

Andrea Cassano-Piché, M.A.Sc., P.Eng

Human Factors North Inc.

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DESIGNATIONS

Licensed Engineer Professional Engineers of Ontario
2009

EDUCATION

Bachelor of Applied Science (Industrial Engineering)
2004
Master of Applied Science (Industrial Engineering)
2006

University of Toronto, Toronto ON

AWARDS

2015 AAMI & Becton Dickinson's Patient Safety Award (HumanEra Team award)
2005 NSERC CGS-M Postgraduate Scholarship
2003 Human Factors and Ergonomics Society Chapanis Award Finalist: Best Student Paper

COMMITTEES

2012 - 2016	Reviewer, Safety Science Journal
2010 – 2015	Member, AAMI Infusion Devices Steering Committee
2008 - 2010	Member, CAPCA System Therapy Safety Committee
2008 - 2010	Member, UHN Safe Medication Practice Committee

PROFESSIONAL EXPERIENCE

Human Factors North Inc.

2015 - Present

Human Factors Engineering Consultant

Clients

MDA

- Currently conducting task analyses to support the development of Human Machine Interfaces for the Gateway External Robotics System (CanadArm 3) on NASA's Deep Space Gateway – a lunar orbiting space station with a goal of extending human presence at a larger distance from Earth.

- Developed a Human Factors Engineering Program Plan for the development of the CanadArm 3 robotic system for the Gateway Space Station program.
- Performed a human factors analysis of hand control input devices for the Gateway on-orbit robotic workstation based on literature review and interviews with representative end users (flight controllers and astronauts).

Relay Medical

- Conducted a human factors evaluation of a home medication management system. Coordinated user trials and conducted at home interviews with representative end users.

Centre for Surgical Invention and Innovation

- Conducted a formative usability evaluation of the Image Guided Automated Robot for MRI guided breast tumor biopsy and ablation.
- Create workflow wireframe designs for an improved pendant (remote control) for the IGAR.

Association for the Advancement of Medical Instrumentation – Health Technology Safety Institute

- Prepared case-study white papers for the publication Safety Innovation Series

ISMP Canada

- Workshop facilitator for FMEA and RCA workshops
- Consultant on FMEA Investigations
- Development of human factors online training content

Vancouver Coastal Health Authority

- Conducted an investigation of human factors issues contributing to biofilm development in hospital sinks.

Association for the Advancement of Medical Instrumentation

- Authored a white paper on continuous monitoring of patients on opioids.

Healthcare Excellence Canada

2022-Present

Senior Program Lead

Responsibilities:

- Identify and evaluate healthcare innovations with the potential to improve the quality and safety of healthcare for all Canadians.
- Design and implement programs that support the spread of innovations proven to improve quality and safety in healthcare.
- Build partnerships and collaborate with people and organizations to more effectively drive adoption, extend reach, build capacity and catalyze policy change.

HumanEra, University Health Network

2010 - 2015

Human Factors Engineer

Responsibilities:

- Conducting applied patient safety research and knowledge translation projects aimed at identifying and mitigating health technology safety risks on behalf of Health Quality Ontario.
- Expanding human factors capacity through educational offerings at the local, national, and international levels including co-authoring the book *Human Factors for Health Technology Safety* (<http://cedglobal.org/wp-content/uploads/2016/11/CED-HF-Health-Technology-Safety.pdf>)
- Participating on national and international steering committees with aims to improve quality and safety in healthcare.

Healthcare Human Factors, University Health Network

2006 - 2010

Human Factors Engineer

Responsibilities:

- Conducting hospital system-wide patient safety/quality projects (e.g., Failure Mode and Effects Analyses, incident investigation, human factors evaluation of technology for procurement).
- Conducting national human factors patient safety research projects (e.g., Improving the Safe Delivery of IV Chemotherapy in Canada).
- Conducting human factors evaluations of health technology to support the design of new technology (consulting to vendors).
- Developing and teaching human factors workshops to increase awareness of human factors and systems issues at the University Health Network and other healthcare organizations.

