Office of Evidence Based Practice (EBP) – Critically Appraised Topic (CAT): Multi-use books in waiting rooms

Specific Care Question

Should multi-use books, in hospital or clinic waiting rooms, be removed to minimize disease spread?

Recommendations Based on Current Literature (Best Evidence) Only

A strong recommendation is made to remove multi-use books from the waiting rooms within the organization. This recommendation is made by the Department of EBP based on review of current literature, recommendations obtained from a Joint Commission Consultant, and current practices of other pediatric organizations. The overall certainty in the evidence is very low[d] based on the type of studies identified and the number of samples studied; additional data was obtained from a Joint Commission Consultant, and feedback from peer organizations. When there is a lack of scientific evidence, standard work should be developed, implemented, and monitored.

Literature Summary

Background.

At a recent Joint Commission consultant visit at Children's Mercy, two standard precaution findings were identified in the waiting rooms of the Pediatric Intensive Care Unit and the Gastroenterology Clinic. The findings indicate that multi-use books are an infection control risk point for the organization and should be removed. This review will summarize identified literature to answer the specific care question.

Study characteristics. The search for suitable studies was completed on October 23, 2019. S. Dierking, MSN, RN, CPHQ and S. T. Spiking, BSN, RN, CEN, CIC reviewed the 17 titles and/or abstracts found in the search and identified[a] one guideline and 12 single studies believed to answer the question. The guideline (Rathore, Jackson, & Committee on Infectious Diseases, 2017) was not selected to guide this CAT based on the realization the question is not answered within the guideline. After an in-depth review of the remaining 12 articles, three studies[b] answered the question. The three studies were cohort studies which measured either viral (D'Arcy, Cloutman-Green, Klein, & Spratt, 2014) or bacterial (Charnock, 2005; Gudakova, Kim, Meredith, & Webb, 2017) contaminates on books in ambulatory health care environments (see Figure 1)[c].

Additional data findings. As there is a lack of evidence for this subject, the synopsis author posed a question (Does your organization provide multi-use books in the ambulatory setting for patients/families?) within three discussion groups: Society of Pediatric Nurses—Clinical Practice & Research and The Children's Hospital Association—Educators and Infection Prevention. To date, the following hospitals have responded that only single-use books are used in the following organizations: Akron Children's Hospital, Akron, OH; Children's Health, Dallas, TX; Children's Hospital, Seattle, WA; Children's Minnesota, Minneapolis, MN; Covenant Children's Hospital, Lubbock, TX; Chilton Medical Center, Pompton Plains, New Jersey; and Dayton Children's Hospital, Dayton, Ohio.

In addition, Y. Ballam, BS, CIC polled the local Association for Professionals in Infection Control and Epidemiology (APIC) chapter on September 18, 2019 to learn member organization practice related to this question. From this poll, the following organizations identified that they allow only single-use books: Liberty Hospital, Liberty, MO; Mosaic Life Care, St. Joseph, MO; North Kansas City Hospital, North Kansas City, MO; and St. Joseph Medical Center, Kansas City, MO.

Summary by Outcome

Bacterial growth. Two studies (Charnock, 2005; Gudakova et al., 2017) measured bacterial contamination on magazines (Charnock, 2005; Gudakova et al., 2017) and books (Gudakova et al., 2017). Bacterial growth from the 15 samples acquired was found to be low on magazines in eleven practice surgeries with only two colonies of *Statphylococcus aureus* detected *(Charnock, 2005)*. Conversely, Gudakova et al. (2017) found 77.1% more total microbial growth on magazines in the sick-child waiting area compared to the well-child waiting area (*n* = 14). In addition, Gudakova et al. (2017) reported children's books in the well-child waiting area had more microbial growth (62.9% more staphylococci bacteria and 98.9% more enteric bacteria) than measured on the sick-child waiting room books.

