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▶ **To cite this version:**

Laurent Mériade, Corinne Rochette. Integrated care pathway for breast cancer: a relational and geographical approach. Social science & medicine, 2020, pp.113658. 10.1016/j.socscimed.2020.113658 . hal-03091385

HAL Id: hal-03091385
https://hal.science/hal-03091385

Submitted on 30 Dec 2020

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PII: S0277-9536(20)30877-7

DOI: https://doi.org/10.1016/j.socscimed.2020.113658

Reference: SSM 113658

To appear in: *Social Science & Medicine*

Revised Date: 7 December 2020

Accepted Date: 22 December 2020

Please cite this article as: Mériade, L., Rochette, C., Integrated care pathway for breast cancer: a relational and geographical approach, *Social Science & Medicine*, https://doi.org/10.1016/j.socscimed.2020.113658.

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Credit Author Statement

Laurent Mériade:

- Conceptualization: literature review
- Methodology: relational and cartographic analysis
- Survey: interviews, coding
- Writing: original project, writing
- Review: drafting amendments
- Editing

Corinne Rochette:

- Conceptualization: conceptual framework
- Methodology: relational analysis
- Survey: CoPil data collection, interviews, coding
- Writing: original project, writing
- Review: drafting amendments, responses to reviewers

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Acknowledgements. The authors of this article would like to warmly thank the Clermont Auvergne University for supporting this project and the management and staff of the CLCC Jean Perrin in Clermont-Ferrand (France), for providing access to the data for this study.

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Abstract

This paper examines how to apply a spatial approach (relational and geographical) to care pathways for their better integration within their territories. Based on the case study of a senology department of a French Cancer Diagnosis, Treatment and Research Center, we apply a mixed research methodology using qualitative data (synthesis documents, meeting minutes, in-depth interviews) and quantitative data relating to the mobility and geographical location of a cohort of 1798 patients treated in this center. Our results show the inseparable nature of the relational dimension and the geographical approach to move towards greater integration of breast cancer care pathways. This inseparability is constructed from the proposal of a method for mapping the integrated care pathways in their territories. This method, applied to our case study, allows us to identify four main categories of pathways for the cohort of patients studied.

Keywords. care pathway; integrated care; spatial approach; mixed method; breast cancer; France.

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1. Introduction

Since the 1990s, care pathways have been implemented as a method of monitoring medical treatment processes and times. Their definition is an important issue for ensuring continuity of care (Valentijn et al., 2017) and the modernization of health systems. The care pathway is associated with greater efficiency and quality of hospital care (Vanhaecht et al., 2010, p. 118) as well as increased patient satisfaction (Everink et al., 2017). Consequently, care pathways are the result of the chronological articulation of a set of health services and acts taken care of by different actors in a care process (Allen, 2009; Vanhaecht, De Witte and Sermeus, 2007).

In practices, the hospital as a pivotal actor concentrates resources strongly, which contributes to the definition of a care pathway that is geographically and clinically tightened around hospital care services without always taking into account the patient's socio-economic constraints (Røsstad et al., 2013). The Integrated Care Pathway (ICP) concept provides an approach that is more open to the health ecosystem of a given territory and more patient-centred (Campbell et al., 1998). The power of ICP lies in its ability to embed the care pathway in its social and geographical dimensions (Huby and Rees, 2005). It is quite surprising to note the research deficit linking ICPs to the geographical approach, even though the care pathway incorporates the relationship to geographical space. This relationship to geographical space merits being incorporated on the one hand because of its objective of integrating medical resources that are not necessarily co-located, and on the other hand because the patient's pathway is not only a sequence of care, it also involves physical displacement in order to benefit from this care. Despite its interest, geographic mapping is still under-exploited (Checkland et al., 2019; Harlay, 1989; King, 1996; Price-Chalita, 1994). To date, attempts to geographically conceptualize care pathways (Nuemi et al., 2013; Nuti et al., 2016; Yu et al., 2017) have used the map as a descriptive and static tool at the service of public health policies and less at the service of patients and health professionals.

