XVIII CURSO ALMA
RIO DE JANEIRO 2019

GERONTOTECNOLOGÍA

31 de octubre al 3 de noviembre de 2019

Sistemas de Detección Automática de Caídas

Grupo 2

Objetivos

- Detectar los factores de riesgo de caídas por medio de la tecnología.
- Identificar sistemas de detección automática de caídas.
- Determinar estrategias de prevención y rehabilitación en caídas con el uso de la tecnología.

¿Cómo detectar factores de riesgo de caídas por medio de la tecnología?

Balance y Movilidad

Sun and Sosnoff *BMC Geriatrics* (2018) 18:14
DOI 10.1186/s12877-018-0706-6

BMC Geriatrics

RESEARCH ARTICLE Open Access

Novel sensing technology in fall risk assessment in older adults: a systematic review

Ruopeng Sun and Jacob J. Sosnoff*

Sensores:

- Medición de marcha
- Movimientos del tronco
- Transición sedente a bípedo

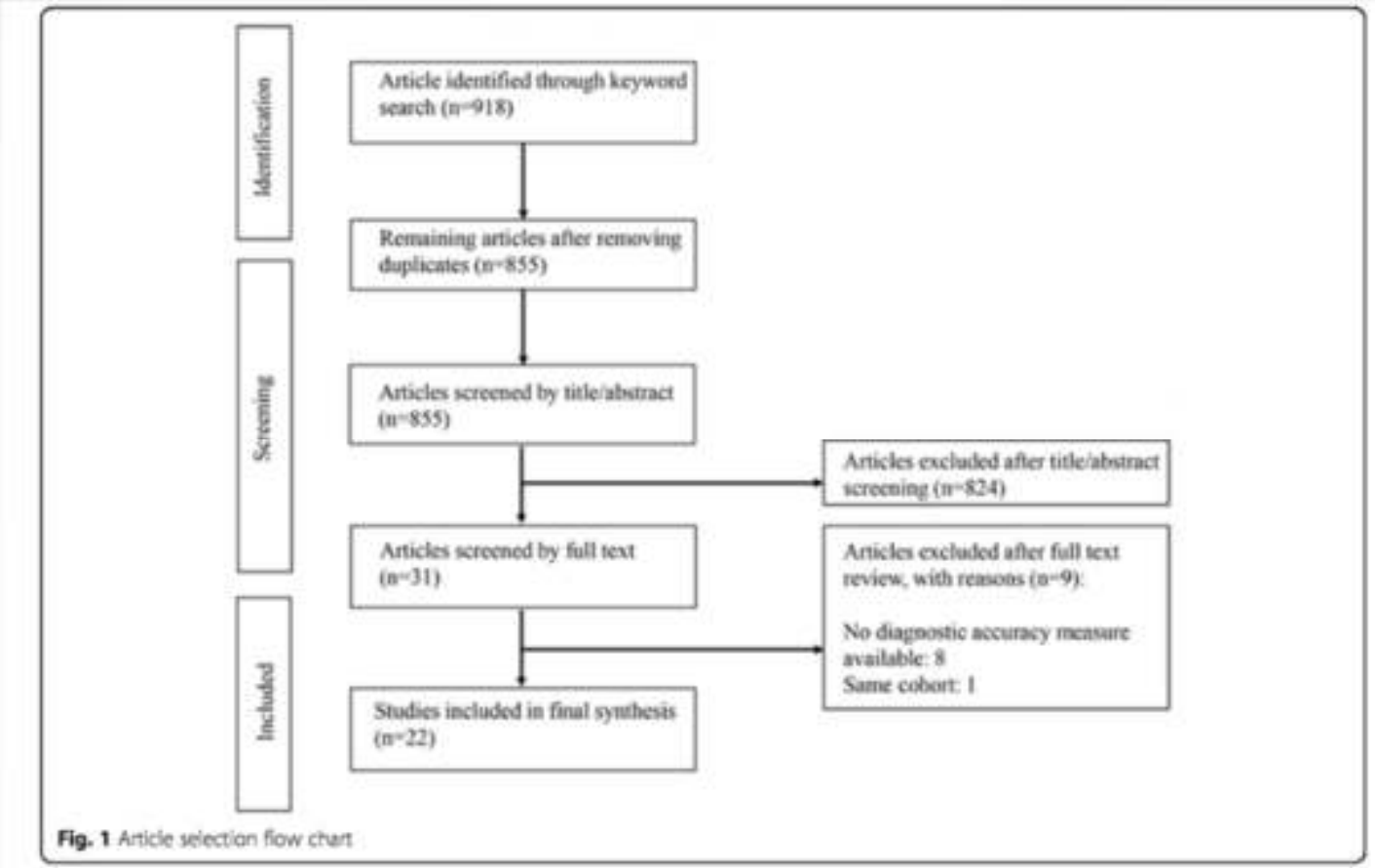

Fig. 1 Article selection flow chart

- Existe gran variación en el desempeño de las herramientas para predecir caídas:

- Precisión: 48-100%
- Sensibilidad: 16-100%
- Especificidad: 40-100%

Marcha

BMC Musculoskeletal Disorders

BioMed Central

Research article

Open Access

Test-retest reliability of temporal and spatial gait characteristics measured with an instrumented walkway system (GAITRite®)

Cornelis JT van Uden*[1] and Marcus P Besser[2]

Address: [1]Department of Physical Therapy, University Medical Center Nijmegen, P.O. Box 9101, 6500 HB Nijmegen, The Netherlands and [2]Department of Physical Therapy, Thomas Jefferson University, 130 South 9th Street Suite 830, Philadelphia, PA 19107-5233, USA

Email: Cornelis JT van Uden* - c.vanuden@fysioth.umcn.nl; Marcus P Besser - marcus.besser@jefferson.edu

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Published: 17 May 2004

BMC Musculoskeletal Disorders 2004, **5**:13

Received: 08 February 2004

Accepted: 17 May 2004

Realiza mediciones como:

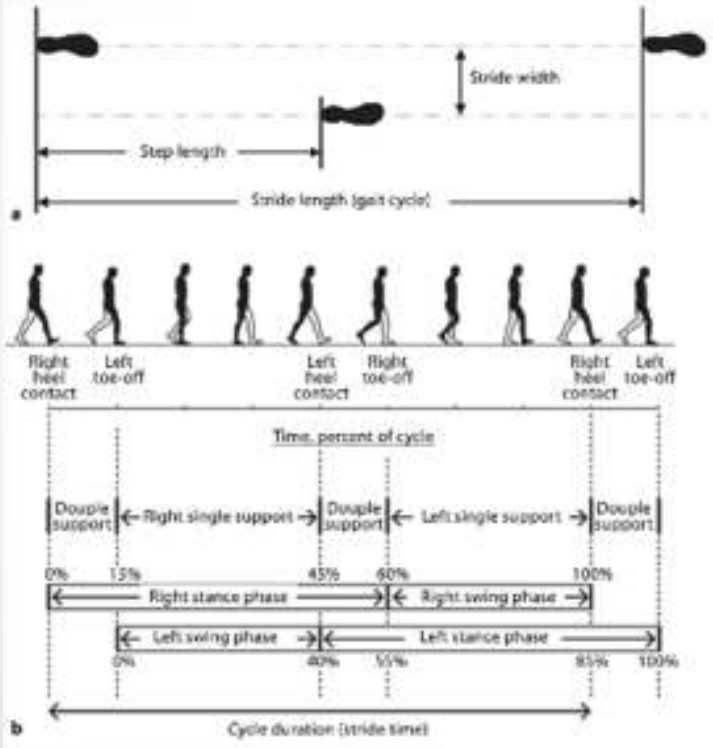
- Cadencia
- Longitud de la zancada
- Velocidad de la marcha

Imágenes cortesía HNGG Costa Rica

The Role of Gait Analysis in Seniors' Mobility and Fall Prevention

Stephanie A. Bridenbaugh Reto W. Kressig

Department of Acute Geriatrics, University Hospital of Basel, Basel, Switzerland



Gerontology 2011;57:256–264

Table 1. Specifications of GAITRite electronic walkway system used at Basel Mobility Center

Length	972 cm
Width	61 cm
Number of pressure sensors	29,952
Walkway model	Platinum
Software version	39
Scanning frequency	60 Hz
Length of extensions at each end of walkway[1]	125 cm

GAITRite:
Valores de referencia: 1 m/s
Variabilidad de la marcha: 3%

Reporte de Caso

Mujer, 72 años, caedora recurrente
Holter, MAPA, EMG, EEG, US

Caminata espontánea:
Velocidad de la marcha 1.23 m/s
Variabilidad de la marcha: 1%
Normal

Caminata con tareas de memoria, contar números inversamente:
Velocidad de la marcha 0.24 m/s
Variabilidad de la marcha: 74%
Alterada

Neuropsicología

DCL ejecutivo

Conclusión:
Caedora recurrente por DCL ejecutivo

¿Cómo identificar sistemas de detección automática de caídas?