Certainty of the evidence for bacterial growth. The certainty of the body of evidence was very low based on four factors: within-study risk of bias, directness of evidence, precision of effect estimates and consistency among studies. The body of evidence was assessed to have very serious risk of bias, very serious imprecision, not serious indirectness and very serious inconsistency. The risk of bias was very serious due to study design used for the two studies. Imprecision was high due to the low number of samples studied. Inconsistency was very serious as the studies occurred in different environments.

Viral nucleic acid detection. One study, D'Arcy et al. (2014), measured the viral nucleic acid on books in Outpatient Waiting Area in a pediatric hospital in the United Kingdom, (*n* = 3). D'Arcy et al. (2014) reported that books had 8 copies of adenovirus (per 10 cm^2) for all three sample points.

Certainty of the evidence for viral nucleic acid detection. The certainty of the body of evidence very low based on four factors: within-study risk of bias, directness of evidence, precision of effect estimates and consistency among studies. The body of evidence was assessed to have very serious risk of bias, and very serious imprecision. The risk of bias was very serious due to study design used for the study. Imprecision was high due to the number of samples studied. As only one study (D'Arcy et al., 2014) was identified to answer this question consistency could not be assessed.

Identification of Studies

Search Strategy and Results (see Figure 1)

Pub Med:
("waiting room" OR "waiting rooms" OR "waiting area" OR "waiting areas") AND (book OR magazine OR infection OR viral OR microbial OR contamination)
Records identified through database searching *n* = 17
Additional records identified through other sources *n* = 0

Studies Included in this Review

Citation	Study Type
Charnock (2005)	Cohort; Magazines sampling from 11 general practice surgeries in 2 Norwegian cities
D'Arcy et al. (2014)	Cohort; Book sampling from Outpatient Waiting Area at a United Kingdom pediatric hospital
Gudakova et al. (2017)	Cohort; Book sampling from three pediatric offices in South Carolina

Studies Not Included in this Review with Exclusion Rationale

Citation	Reason for exclusion
Ade, Burger, Cuntzmann, Exinger, and Meunier (2017)	Article in Spanish
Avila-Aguero, German, Paris, and Herrera (2004)	Books were not studied
Bright, Boone, and Gerba (2010)	Books were not studied
Hübner, Hübner, Kramer, and Assadian (2011)	Tested within a lab environment
Kanamori, Rutala, and Weber (2017)	Books were not studied
McBride (2018)	Review article of the AAP 2017 guidelines
Merriman, Corwin, and Ikram (2002)	Books were not studied
Rathore et al. (2017)	Question not answered in guideline

Reynolds et al. (2019)	Books were not studied
Sexton, Wilson, Sassi, and Reynolds (2018)	Books were not studied

Methods Used for Appraisal and Synthesis

[a]Rayyan is a web-based software used for the initial screening of titles and / or abstracts for this analysis (Ouzzani, Hammady, Fedorowicz & Elmagarmid, 2017).

[b]Review Manager (Higgins & Green, 2011) is a Cochrane Collaborative computer program used to assess the study characteristics as well as the risk of bias and create the forest plots found in this analysis.

[c]The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) flow diagram depicts the process in which literature is searched, screened, and eligibility criteria is applied (Moher, Liberati, Tetzlaff, & Altman, 2009).

[a]Ouzzani, M., Hammady, H., Fedorowicz, Z., & Elmagarmid, A. (2016). Rayyan-a web and mobile app for systematic reviews. *Systematic Reviews, 5*(1), 210. doi:10.1186/s13643-016-0384-4

[b]Higgins, J. P. T., & Green, S. e. (2011). *Cochrane Handbook for Systematic Reviews of Interventions [updated March 2011]* (Version 5.1.0 ed.): The Cochrane Collaboration, 2011.