Our research positions the spatial approach as a fundamental element in the structuring of patient care pathways in the perspective developed.

In the 1970s, the spatial approach is seen as a social construct. Space is understood in its physical reality (geography) and in the representation that individuals have of this physical reality (Lefebvre, 1974). Space is both conceived but also perceived and experienced (Lefebvre, 1974), hence the need to link the geographical elements of a space with the relations to that space. Therefore, approaching ICP in its physical (location of care providers) and relational (articulation of these care providers) dimensions could offer a new read of ICP. The principles of ICP are general and require appropriation by health care professionals in order to build effective and efficient territorial integrated care pathways (Everink et al, 2017; Lalani, 2020). This appropriation requires a definition of the intervention space for these health professionals (Lalani, 2020) and an open mind to multi-professional cooperation (Hamilton et al, 2015). It also requires knowledge of the health resources available in the territory and the way in which patients use them in order to reduce the fragmentation of care provision (Foglino et al., 2016). It needs the adoption of a patient centered care approach larger than only an internal medical approach (Epstein and Street, 2011). To this end, the research question of this article seeks to determine how to describe the integration of patient care pathways in their territories from a spatial approach combining the relational and geographical dimensions of the care pathway.

Indeed, the patient pathway is not only located within an institution but on a geographical territory where medical resources are not co-located.

This research has two objectives. First, on the theoretical level, its objective is to contribute to the current research on ICP by integrating the spatial approach (in its relational and geographical dimensions) related to the definition of the patient care pathway. Secondly,

our work has an empirical objective, which is to understand how to succeed in developing the ICP based on stakeholder representations and patient pathways in order to, by focusing on the medical dimensions, identify the building blocks of care pathways (management establishments, patients, General Practitioners, pharmacies, local health services) in breast cancer care.

Our work is based on the study of the totality of patients (1,798 patients) treated for breast cancer in 2017 and 2018 in a French Cancer Diagnosis, Treatment and Research Center (in French, *Centre de Lutte Contre le Cancer* - CLCC). Breast cancer is the most frequent cancer in the world according to the 2018 data from the World Health Organization with 2.09 million cases, and also in France as in most Western countries. Breast cancer is a relevant example because treatment takes place over a relatively long period of time and medical and paramedical personnel are easily identifiable (Baffert et al., 2015).

Our work combines a qualitative approach based on the analysis of CLCC healthcare professionals' discourse with a mapping approach of patient movements and available medical resources in the study area.

In this paper, firstly, we review the literature on care pathways, integrated care and highlight the interest of geographical mapping in structuring the integration of care pathways. Secondly, we present the field, the case study, as well as the research design and analytical process. Next, we show that a relational and geographical analysis of breast cancer care pathways offers an initial description of care pathways integrated into their territory, illustrated in our case study by four main categories of pathways. Finally, we discuss the theoretical and practical contributions of these results.

2. Theory

2.1. From the care pathway to the integrated care pathway (ICP)

The concept of the care pathway offers significant flexibility and effectiveness (Allen, 2009; Armitage et al., 2009) in aligning the interests of stakeholders in health care institutions (management, physicians, patients) on a practical level and more broadly considering the links between the hospital and the city on a territorial scale (Foglino et al., 2016). It is naturally linked to the concept of integrated care (Goodwin, 2013; Valentijn et al., 2013) because it is based on the principle of continuity of the pathway (Checkland et al., 2019; Pinder et al., 2005).

Integrated care is an organizing principle for care delivery with the aim of achieving improved care through better coordination of care. So when results of efforts are beneficial for patient groups, the outcome can be called integrated care (Kodner and Spreeuwenberg, 2002). Integration involves connecting all the components of the health care system (Leutz, 1999, pp. 77-78). Work on ICPs (Allen, 2009; 2014; Campbell et al., 1998; Zander, 2002) has progressively operationalized these principles of integration at the level of a clinical care pathway. In particular, they have identified the necessary ingredients for pathway integration such as organizational and professional alignment with common goals, centralized and shared information, clinical leadership, and financial incentives (Rosen et al., 2011), but the spatial dimension has been largely neglected.