International Journal of Medical Informatics 111 (2018) 58–71

Contents lists available at ScienceDirect

International Journal of Medical Informatics

journal homepage: www.elsevier.com/locate/ijmedinf

Review article

The state of knowledge on technologies and their use for fall detection: A scoping review

N. Lapierre[a,b], N. Neubauer[c], A. Miguel-Cruz[d,c], A. Rios Rincon[d,c], L. Liu[c], J. Rousseau[b,e,*]

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[b] Research Center, Institut universitaire de gériatrie de Montréal (Pavillon André-Roch Lecours), 4565 chemin Queen-Mary, Montréal, Québec, H3W 1W5, Canada
[c] Department of Occupational Therapy, Faculty of Rehabilitation Medicine, University of Alberta. 2-64 Corbett Hall, Edmonton, AB, T6G 2G4, Canada
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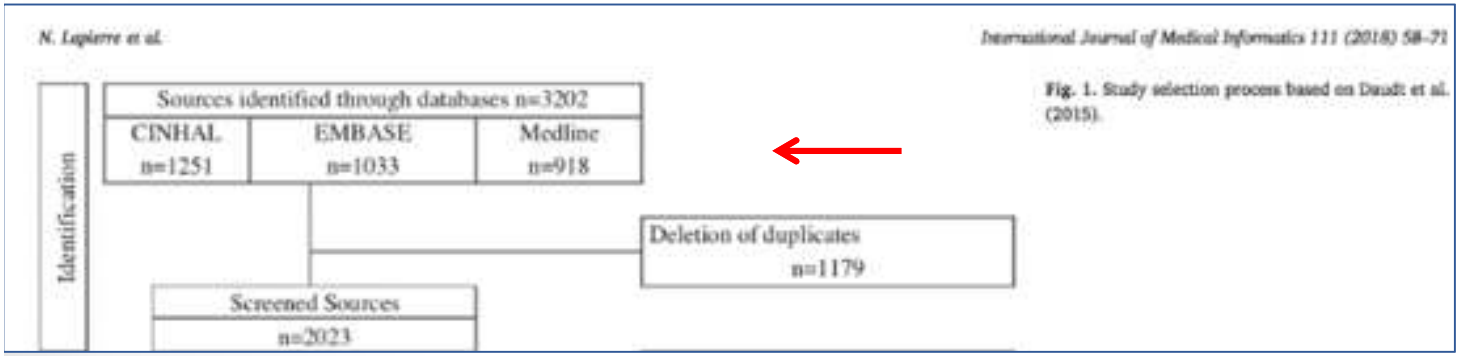
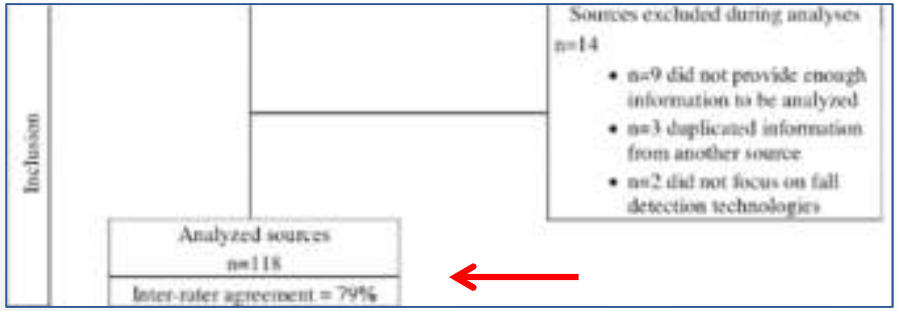