[c]Moher D, Liberati A, Tetzlaff J, Altman DG, The PRISMA Group (2009). *P*referred *R*eporting *I*tems for *S*ystematic Reviews and *M*eta-*A*nalyses: The PRISMA Statement. PLoS Med 6(7): e1000097. doi:10.1371/journal.pmed1000097 **For more information, visit www.prisma-statement.org.**

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Acronyms Used in this Document

Acronym	Explanation
APIC	Association for Professionals in Infection Control and Epidemiology
CAT	Critically Appraised Topic
EBP	Evidence Based Practice
PRISMA	Preferred Reporting Items for Systematic Reviews and Meta-Analyses

Date Developed / Updated

01/2020

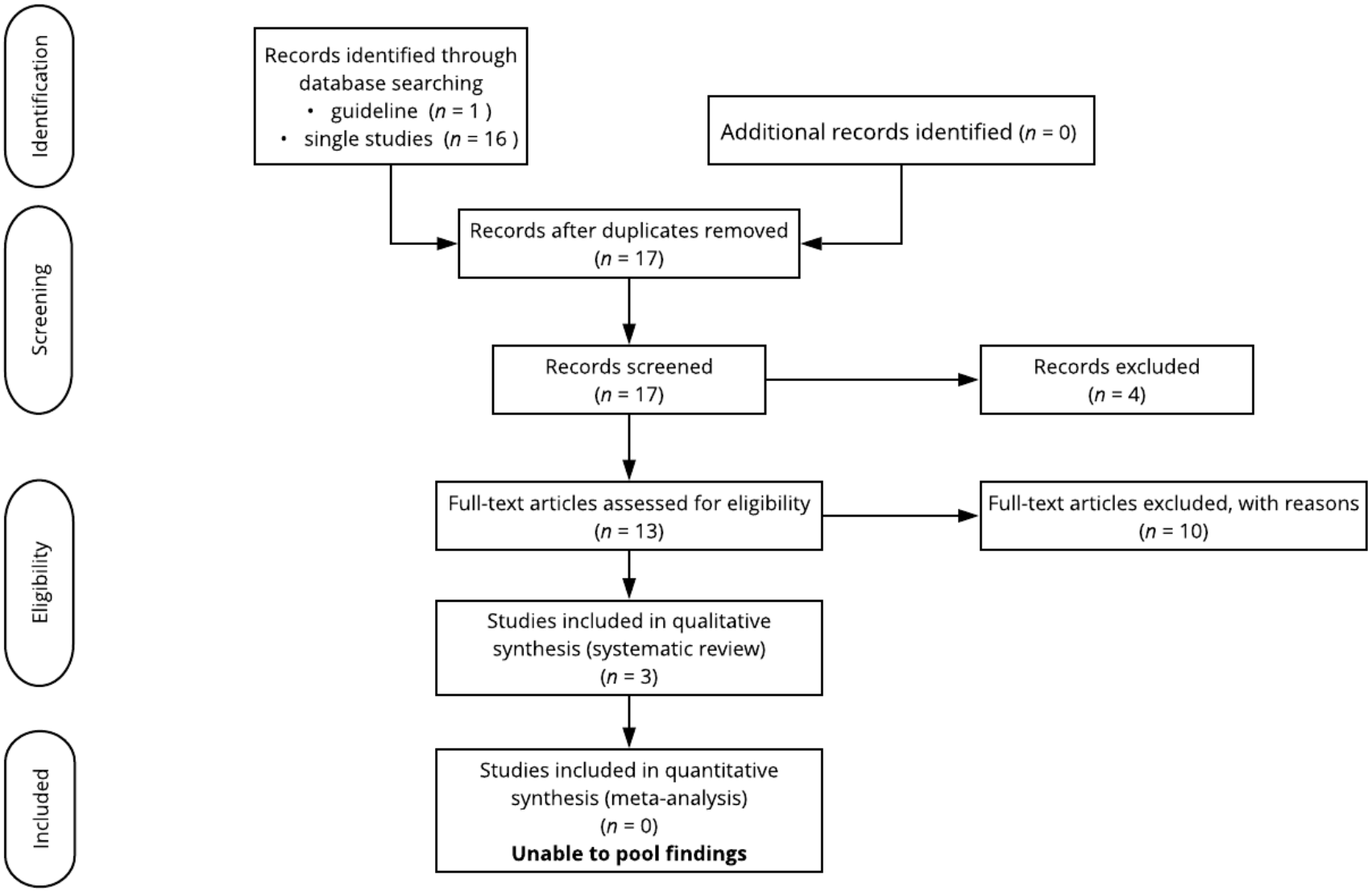

Figure 1. Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRIMSA)[e]