Medical Engineering, University Health Network

2002 -2004

Human Factors Engineering Intern

Responsibilities:

- Developing a human factors informed procurement process to support the safe selection and effective implementation of health technology.
- Investigating adverse events and near misses and provided guidance on mitigating the related issues.

Sample Projects

Human Factors Evaluation of the IGAR Breast Tumor Biopsy Robot

Funder: Centre for Surgical Invention and Innovation

Human Factors evaluation of the workflow, interface design and hardware design of the IGAR breast tumor biopsy robot to support hardware and interface design changes as part of the formative design process.

Improving the safe administration of multiple intravenous (IV) infusions

Funder: Health Quality Ontario

Reports/Tools:

- [Multiple IV Infusions Phase 1b – Practice and Training Scan](#)
- [Multiple IV Infusions Phase 1b – Interim Recommendations](#)
- [Multiple IV Infusions Phase 2a – Ontario Survey](#)
- [Multiple IV Infusion eLearning Modules](#)

Multi-phase research study aimed at applying human factors methods to identify and mitigate risks associated with administering multiple IV infusions.

- Conducted field studies conducted in 12 units across 10 Ontario hospitals.
- Developed of best practice recommendations for the province
- Supported the development of interactive training tools (eLearning modules) for nurses.
- Provided implementation support at 3 Ontario hospitals
- Partnered with medication technology, safety, and nursing organizations to ensure wide dissemination of findings

Improving the Safety of Ambulatory Intravenous Chemotherapy in Canada

Funders: Canadian Patient Safety Institute, Canadian Association of Provincial Cancer Agencies, Cancer Care Manitoba, Cancer Care Ontario, Alberta Cancer Board, New Brunswick Cancer Network, British Columbia Cancer Agency

Reports:

[Improving the Safety of Ambulatory Intravenous Chemotherapy in Canada](#)

A national safety project to identify risks associated with administering ambulatory intravenous (IV) chemotherapy and providing recommendations for system improvement.

- Conducted field studies in 6 cancer centres across Canada.
- Conducted a national survey of policies, practices and incidents related to ambulatory IV chemotherapy delivery.
- Published recommendations based on study findings.

Development of a human factors program at the Hospital Virtual de Valdecilla

Funder: Hospital Universitario Marqués de Valdecilla

Human factors training within an academic hospital, simulation centre, and innovation centre in Santander, Spain to support the development of a new human factors program to service local (Cantabria region), national (Spain) and international healthcare organizations, and health technology companies and regulators.

- Provided introductory human factors lectures to staff across Valdecilla to introduce human factors thinking and support cultural change across the organization.
- Provided detailed methodological training to an interdisciplinary group of health professionals and engineers.

Development of a Human Factors Engineering Course for the British Columbia Institute of Technology

Funder: British Columbia Institute of Technology (BCIT)

Led the development of Human Factors Engineering in Health – a 12-week, online credit course offered as part of the Biomedical Engineering Technology program at BCIT.

Development of a Hazard Reporting System

Funder: University Health Network

Led the expansion of UHN's incident reporting system to include the tracking of 'hazards' (i.e., any risk with the potential to cause harm regardless of whether it led to a near miss or an incident).

- Requested and received organizational support to expand the incident reporting system.
- Developed hazard definitions, categories and rating system
- Provided training to clinical staff and created communion the new system

Usability Evaluation of Infusion Technology During Development Cycle

Funder: Smith's Medical

Conducted formative and summative usability evaluations of several infusion systems and infusion-related accessories in a simulation laboratory.

Root Cause Analysis of Repetitive Strain Injuries Incurred by Clinical Pharmacists

Funder: University Health Network

Identified root causes of RSIs following the implementation of a Computerized Physician Order Entry system. Worked with pharmacy management and pharmacy informatics to identify a solution strategy that involved redistribution of workload, changes to staffing levels, redefined roles for pharmacy technicians, and better system integration between the CPOE and pharmacy information systems.

