

**ECOLE DOCTORALE PIERRE LOUIS DE SANTE PUBLIQUE A PARIS**  
**EPIDEMIOLOGIE ET SCIENCES DE L'INFORMATION BIOMEDICALE**

Directeur : Pierre-Yves Boëlle  
Responsable pour l'Université Paris Cité : Isabelle Boutron

**PROPOSITION DE SUJET DE THESE**

**SIGLE ET NOM DU LABORATOIRE :** CENTER OF RESEARCH IN EPIDEMIOLOGY AND STATISTICS (CRESS-U1153)

**NOM DE L'EQUIPE :** METHODS

**DIRECTEUR DE THESE :** VIET THI-TRAN

**ADRESSE :** HOPITAL HOTEL-DIEU, 1 PLACE DU PARVIS NOTRE-DAME, 75004 PARIS

**TITRE DE LA THÈSE :** IDENTIFYING CARING ACTIVITIES THAT CONVERSATIONAL AGENTS COULD AUGMENT IN PRIMARY CARE AND EVALUATING THEIR ACCEPTABILITY FOR PATIENTS AND CLINICIANS.

**CO-ENCADRANT :** ASTRID CHEVANCE

**EQUIPE DU CO-ENCADRANT :** METHODS - CENTER OF RESEARCH IN EPIDEMIOLOGY AND STATISTICS (CRESS-U1153)

**LABORATOIRE :** HOPITAL HOTEL-DIEU, 1 PLACE DU PARVIS NOTRE-DAME, 75004 PARIS

**PRESENTATION DU SUJET**

**Title:** Identifying caring activities that conversational agents could augment in primary care and evaluating their acceptability for patients and clinicians.

**1. Scientific context**

*AI has the potential to transform healthcare by modifying medical decision-making*

How to improve medical decision-making, whether it concerns diagnosis or therapeutic choices, is a key question that led to the development of an evidence-based medicine (EBM) in the late 1980's. Thus far, the development of artificial intelligence (AI) in medicine has mainly sought to support medical decisions to diagnose and choose the best treatment for patients, as well as conducting population-based risk prediction analytics <sup>1</sup>.

More recently, the development of conversational agents has expanded the potential uses of AI in medicine beyond decision-making <sup>2</sup>. Conversational agents, tools where users have conversations with a machine <sup>3</sup>, now hold the potential to augment the care provided during and between consultations. For example, conversational agents have been used to answer patients' questions for further medical advice <sup>2</sup>. Additionally, by establishing strong connections with users, these tools can potentially transform the way patients interact with the healthcare system. While still in its infancy, the literature indicates that the use of conversational agents has the capability to profoundly transform the healthcare organisation entirely, through such benefits as increases in clinician productivity, building therapeutic alliance, and improving patient outcomes <sup>2</sup>.

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*Conversational agents and patient-centred healthcare: positioning humans and machine*

One of the key features of patient-centred healthcare is to take into account patients' perspectives in decision-making. The augmentation of human-human interactions with human-machine interactions in this process has been flagged as ethically pernicious<sup>4-7</sup>. Conversational agents that are unable to take into consideration the intricacies constituting patients' lived experiences are a prime example of this<sup>4,8</sup>. Regardless of their efficiency, the use of conversational agents in healthcare brings about a concern that uniquely human aspects may be lost.

Beyond medical decision-making, conversational agents may also change the professional tasks of clinicians and therefore their social role, implying changes in the patient-clinician relationship both at the micro and the macrosocial level (the patient-clinician level and the social professional group). For instance, the use of conversational agents may save some time in a clinician day to do other clinical tasks, in particular those which are human-specific. At the same time, conversational agents may also change the capabilities of patients, which may change patients' needs and expectations toward clinicians.

To our knowledge, there is no literature dedicated to the identifying which activities in healthcare patients and clinicians consider conversational agents to be acceptable. Therefore, amidst the forthcoming integration of conversational agents in healthcare, it is necessary that we consider how care and conversational agents can 'compliment and balance' each other<sup>9</sup> by identifying the important caring activities that can and cannot be augmented by conversational agents with respect to patient-centred healthcare.

