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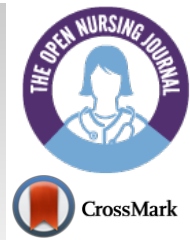
Supplementary Material

Interventions to Reduce Patient Identification Errors in the Hospital Setting: A Systematic Review

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Supplementary Table 1. Search strategies for individual databases and grey literature and total number of articles found. Database inception-2020, searched on March 2020.

Databases	Search Strategy/ Total Articles Found
Embase (HDAS Nice)	1: 'Patient identification'/exp 2: 'Patient identification systems': ab.ti OR 'Patient identification system': ab.ti OR 'Patient tracking':ab.ti 3 'Patient identification' OR 'Bracelet*' OR 'Wristband' OR 'Error*' OR 'Integrity' OR 'Mistake' 4: 'Patient misidentification': ab.ti 5: 1 OR 2 OR 3 OR 4 6: 'Hospital" exp/ 7: 'Hospital' OR 'Hospitalisation' OR 'Hospitalization' OR 'Hospitals' OR 'Hospitalized' 8: 'Patient'/exp 9: 'Patient OR 'Patients' OR 'Inpatient' OR 'Inpatients' 10: 6 OR 7 OR 8 OR 9 11: 5 AND 10 Total articles found: **727**
Medline (HDAS Nice)	1: "Patient identification systems" [MESH] 2: ("Patient identification systems" OR "Patient identification system" OR "Patient tracking") [Title/Abstract] 3: (((patient ADJ2 identf*7) OR bracelet* OR wristband*) ADJ2 (error* OR integrity OR mistake*)) [Title/Abstract] 4: (patient* ADJ3 misidentfif*7) [Title/Abstract] 5: 1 OR 2 OR 3 OR 4 6: ("Inpatients" [MESH]) OR Hospitals" [MESH] 7: (hospital OR hospitalisation OR hospitalization OR hospitals OR hospitalized OR hospitalized) 8: "Patients [MESH] 9: (patient*[Title/Abstract]) OR inpatient*[Title/Abstract] 10: 6 OR 7 OR 8 OR 9 11: 5 AND 10 Total articles found: **577**

(Supplementary Table 1) contd.....

Cinahl (EBSCO)	1: MH "Patient identification" 2: TI "patient identification systems" OR TI "patient identification system" OR TI "patient tracking" 3: AB "patient identification systems" OR AB "patient identification system" OR AB "patient tracking" 4: "patient identification" OR "bracelet* OR "wristband*" OR "error*" OR "integrity" OR "mistake*" 5: TI "patient misidentification" OR AB "patient misidentification" 6: 1 OR 2 OR 3 OR 4 OR 5 7: "Hospital" OR "hospitalisation" OR "hospitalization" OR "hospitals" OR "hospitalised" OR hospitalized 8: "Patient*" OR "inpatient*" 9: 7 OR 8 10: 6 AND 9 Total articles found: **303**
The Cochrane Library (Central)	MeSH descriptor: [Patient Identification Systems] explode all trees Total articles found: **16**
Scopus (Elsevier)	1: TITLE-ABS-KEY ("patient identification systems" OR "patient identification system" OR "patient tracking") 2: TITLE-ABS-KEY (bracelet* OR wristband*) 3: TITLE-ABS-KEY (error* OR integrity OR mistake*) 4: 1 AND 2 AND 3 Total articles found: **50**
Medes	(sistemas de identificación de pacientes OR "sistemas de identificación de pacientes "[título/resumen/palabras_clave]) Total articles found: **12**
Lilacs	tw:(sistemas de identificação de pacientes) AND (db:("LILACS") AND mh:("Sistemas de Identificação de Pacientes")) (tw:(Sistemas de Identificação de Pacientes)) AND (mh:("Sistemas de Identificação de Pacientes")) Total articles found: **45**
Dart-europe	Patient identification systems Total articles found: **87**
Banco De Teses Capes	"identificação do paciente" Total articles found: **99**
Open Grey	patient identification Patient safety lang:"en" Total articles found: **100**
Google Scholar	"patient identification errors" AND "hospital*" Total articles found: **645**
Proquest	ab("patient identification systems" OR "patient identification system" OR "patient tracking") OR ti("patient identification systems" OR "patient identification system" OR "patient tracking") OR ft("patient identification systems" OR "patient identification system" OR "patient tracking") OR mainsubject(patient identification systems) AND error OR (identification errors) AND wristbands Total articles found: **273**
Theses Canada	"patient identification" Total articles found: **3**
NHS Improvement	patient identification Total articles found: **3**