Root Cause Analysis of an Air-Oxygen Mix-Up Incident

Funder: University Health Network

Identified the root causes of an air-oxygen mix-up incident that resulted in a serious decline of a patient's blood oxygen saturation. Analysis was conducted using the Human-tech ladder as a framework to guide the analysis.

Failure Mode and Effects Analysis of Ordering, Preparing and Distributing Blood Products

Funder: University Health Network

Provided leadership to UHN's Risk Management team while conducting their first FMEA. Supported the development of workflows associated ordering, preparing, and distributing blood products. Supported the development of risk assessment criteria, the assessment of risk and the development of mitigating strategies across three UHN hospitals (Toronto General Hospital, Toronto Western Hospital, Princess Margaret Hospital). The work was submitted in support of UHN's Accreditation.

Usability Evaluation of Patient-Controlled Analgesia Pumps for Hospital Procurement

Funder: University Health Network

Conducted a comparative human factors assessment of patient-controlled analgesia pumps. Methods included observations, cognitive walkthroughs, surveys and high-fidelity usability testing in a simulation lab.

Usability Evaluation of Electrosurgical Units for Hospital Procurement

Funder: University Health Network

Conducted a comparative human factors assessment of electrosurgical units. Methods included observations, cognitive walkthroughs, surveys, and low-fidelity usability in situ.

Usability Evaluation of an Integrated Community Care Portal (iCCP)

Funder: Toronto Central Community Care Access Centre (CCAC)

Conducted a usability evaluation of the iCCP to identify usability issues that contributed to the collection of inaccurate client data, reduced efficiency and user frustration. Methods included interviews and field observations in the homecare and CCAC office environments.

Human Factors and Workflow Analysis of the Integration of Cone Beam CT in Head and Neck Surgery

Funder: National Institutes of Health

Conducted an analysis of human factors and workflow issues associated with introducing cone beam CT scanning at pre-determined phases of head and neck surgical cases. Methods included direct observation and video analysis.

Teaching Experience

Lecturer/seminar leader in the department of Mechanical and Industrial Engineering, Faculty of Applied Science, University of Toronto for the following undergraduate and graduate courses:

- MIE240: Human Centred Systems Design
- MIE345: Case Studies in Ergonomics
- APS111: Engineering Strategies and Practice I
- MHI 2004: Human Factors and Change Management

Other teaching experience:

- VA Quality Scholars Seminar on Human Factors

Selected Publications

Books

Cassano-Piché A, Trbovich P, Griffin M, Lin YL, Easty A. *Human Factors for Health Technology Safety*. Clinical Engineering Division, International Federation of Medical & Biological Engineering, editor(s). (United States): IFMBE; 2015. 253 p. Free download available at: ifmbe.org

Reports

Fan M, Koczmara C, Masino A, **Cassano-Piché A**, Trbovich P, Easty A. Multiple Intravenous Infusions Phase 2a: Ontario Survey. Ontario Health Technology Assessment Series. Ontario Health Technology Assessment Series; Vol. 14: No. 4, pp. 1-141, May 2014 (Medline Indexed).

Cassano-Piché A, Fan M, Sabovitch S, Masino C, Easty AC, Health Technology Safety Research Team, Institute for Safe Medication Practices Canada. Ont Health Technol Assess Ser [Internet]. 2012 May; 12(16):1-132. (Medline Indexed).

Easty A, Pinkney S, **Cassano-Piché A**, Masino C, Koczmara C, Trbovich P. Multiple intravenous infusions phase 1a: Situation scan summary report. Report prepared for the Ontario Health Technology Advisory Committee. 2010 Sep.

Refereed Journal Articles

White R, **Cassano-Piché A**, Fields A, Cheng R, Easty A. Intravenous chemotherapy preparation errors: Patient safety risks identified in a pan-Canadian exploratory study. *J Oncol Pharm Pract*. 2013 Feb 1;Feb(1). 2013 Feb 1.

