1432-41. doi: 10.1017/S0950268814002301. Epub 2014 Aug 29. PMID: 25170900.	wrong outcome (no information on toys), wrong setting (public playground)