Characteristics of Intervention Studies
Charnock (2005)

Methods	**Methods:** Cohort
Participants	**Participants:** Magazines from 11 general practice surgeries **Setting:** General practice surgeries in 2 Norwegian cities **Number of A4-format glossy magazines studied:** *N* = 15 **Number completed:** *N* = 15 **Gender, males:** • Not Applicable **Race / ethnicity or nationality:** • Not Applicable **Age range in months:** • Magazines were between 2 to 9 months old at time of collection **Inclusion criteria:** • Magazines collected from the top of horizontal piles, collected at end of surgery day **Exclusion criteria:** • None identified **Covariates identified:** • Not reported
Interventions	**Interventions:** • Whole surface of the front page of each magazine was swabbed using a TECRA® ENVIROSWAB • Swab was returned to tube and 5 ml of tryptone soya broth was added • Tube was shaken vigorously for 30 seconds to release microbes into broth • After 30-45 minutes at 37°C, samples were spread on agar media • Plates stood at room temperature for 1 hour before being incubated at 37°C • Analyses were performed within 6-12 hours of collection, and colonies were examined after 24 hours and again after 48 hours • Total microbial count was based on growth on blood agar • Colonies showing α/ß-haemolyse were studied further to see if they were streptococci
Outcomes	**Primary outcome(s)** • Bacterial contamination of magazines • Contamination of potentially pathogenic bacteria (enteric bacteria, *Staph. aureus, C. perfringens,* enterococci, and ß-haemolytic steptococci)* **Secondary outcome(s):** • Not reported **Safety outcome(s):** • Not reported

Notes	**Results:** • All magazine covers were contaminated with bacteria • Four covers grew colonies of α-haemolytic streptococci in low numbers (*Steptococcus mitis; Strep. sanguis* - both normally found in oral and upper respiratory tracts and considered non-pathogenic*)* • Two colonies of *Staph. aureus* were detected (of the targeted groups of potentially pathogenic bacteria) and were methicillin sensitive • Gram-negative bacteria did not appear to be present as no colonies appeared on TSAP (tryptone soya agar plates), TSC (tryptose sulphite cycloserine), BG (Brilian Green), or XLD (xylose lysine desoxycholate) plates o Author notes that these bacteria may become non-viable in a few hours time and did not survive the period between collection and testing (6-12 hours) • Per author, results did not provide any grounds for the removal of magazines from waiting areas. • This study did not target viral pathogens and author recommended further study of that aspect

D'Arcy et al. (2014)

Methods	Cohort Study
Participants	**Setting:** Outpatient Waiting Area at a United Kingdom pediatric hospital **Samples in study:** *N* = 78 • **Group 1, Door Handles:** *n* = *7* x 3 months = 21 • **Group 2, Furniture:** *n* = *8* x 3 months = 24 • **Group 3, Books:** *n* = 1 x 3 months = 3 • **Group 4, Miscellaneous items:** *n* = 9 x 3 months = 27 • **Group 5, Air at Nurse's station:** *n* = 1 x 3months = 3 **Number completed:** *N* = 78 • **Group 1:** *n* = 21 • **Group 2:** *n* = 24 • **Group 3:** *n* = 3 • **Group 4:** *n* = 27 • **Group 5:** *n* = 3 **Gender, males:** Not applicable **Race / ethnicity or nationality:** Not applicable **Age:** Not applicable **Inclusion criteria:** Fixed, high-touch sites in an outpatient waiting room, once a month for three months. **Exclusion criteria:** Not reported **Covariates identified:** Not reported