Supplementary Table 2. Full-text articles excluded, with reasons.

Reason for Exclusion	References of Excluded Studies
Inappropriate Study Population	1. Alvarez Lopez COM. La seguridad del paciente en el laboratorio clinico. Implantacion de un protocolo de identificacion inequivoca de paciente. Revista del Laboratorio Clinico. 2012;5(1):3–9. 2. Bittle MJ, Charache P, Wassilchalk DM. Registration-associated patient misidentification in an academic medical center: causes and corrections. Joint Commission Journal on Quality & Patient Safety. 2007;33(1):25–33. 3. Bologna LJ, Mutter M. Life after phlebotomy deployment: reducing major patient and specimen identification errors. Journal of healthcare information management: JHIM. 2002;16(1):65–70. 4. Cleopas A, Kolly V, Bovier PA, Garnerin P, Perneger TV. Acceptability of identification bracelets for hospital inpatients. Quality & safety in health care. 2004;13(5):344–8. 5. Murphy MF. Application of bar code technology at the bedside: the Oxford experience. Transfusion. 2007;47(2):120S–124S. 6. Ning H-C, Lin C-N, Chiu DT-Y, Chang Y-T, Wen C-N, Peng S-Y, *et al.* Reduction in Hospital-Wide Clinical Laboratory Specimen Identification Errors following Process Interventions: A 10-Year Retrospective Observational Study. PloS one. 2016;11(8):1–11.

(Supplementary Table 2) contd.....