- Literatura en Inglés, Francés y Español
- 2006-2016



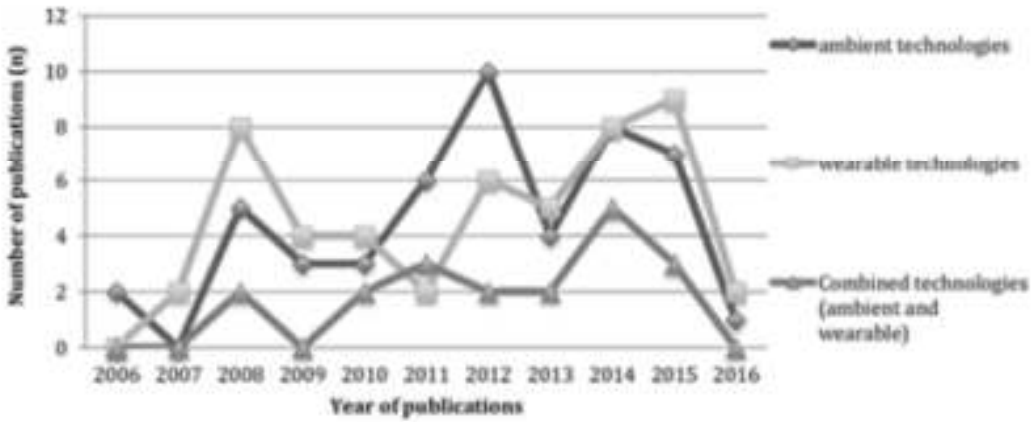


Fig. 2. Number of publications each year per type of technology.

- Dispositivos de portar
- Dispositivos del ambiente
- Combinados

N. Lapierre et al.

International Journal of Medical Informatics 111 (2018) 58–71

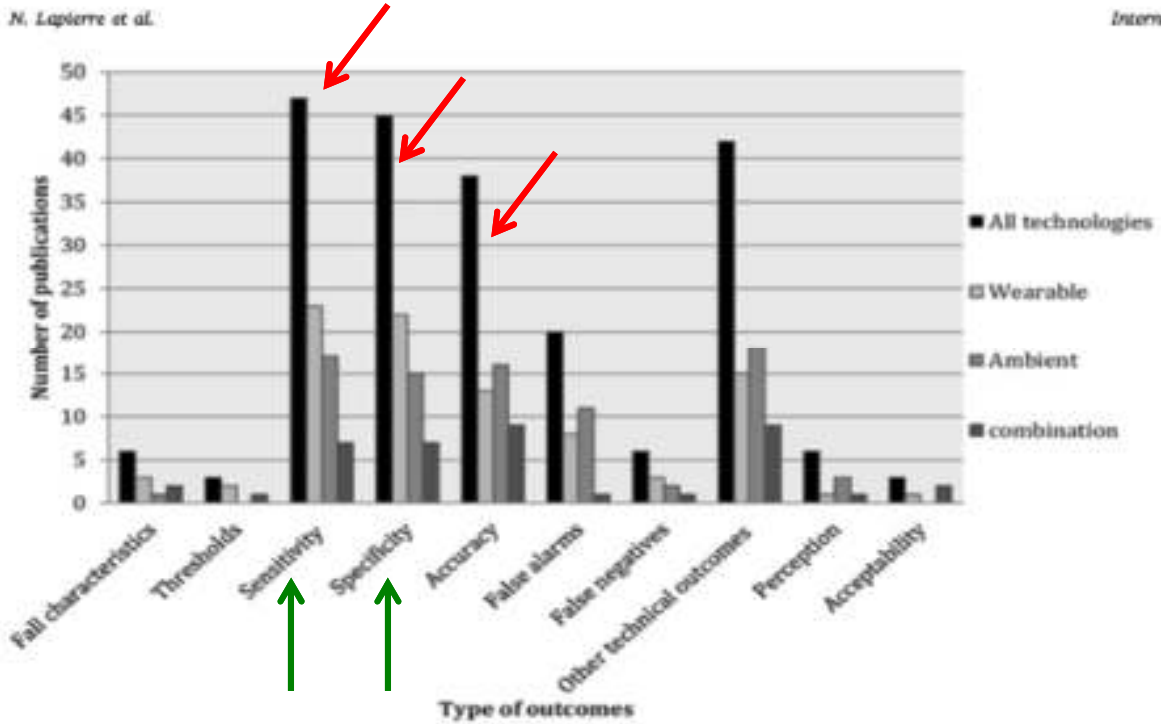


Fig. 3. Number of publications per type of outcome for each category of technology.

sensors

MDPI

Article

Optimization and Technical Validation of the AIDE-MOI Fall Detection Algorithm in a Real-Life Setting with Older Adults

Simon Scheurer [1,2], Janina Koch [1,2], Martin Kucera [1], Håkon Bryn [1], Marcel Bärtschi [1], Tobias Meerstetter [1,2], Tobias Nef [3,4] and Prabitha Urwyler [3,4,5,*]

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- Edad:86.25 ± 6.66 años
- Total: 20 participantes
- Recolección de datos a los 59 y 66 días
- Utilizando Aide-Moi

Table 1. Subject demographics (N = 20).