Interventions	**Both:** Surface sampling. 1. Wet cotton swabs were run over each 10-cm^2 site, horizontally, vertically and diagonally before snapping off into 1-mL RNA*later* stabilization buffer. 2. Trypton Soy Agar contact plates were pressed onto surfaces with an even pressure for ten seconds and incubated at 37ºC for 48 hours prior to counting. Air. A Burkard C90M cyclone sampler was set at a flow rate of 16.6L/minutes and left to run over ten hours, starting one hour prior to the area being open to patients and ending one hour after the final patient vacated the area.
Outcomes	**Primary outcome(s):** Viral nucleic acid detected on a variety of surfaces and in the air. Adenovirus (AV) threshold values were converted into copy number per swab site for positive sites using standard curve date. **Secondary outcome(s)** • Not reported **Safety outcome(s):** • Not reported
Notes	**Results:** AV threshold values • **Group 1:** 8,200 • **Group 2:** 14,885 • **Group 3:** 8 • **Group 4:** 33,520 • **Group 5:** 6 The highest copy number was recovered from the top of the television in November (20,635 copies). Relatively high numbers were also found on a chair (7,711 copies) in November. Other positive objects (e.g., book, both sites on the toy cooker) have < ten copies. Of all the sites sampled 42% (*n* = 33) were positive for the presence of viral nucleic acid. Of these, 19% (*n* = 8) were positive for more than one virus. Adenovirus and torque-teno virus were most commonly identified at the same site.

Gudakova et al. (2017)

Methods	Cohort
Participants	**Participants:** Surfaces in contact with patients **Setting:** Three pediatric offices in South Carolina **Number enrolled into study:** *N* = 85 • **Group 1, Seat in well- and sick-child waiting rooms*:** *n* = 18 • **Group 2, Tables in well- and sick-child waiting rooms:** *n* = 12 • **Group 3, Children's tables in well- and sick-child waiting rooms:** *n* = 14 • **Group 4, Children's seats in well- and sick-child waiting rooms:** *n* = 14 • **Group 5, Magazines in well- and sick-child waiting rooms:** *n* = 14 • **Group 6, Books in well- and sick-child waiting rooms:** *n* = 14 **Number completed:** *N* = 85 • **Group 1:** *n* = 18 • **Group 2:** *n* = 12 • **Group 3:** *n* = 14 • **Group 4:** *n* = 14 • **Group 5:** *n* = 14 • **Group 6:** *n* = 14 **Gender:** • Not applicable **Race / ethnicity or nationality:** • Not applicable **Age:** • Not applicable **Inclusion criteria:** • Surface in pediatric office **Exclusion criteria:** • Not reported **Covariates identified:** • Not reported
Interventions	**Both:** Wipes are swept horizontally, flipped and then swept vertically • **Group 1:** A 4 x 4 in. (25.4 x 25.4 mm) area is swabbed • **Group 2:** A 4 x 4 in. (25.4 x 25.4 mm) area is swabbed • **Group 3:** A 4 x 4 in. (25.4 x 25.4 mm) area is swabbed • **Group 4:** A 4 x 4 in. (25.4 x 25.4 mm) area is swabbed • **Group 5:** Entire front cover is swabbed • **Group 6:** Entire front cover is swabbed

Outcomes	**Primary outcome:** • Total microbial counts on surfaces* **Secondary outcome:** • Not reported **Safety outcome:** • Not reported *Outcomes of interest to the CMH CPG or CAT development team
Notes	**Results:** **Seats:** • Sick-child waiting room shows 78.6% more total microbial growth compared to well-child waiting area. • Material of seats did not impact microbial growth **Tables:** • Well-child waiting areas had more total microbial growth **Children's tables:** • No numbers reported **Children's seats:** • Sick-child waiting area had 63.2 % more total microbial growth (90.4% more staphylococci bacteria and 83.8% more enteric bacteria) than well-child waiting area. **Magazines:** • Sick-child waiting area had 77.7% more total microbial growth. **Children's books:** • Well-child waiting areas had more total microbial growth (62.9% more staphylococci bacteria and 98.9% more enteric bacteria) than on the sick-child waiting room books.

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