Inappropriate Study Population	7. Palmgren JE, Lahtinen T. Fingerprint recognition to assist daily identification of radiotherapy patients. Journal of Radiotherapy in Practice. 2009;8(1):17–22. 8. Solangasenathirajan S, Khera J, Jones M, Hett D, Jonas M. Finger vein pattern technology: A new promising means of secure patient identification in hospitals. Intensive Care Medicine. 2013;39(Supl 2). 9. Turner CL, Casbard AC, Murphy MF. Barcode technology: its role in increasing the safety of blood transfusion. Transfusion. 2003;43(9):1200–9. 10. Verbeke F, Van Bastelaere S, Nyssen M. Patient Identification And Hospital Information Management Systems In Sub-Saharan Africa: A Prospective Study In Rwanda And Burundi. Rwanda Medical Journal. 2012;69(4):7–12.
Other Outcomes	1. Adelman JS, Kalkut GE, Weiss JM, Berger MA, Southern WN, Schechter CB, *et al.* Understanding and preventing wrong-patient electronic orders: A randomized controlled trial. Journal of the American Medical Informatics Association. 2013;20(2):305–10. 2. Brito M de FP. Avaliação do processo de identificação do paciente em serviços de saúde. Thesis. Ribeirão Preto: Universidade de São Paulo; 2015. 3. Brown B, Riippa M, Shaneberger K. Promoting patient safety through preoperative patient verification. AORN Journal. 2001;74(5):690–8. 4. Campbell K, Muniak A, Rothwell S, Dempster L, Per J, Barr K. Improving Quality and Safety through Positive Patient Identification. Healthcare quarterly. 2015;18(3):56–60. 5. Carneiro de Azevedo KC, Pereira de Melo Alves AM, Félix ZC, Gomes Viana AC. Implementation Of The Patient Safety Core In A Health Service. Revista de Enfermagem UFPE. 2016;10(12):4692–5. 6. Carrillo-García C, Noguera-Villaescusa P, García-Moñino MC, Vivo-Molina MC, Martínez-Hurtado R, Dolores Flores-Bienert M. Competencia de Enfermería en la Identificación Inequívoca de los Pacientes de un Hospital Universitario. Nure Investigación. 2016;13(80):1–7. 7. Carroll G, Watson T, Staber M. Patient identification wristbands: Can you trust them? Transfusion Medicine. 2013;23(4):283–4. 8. Cengiz C, Celik Y, Hikmet N. Evaluation of patient wristbands and patient identification process in a training hospital in Turkey. International Journal of Health Care Quality Assurance. 2016;29(8):820–34. 9. Covas MDC, Salvatierra B, Velazquez V, Alda ER. Utilizacion de la pulsera de identificacion en el recien nacido. ?un metodo seguro? Archivos Argentinos de Pediatria. 2018;116(1):72–7. 10. Dale JC, Renner SW. Wristband errors in small hospitals: a College of American Pathologists' Q-Probes study of quality issues in patient identification. Laboratory Medicine. 1997;28(3):203–7. 11. Davis R, Murphy MF, Sud A, Noel S, Moss R, Asgheddi M, *et al.* Patient involvement in blood transfusion safety: patients' and healthcare professionals' perspective. Transfusion medicine. 2012;22(4):251–6. 12. De Souza Macedo MC, Ferreira De Almeida L, Guimarães Assad L, Gonçalves Rocha R, Rangel Ribeiro GDS, Vasconcelos Pereira LM. Patient identification through electronic wristband in an adult general intensive care unit. Revista de Enfermagem Referência. 2017;4(13):63–70. 13. Fabini D, Benítez SE, Buscarini R, Schachner B, Smith M, Luna D, *et al.* Implementación de pulseras de identificación univoca de pacientes: el primer paso hacia el Barcoding. IV Congreso Latino Americano de Informatica Medica; 2011. 14. Gamston J. A Service Development Project to improve accurate identification of emergency patients [dissertation]. Londres: King's College London; 2012. 15. Gray JE, Suresh G, Ursprung R, Edwards WH, Nickerson J, Shiono PH, *et al.* Patient misidentification in the neonatal intensive care unit: Quantification of risk. Pediatrics. 2006;117(1):e43–7. 16. Guadalupe M, Guadalupe M. Identificación del Paciente como medida de Seguridad en la atención hospitalaria. Monográficos de Investigación en Salud. 2009;14:22–7. 17. Hemesath MP, Santos HB dos, Torelly EMS, Barbosa A da S, Magalhães AMM de. Estratégias educativas para melhorar a adesão à identificação do paciente. Revista gaúcha de enfermagem. 2015;36(4):43–8. 18. Hoffmeister LV, de Moura GMSS. Uso de pulseiras de identificação em pacientes internados em um hospital universitário. Revista Latino-Americana de Enfermagem. 2015;23(1):36–43. 19. James KP, Connaughton D, Yates J, Sengupta S. Compliance with use of patient identification wristbands in an Irish emergency department. European Geriatric Medicine. 2012;3:s33–143. 20. Junior JGN. Ciclo De Melhoria Para Uma Correta Identificação Do Paciente Em Hospitais Oncológicos. Dissertation. Rio Grande do Norte: Universidade Federal do Rion Grande do Norte; 2016. 21. Kerr P, Sansom V, Davies J. Effect of staff training for correct patient identification. Transfusion Medicine. 2011;21:39. 22. Latham T, Malomboza O, M'Baya B, Nyirenda L, Ashford P, Emmanuel J, *et al.* Quality in practice: Implementation of hospital guidelines for patient identification in Malawi. International Journal for Quality in Health Care. 2012;24(6):626–33. 23. Martinez-Ochoa EM, Cestafe-Martinez A, Rivera-Sanz F, Soledad Martinez-Saenz M, Belio-Blasco C, Caro-Berguilla Y. Evaluación de la implantacion de un sistema de identificación inequívoca de pacientes en un hospital de agudos. Medicina Clinica (Barc). 2010;135(Supl 1):61–6. 24. Mollon D L. Fields W L. Is this the right patient? An educational initiative to improve compliance with two patient identifiers. The Journal of Continuing Education in Nursing. 2009;40(5):221–7. 25. Moris De La Tassa J, Fernandez De La Mota E, Aibar-Remon C, Castan Cameo S, Ferrer Tarres JM. Identificacion inequivoca de pacientes ingresados en hospitales del Sistema Nacional de Salud. Medicina Clinica (Barc). 2008;131(Supl 3):72–8.