Demographics	First Phase	Second Phase
Number of participants	11 *	18 *
Gender (m/f) (% female)	4/7 (64)	6/12 (67)
Age (years) (mean ± SD)	85.64 ± 7.81	87.50 ± 5.65
Falls history 6 months before study (mean ± SD)	11.45 ± 11.1	7.28 ± 8.87
MoCA score (mean ± SD)	10.64 ± 9.34	6.35 ± 7.52
Katz score (mean ± SD)	1.91 ± 1.38	2.11 ± 1.88
Morse Fall Scale score (mean ± SD)	80.45 ± 8.50	79.44 ± 9.22

* Nine participants participated in both phases. The total participation was limited to two months. MoCA: Montreal Cognitive Assessment.

Table 2. Comparison of first- and second-generation algorithm.

	First Phase	Second Phase
Study duration in days	59	66
Amount of data collected (one-minute slices)	675,390	735,872
Number of features used in algorithm	3	15
Real falls documented in event protocol	18	23
Sensor recorded falls	11	20
False alarms documented in event protocol	29	12
True Positive (correctly classified falls)	3	16
True Negative (correctly classified non-falls)	675,350	735,840
False Positive (wrongly classified non-falls)	29	12
False Negative (wrongly classified falls)	8	4
Sensitivity	27.273%	80.0%
Specificity	99.995%	99.998%
Accuracy	99.994%	99.997%
Precision	9.375%	57.143%
F-measure	13.953%	66.666%

INTERNATIONAL JOURNAL OF MEDICAL INFORMATICS 83 (2014) 416–426

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journal homepage: www.ijmijournal.com

Older adults' perceptions of technologies aimed at falls prevention, detection or monitoring: A systematic review

Helen Hawley-Hague[a,*], *Elisabeth Boulton*[a], *Alex Hall*[a], *Klaus Pfeiffer*[b], *Chris Todd*[a]

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[b] *Klinik für Geriatrische Rehabilitation, Robert-Bosch-Krankenhaus, Stuttgart, Germany*

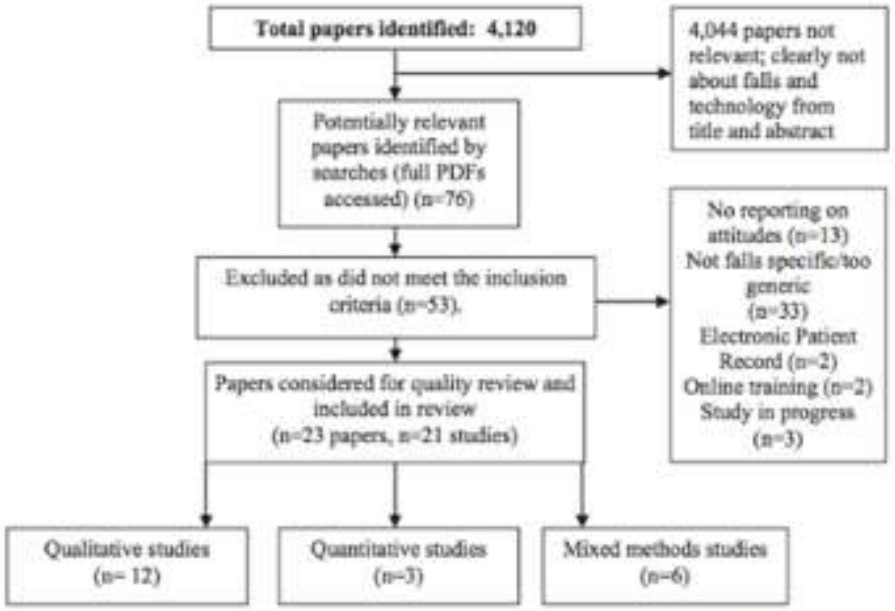

Fig. 1 – PRISMA diagram: flow of studies included and excluded in review.

Inclusión: Edad > 50 años

Alarmas de emergencia personales y en casa

Uso de computadores

Robótica

Consolas de juegos

Imágenes cortesía Msc Alexis Cruz HNP Costa Rica

¿Cómo determinar estrategias de prevención y rehabilitación en caídas con el uso de la tecnología?