## 2. Research questions

The aim of the PhD project is to evaluate an acceptable positioning for patients and clinicians of conversational agents to augment the caring activities present in primary care. For this purpose, the candidate will need to investigate the following questions:

- Among caring activities in healthcare, which could be augmented by conversational agents? (Addressed by project 1).
- Would it be acceptable for patients and clinicians to have conversational agents deliver the different type of caring activities? (Addressed by project 2).

## 3. Methods

*Project 1: A typology of the different care activities that could be augmented by conversational agents.*

**Rationale:** While medical consultations primarily involve making diagnostic and treatment decisions, the whole scope of caring activities may encompass much more<sup>10</sup>. Human care is a complex and multifaceted phenomenon that is constructed by a range of values, beliefs, and morals that establish a standard of care<sup>5-7</sup> and has long been recognised as an essential to effective healthcare provision<sup>11</sup>. Conversational agents may be an interesting solution to meet the challenge of rising burdens placed on healthcare services.

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**Objectives:** 1) To identify and characterize the different care activities that happen during and between consultations that could be augmented with conversational agents, in respect with the principles of patient-centred care, and 2) To quantify the time spent on different care activities that occur during and between consultations.

**Methods:** First, we will conduct a scoping review of the literature about potential caring activities that could be augmented by conversational agents in primary care. To further contextualise the findings of the scoping review, the candidate will observe 20 consultations and conduct in-depth interviews with 10 clinicians, 10 patients, 5 experts in the field of using conversational agents in healthcare, and 5 experts of care ethics in healthcare. These interviews and observation will facilitate the development of an assessment grid and semi-structured interview guide to evaluate caring activities during and between consultations (potential areas of assessment include decisions on diagnosis, emotional support, patient-education, etc).

Second, we will perform a study to identify and categorise the different types of activities that constitute care during and between consultations. We aim to recruit medical students (3<sup>rd</sup> to 6<sup>th</sup> years) who will complete an observatory internship to conduct assessments during their observation time of consultations. All medical students will receive a standardized formation for the grid and interview procedure to identify and categorise the different types of activities that constitute care during and between consultations. These activities will be recorded and quantified by the frequency and time dedicated to each activity. Medical students will also be able to identify new activities (if any) that may have been overlooked. We aim to observe about 500 consultations across various practice settings in France. A group of experts will discuss how each care activity identified could be augmented by conversational agents.

**Output:** At the end of this study, we will have a list of caring activities of patients and clinicians that could be augmented with conversational agents, with results on the frequency of use and the time spent on different caring activities.

*Project 2: Acceptability of conversational agents to augment care activities.*

**Rationale:** Conversational agents have shown potential in reducing the burden on the healthcare system by serving as intermediaries for monitoring and consulting the public <sup>2</sup>. Identifying how and when conversational agents can be considered acceptable tools to augment care in a variety of healthcare situations is crucial for their effective implementation <sup>8</sup>.

**Objectives:** 1) To assess the acceptability of using conversational agents during and between healthcare consultations and 2) to evaluate the willingness of patients and clinicians to use conversational agents in primary care.

**Methods:** We will conduct a large online multilingual survey that involves an international sample of clinicians and patients. The survey will collect variables that may affect the willingness to use conversational agents in healthcare such as socio-demographical characteristics, health characteristics, AI literacy and relationship to new technologies in the form of close-ended questions. The survey will investigate acceptability of conversational agents based on the model of Sekhon et al. and collecting the insights of participants through a vignette methodology based on previous methodology published by the directors <sup>12-14</sup>. The situations proposed in the set of 3 to 5 vignettes will be based on the results of the first project.