(Supplementary Table 2) contd.....

Other Outcomes	26. Pablo-Comeche D, Buitrago-Vera C, Meneu R. Evaluation of the launch of an unambiguous patient identification strategy in the hospitals of the Valencian Healthcare Agency (Spain). Medicina Clinica (Barc). 2010;135(Supl 1):54–60. 27. Panno SF. Adesão Ao Protocolo De Identificação Do Paciente Em Unidades Pediátricas: Estratégia Para O Cuidado Seguro. Dissertation. Rio Grande do Sul: Universidade Franciscana; 2017. 28. Quadrado ERS, Tronchin DMR. Avaliação do protocolo de identificação do neonato de um hospital privado. Revista Latino-Americana de Enfermagem. 2012;20(4):659–67. 29. Renner SW, Howanitz PJ, Bachner P. Wristband identification error reporting in 712 hospitals. A College of American Pathologists' Q-Probes study of quality issues in transfusion practice. Archives of pathology & laboratory medicine. 1993;117(6):573–7. 30. Rosenthal T, Erbeznik M, Padilla T, Zaroda T, Nguyen DH, Rodriguez M. Observation and measurement of hand hygiene and patient identification improve compliance with patient safety practices. Academic medicine. 2009;84(12):1705–12. 31. Salazar-de-la-Guerra RM, Santotomás-Pajarrón A, González-Prieto V, Menéndez-Fraga MD, Hurtado CR. Benchmarking en la identificación de pacientes: una oportunidad para aprender. Revista de Calidad Asistencial. 2017;32(2):97–102. 32. Sevdalis N, Ranger C, Norris B, Bothwell S. Designing evidence-based patient safety interventions: The case of the UK's national health service hospital wristbands. Journal of Evaluation in Clinical Practice. 2009;15(2):316–22. 33. Sánchez XM. Errores de identificación de pacientes. Enferm Clin. 2011;21(5):295–6.
Inappropriate Study Design	1. AHC Media: Continuing Medical Education Publishing. Hospital begins bar coding wristbands for safety [Internet]. Healthcare Risk Management; 2007 [cited 2020 Aug 26]. p. 91–2. Available from: https://www.reliasmedia.com/articles/105457-hospital-begins-bar-coding-wristbands-for-safety. 2. Beyea SC. Patient safety first. Patient identification -- a crucial aspect of patient safety. AORN Journal. 2003;78(3):478–82. 3. Beyea SC. Systems that reduce the potential for patient identification errors. AORN Journal. 2002;76(3):504–6. 4. HCPro. Eight steps to safer care: hospital performs FMEA on patient identification. Briefings on Patient Safety. 2005;6(4):1–5. 5. Hoovler G. The stanford hospital & clinics veterans' wristband. Stanford Nurse. 2013;33(1):24–8. 6. Joint Commission Resources. Technology in patient safety: using identification bands to reduce patient identification errors. Joint Commission Perspectives on Patient Safety. 2005;5(4):1–10. 7. Moreno De La Hidalga M. Fariñas Álvarez C. Acon Royo D. Rodríguez Cundin P. Crespo Santiago A. Y Gómez Muñoz R. I. Mejorando La Seguridad De Nuestros Pacientes: Evaluación De La Identificación De Pacientes En El Hospital Sierrallana. In Cadiz; 2009. 8. National Patient Safety Agency. Standardising wristbands improves patient safety [Internet]. Safe Practice Notice 24. London; 2007 [cited 2020 Aug]. Available from: https://psnet.ahrq.gov/resources/resource/5667/Standardising-wristbands-improves-patient-safety 9. Pysyk CL. A change to the surgical safety checklist to reduce patient identification errors. Canadian Journal of Anaesthesia. 2018;65(2):219–20. 10. Roshental MM. Perioperative grand rounds: A near miss lesson: check the wristband. AORN journal. 2008;88(6):915–6. 11. Trapskin PJ, White L, Armistead JA. Management consultation. Improving the accuracy of patient identification in the medication-use process. American Journal of Health-System Pharmacy. 2006;63(3):218–22. 12. Smith AF, Casey K, Wilson J, Fischbacher-Smith D. Wristbands as aids to reduce misidentification: an ethnographically guided task analysis. International journal for quality in health care. 2011;23(5):590–9. 13. Khammarnia MS, Kassani AS, Eslahi M. The efficacy of patients' wristband bar-code on prevention of medical errors: a meta-analysis study. Applied clinical informatics. 2015;6(4):716–26.
Studies from the Same Sample	1. Cuadrado MA, Alvarez C, Ortega I, Arroyo M. Effective strategies of unequivocal identification of the patient and their biological samples. Biochemia Medica. 2011;21(2). 2. Hemesath MP, Santos HB dos, Torelly EMS, Motta MB, Pasin SS, Magalhães AMM de. Avaliação e gestão da adesão dos profissionais à verificação da identificação do paciente. Revista Acreditação. 2015;5(9):45–54. 3. Walley SC, Berger S, Harris Y, Hayes L. Patient identification band error rates at a children's hospital. Journal of Investigative Medicine. 2012;60(1):440–1.
Language (Article in Chinese)	1. Wei X, Zhao Q. Patients participating check to enhance the accuracy of patient identification. Chinese Nursing Research. 2010;24(8A):2036–7.
Full Text Not Available	1. Hull JG, Taylor LA. How we reduced identification errors. MLO: Medical Laboratory Observer. 1983;15(3):95–102.