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Contents lists available at ScienceDirect

Applied Ergonomics

journal homepage: www.elsevier.com/locate/apergo

Exergame technology and interactive interventions for elderly fall prevention: A systematic literature review

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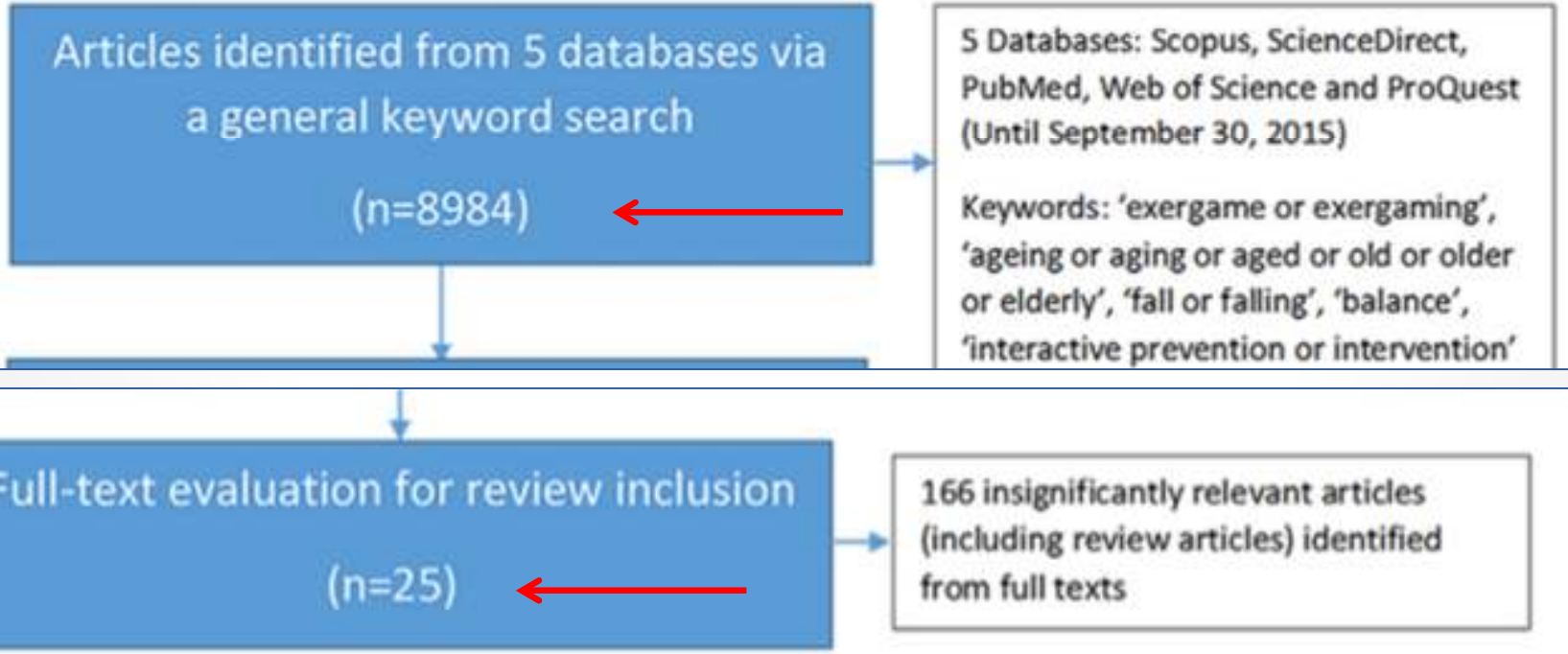

Fig. 1. Flowchart of literature searching and studies selection.

Table 2
Frequency distribution of reported exergaming devices for elderly fall prevention.

Exergaming devices	Number of studies
Nintendo Wii	14
Xbox Kinect	5
SensBalance Fitness Board	2
Dance Dance Revolution (Dance Video Game with a pad)	1
Wobble Board	1
Xavix Measured Step System (XMSS)	1
Lower Limb Power Rehabilitation System (LLPR)	1
Total	25

Imágenes cortesía Msc. Alexis Cruz
HNP Costa Rica

Conclusiones

- Las herramientas tecnológicos en la detección de factores de riesgo de caídas tienen un desempeño variable.
- Los sistemas de detección automática de caídas proveen seguridad y aceptabilidad.
- Los juegos interactivos son una herramienta prometedora, para el entrenamiento de la marcha, equilibrio y la prevención de caídas en la población adulta mayor.