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Additionally, these results will guide the development of three open-ended questions developed that will allow participants to report free insights on the acceptability of conversational agents. Prior to conducting the survey, the questionnaire will be pilot tested in a small sample of 10 patients and 5 clinicians, and feedback will be incorporated. The candidate will perform a thematic content analysis of the free-text responses, and quantitative analysis of the close-ended and vignette questions. Finally, a logistic regression will be used to identify the determinants of acceptability of conversational agents.

Output: The findings from the study will indicate the acceptability of conversational agents in different caring activities in healthcare.

#### 4. Data sources

Applicants should be experienced and confident in utilising secondary data to build their academic knowledge basis on the topic. This should be extended throughout the doctorate through the candidate's collection of primary data relevant to the planned projects (e.g., online surveys, vignette methodology, semi-structured in-depth interviews, etc.). The candidate will be supported by the METHODS team which has expertise in both evidence synthesis and conducting large online international surveys. This team hosts the ComPaRe e-cohort which includes 50,000 patients with a diagnosis of chronic disease. This will be the main source of the recruitment of participants for the online survey. Finally, the METHODS team has close relationships with the Département de Médecine Générale of the Université Paris Cité, and with leaders of the primary care community who will assist in recruiting clinicians for both projects.

#### 5. Subjects/Study size(s)

- Project 1: Preliminary study = 10 general practitioners, 10 patients, 5 experts in the field of using conversational agents in healthcare and 5 care ethics experts. Observational study = 50 medical students doing an internship in primary care. Each medical student will need to perform at least 10 observations.
- Project 2: Pilot survey = 10 patients and 5 clinicians. Online Survey in three languages (French, English, Spanish = 3000 participants with a regular assessment of data saturation for the qualitative data.

#### 6. Projected Timeline

September 2023 - February 2024	Protocol of study 1 and 2 and seeking for ethical approval.
March 2024 - August 2024	Launch of the surveys and data collection. Work on bibliographic references.
September 2024 - February 2025	Analysis of the results of project 1.
March 2025 - August 2025	Analysis of the results of project 2 and writing of the paper of project 1.
September 2025 - April 2026	Submission of paper 1 and writing of paper 2.
May 2026 - August 2026	Submission of paper 2 & Thesis - Writing.

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September 2026 - October 2026	Thesis - Supervisor revision.
November 2026	Thesis defence.

**7. Planned Papers**

The candidate will publish at least one paper per project in an academic peer-reviewed journal in the field, such as the *Lancet Digital Health*.

**8. References**

1. Esmailzadeh, P. Use of AI-based tools for healthcare purposes: a survey study from consumers' perspectives. *BMC Medical Informatics and Decision Making* **20**, 170 (2020).
2. Ayers, J. W. *et al.* Comparing Physician and Artificial Intelligence Chatbot Responses to Patient Questions Posted to a Public Social Media Forum. *JAMA Internal Medicine* (2023) doi:10.1001/jamainternmed.2023.1838.
3. Calvo, R. A., Milne, D., Hussain, M. S. & Christensen, H. Natural Language Processing in Mental Health Applications Using Non-Clinical Texts. *Natural Language Engineering* (2017) doi:10.1017/s1351324916000383.
4. Koutsouleris, N., Hauser, T. U., Skvortsova, V. & De Choudhury, M. From promise to practice: towards the realisation of AI-informed mental health care. *The Lancet Digital Health* **4**, e829–e840 (2022).
5. Villegas-Galaviz, C. Ethics of Care as Moral Grounding for AI\*. in *Ethics of Data and Analytics* 78–83 (Auerbach Publications, 2022). doi:10.1201/9781003278290-13.
6. Stokes, F. & Palmer, A. Artificial Intelligence and Robotics in Nursing: Ethics of Caring as a Guide to Dividing Tasks Between AI and Humans. *Nursing Philosophy* **21**, e12306 (2020).
7. Etzioni, A. *Robotic Care of Children, the Elderly, and the Sick (With Oren Etzioni)*. (2018). doi:10.1007/978-3-319-69623-2\_17.
8. Sasseville, M. *et al.* Interactive Conversational Agents for Health Promotion, Prevention, and Care: Protocol for a Mixed Methods Systematic Scoping Review. Preprint at <https://doi.org/10.2196/40265> (2022).
9. Ghanbari-Afra, L., Adib-Hajbaghery, M. & Dianati, M. Human Caring: A Concept Analysis. *J Caring Sci* **11**, 246–254 (2022).
10. Peckham, S. *et al.* The organisation and delivery of health improvement in general practice and primary care: a scoping study. *Health Services and Delivery Research* **3**, 1–180 (2015).
11. Watson, M. J. New Dimensions of Human Caring Theory. *Nurs Sci Q* **1**, 175–181 (1988).
12. Sekhon, M., Cartwright, M. & Francis, J. J. Acceptability of healthcare interventions: an overview of reviews and development of a theoretical framework. *BMC Health Services Research* **17**, 88 (2017).
13. Chevance, A. *et al.* Acceptability of and Willingness to Take Digital Pills by Patients, the Public, and Health Care Professionals: Qualitative Content Analysis of a Large Online Survey. *J Med Internet Res* **24**, e25597 (2022).
14. Oikonomidi, T., Ravaud, P., Barger, D. & Tran, V.-T. Preferences for Alternative Care Modalities Among French Adults With Chronic Illness. *JAMA Netw Open* **4**, e2141233 (2021).