Supplementary Table 3. Studies excluded following assessment of methodological quality.

Study Design	Study Reference	Total yes on critical appraisal check-list	Reasons for Exclusion
Cross-Sectional	LaMarche SA. Quantitative correlational study about patient identification errors and user perceptions of biometrics [PhD thesis]. Ann Arbor: University of Phoenix; 2016	1	Plausible confounding factors were not considered. The type of study was not robust enough to assess the expected outcome.
	Sevdalis N, Norris B, Ranger C, Bothwell S. Closing the safety loop: Evaluation of the National Patient Safety Agency's Guidance Regarding Wristband Identification of Hospital Inpatients. J Eval Clin Pract. 2009;15(2):311-5	1	The outcomes were not measured in a reliable way. Adequate statistical analysis was not used.

(Supplementary Table 3) contd.....

Pre-Post Design Studies	Dhatt GS, Damir HA, Matarelli S, Sankaranarayanan K, James DM. Patient safety: Patient identification Wristband Errors. Clin Chem Lab Med. 2011;49(5):927-9	3	It was not clear whether the follow-up of the results was complete or not. Outcomes were not measured in a reliable way.
	Greenly MA. Helping Hippocrates: A Cross-functional Approach to Patient identification. Jt Comm J Qual Pat Saf. 2006;32(8):463-9	3	It was not clear whether the results were measured in a reliable way. Adequate statistical analysis was not used.
	Hain PD, Joers B, Rush M, Slayton J, Throop P, Hoagg S, *et al.* An intervention to decrease patient identification band errors in a children's hospital. Qual Saf Health Care. 2010;19(3):244-7	5	There were no similar comparisons between the participants. Outcome measures and follow-up were not clear.
	Thomas JJ, Yaster M, Guffey P. The Use of Patient Digital Facial Images to Confirm Patient Identity in a Children's Hospital's Anesthesia Information Management System. Jt Comm J Qual Patient Saf. 2020;46(2):118-21.	2	Lack of control group, there wasn't multiple measurements of the outcome both pre and post intervention. Not clear if the outcomes were measured in a reliable way and not clear whether a proper statistical analysis was used