Jeon J, **Cassano-Piché A**, White R, Hunt R, Easty A. Optimizing the Design of Preprinted Orders for Ambulatory Chemotherapy: Combining Oncology, Human Factors and Graphic Design. *Journal of Oncology Practice*. 2012 Mar;8(2):97-102. doi:10.1200/JOP.2011.00346.

Cassano-Piché A, Cafazzo J, Chagpar A, Easty A. Choosing Safer Medical Technology: How Human Factors Methods Can Help in the Procurement Process. *Human Factors Horizons, Biomedical Instrumentation & Technology*. 2010;Nov-Dec:49-55. Nov-Dec 2010. 49-55.

Cafazzo J, Trbovich P, **Cassano-Piché A**, Chagpar A, Rossos P, Vicente K, Easty A. Human Factors Perspectives on a Systemic Approach to Ensuring a Safer Medication Delivery Process. *Healthcare Quarterly*. 2009;12(Sp Issue). Vol 12, Special Issue 2009

Cassano-Piché, A.L., Vicente, K.J., Jamieson, G., "A test of Rasmussen's framework for risk management in the food safety domain: BSE in the UK". *Theoretical Issues in Ergonomics Science*, vol 10(4), pp. 283-304, 2009.

Vicente, K. J., Kada-Bekhaled, K., Hillel, G., **Cassano, A.**, & Orser, B. A., "Programming errors from patient-controlled analgesia", *Canadian Journal of Anesthesia*, vol. 50, pp. 856-857, 2003

Invited Articles

Cassano Piché, A., "Clinical considerations for the allied professionals: The role of human factors in health care", *Heart Rhythm*. Vol.2, pp. 898-899, 2005. United States.

Refereed Conference Proceedings

Fan M, Pinkney S, **Cassano-Piché A**, White R, Trbovich P and Easty AC (June 2014). Designing Impactful Human Factors Research Programs in Healthcare. Proceedings of the International Symposium of Human Factors and Ergonomics in Healthcare 2014. Access at: <http://hcs.sagepub.com/content/3/1/102.abstract>

Cassano-Piché A, Fan M, and Easty AC. Mitigating risks associated with administering multiple intravenous infusions: methods for organizing and analyzing proactive risk data. Proceedings of the International Symposium of Human Factors and Ergonomics in Healthcare, pp.35-38, 2012. Santa Monica, CA.

Cassano-Piché A, White RA, Jeon J, Easty AC. "Improving ambulatory chemotherapy safety: Results and impact of a multi-disciplinary, multi-jurisdictional proactive risk study", Proceedings of the 2012 Symposium on Human Factors and Ergonomics in Health Care, pp.52-59, 2012. Santa Monica, CA.

Invited Presentations

Cassano-Piché A, Pinkney S, Fan M. Multiple IV Infusions Research and Recommendations. AAMI National Coalition on Infusion Therapy Safety. Annapolis, MD. March 12-13, 2015.

Cassano-Piché, A, Griffin M. Workshop: How to conduct a Human Factors Failure Mode and Effects Analysis. AAMI 2014 Conference. June 1, 2014.

Cassano-Piché, A. Pinkney S. Workshop: How to incorporate Human Factors Engineering in a hospital procurement process. AAMI 2015 Conference. June 1, 2014.

Cassano-Piché, A. Human Factors Science: Improving Safety in Healthcare. Hospital for Sick Children perioperative nursing day. May 6, 2011.

Cassano-Piché, A, Griffin M. Human Factors 101. An invited workshop at the 2011 Canadian Medical and Biological Engineering Conference. June 8, 2011. Toronto.

Cassano-Piché A. Assessing medical technology use safety through simulation. Presented at the MIT CIMIT Forum. Boston, MA. December 7, 2010.

Cassano-Piché, A. Pan-Canadian Research Study on Chemotherapy Safety: Improving the Safety of Ambulatory IV Chemotherapy in Canada. Oncology Nursing Program Committee. February 25, 2009

Cassano-Piché A, Walsh D. Human Factors Impact on Medication Safety. Presented at ISMP's Medication Safety in Community Healthcare Conference. May 8, 2008. Toronto.