**PRÉREQUIS, FORMATION** : THE SUCCESSFUL CANDIDATE FOR THE PHD PROGRAM SHOULD POSSESS A MASTER'S DEGREE IN EPIDEMIOLOGY OR CLINICAL RESEARCH. ADDITIONALLY, A HIGH LEVEL OF PROFICIENCY IN ENGLISH, PREFERABLY AT A C1 OR C2 LEVEL, IS ESSENTIAL. IT IS DESIRABLE FOR THE CANDIDATE TO HAVE EXPERIENCE IN SCIENTIFIC WRITING IN ENGLISH. PROFICIENCY IN OTHER LANGUAGES WOULD BE ADVANTAGEOUS. THE IDEAL CANDIDATE SHOULD DEMONSTRATE PROFICIENCY IN BOTH QUALITATIVE AND QUANTITATIVE RESEARCH METHODS. THEY SHOULD POSSESS THE NECESSARY SKILLS TO ANALYSE COMPLEX PROBLEMS AND EFFECTIVELY TRANSLATE THEM INTO WELL-STRUCTURED, ANALYTICAL APPROACHES. INTELLECTUAL CURIOSITY, A STRONG DESIRE TO LEARN, AND THE ABILITY TO ACCEPT AND INCORPORATE CONSTRUCTIVE CRITICISM ARE HIGHLY VALUED ATTRIBUTES. FURTHERMORE, THE CANDIDATE SHOULD EXHIBIT THE WILLINGNESS AND SELF-

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MOTIVATION NECESSARY TO INDEPENDENTLY CONCEIVE AND DEVELOP RESEARCH PROJECTS, SEEING THEM THROUGH TO COMPLETION. THIS SELF-DRIVEN INITIATIVE IS A VITAL ASPECT OF THE SUCCESSFUL COMPLETION OF THE PHD PROGRAM.

**CONTACT POUR CE SUJET : ASTRID CHEVANCE**

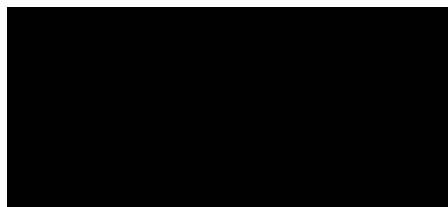
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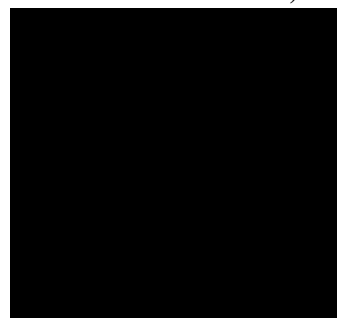
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