The Rainbow Model for integrated care (Valentijn et al., 2017) shows the importance of interrelationships at the macro (system integration), meso (integration of organizations and professionals) and micro (clinical and service integration) levels. The meso level implies a spatial reading, i.e. one that integrates the geographical dimension in addition to the relational dimension (Torre and Gilly, 2000).

The reading of cooperation situations is, however, difficult to dissociate from the geographical approach (Cassi and Plunket, 2014; Torre and Gilly, 2000). The activation of

resources and cooperation on a given geographical territory are linked not only to the geographical proximity (time and distance) between the stakeholders but also to non-geographical proximities (Geldes et al., 2015). Therefore, cooperation between organizations and health professionals becomes central in the construction of a health system oriented towards a logic of integrated care pathways in a given territory. Although ICPs present a manifestation of the dimensions of proximity, research has moved away from the geographical issue by concentrating more on certain non-geographical dimensions. However, these two dimensions are difficult to dissociate in particular in an external and open approach to the ICP (Baffert et al., 2015).

2.2. Geographic mapping of care pathways

Maps can help to define how to develop integrated and patient-centred care services (Zander et al., 1987). Yet, little work on pathway integration uses geographic mapping as an issue or as a methodological tool for studying care integration (Lyngsø, et al., 2014; Sun et al., 2014). Most of the work uses classic investigative techniques (interviews, questionnaires, document analysis, Delphi methods) (Lyngsø, et al., 2014) even though territorial boundaries are major obstacles to the integration of care in inter-organizational contexts (Auschra, 2018).

To date, the spatial approach in health has focused primarily on the macro level on information for institutions or public health policy makers (Borell et al., 2004; Henneman et al., 2011; Shmool et al., 2014) to understand the distribution and causes of disease and the use of resources across countries and regions (Franke et al., 2017; Henneman et al., 2011). Lakhani (2020) uses the spatial approach to define priority areas of intervention against COVID-19 based on information on the populations at risk and the availability and capacity of health services. Other works proposes a spatial approach to defining the social criteria of a medical zone that makes it possible to define continuous health spaces rather than zones defined arbitrarily by administrative boundaries (Chaix et al., 2005), and then to plan the interventions of each establishment belonging to these spaces (Borell et al., 2004). This type of mapping can be useful for planning health services in a region by taking into account the distance of patients from facilities (McMeekin et al., 2014).

However, at a more micro-analytical level, the spatial approach has not been used to represent patient care pathways, even though the configuration of certain territories constitutes a significant barrier to the implementation of coordinated pathways (Walsh et al., 2010). These barriers can be due on the one hand to the geographical configuration (topography, distance, time) and on the other hand to the low density of the relationship between stakeholders. The spatial approach reconciles these two dimensions: space in its physical dimension, i.e. in its geography, with the social dimension, i.e. space as a social construct (Bailey and Gatrell, 1995). Also, beyond the simple interest of the physical (geographical) representation, the maps open the way to a spatial reading of the phenomena observed by including the social construction of space (Bailey and Gatrell, 1995). The rare uses of geographical mapping applied to targeted care pathways highlight geographical variations in patient care and follow-up (Nuti et al., 2016; Wenneberg et al., 2002). By cross-referencing patients' place of residence and the location of the establishments, Nuemi et al. (2013) identify three main types of geographical pathway: migration out of the region (regional patient migration), care carried out exclusively in the department of residence and care carried out outside the patient's department of residence (departments are french administrative entities belonging to a Region). Beyond the physical description of the pathways, the spatial reading of the pathways requires the integration of the social dimension (Nuemi and al., 2013). The Patient-Provider Geographic Map makes possible to visualize the care providers and patients on the same area (Yu et al., 2017). It can provide a basis for defining territorialized ICPs integrating both cure and care resources and patient

characteristics. However, by not integrating individual interactions (between patients and healthcare professionals), these tools limit the reading of the relational dimensions of care pathways (Cummins et al., 2007), that is, why there is an interest to consider ICPs simultaneously in geographical and relational dimensions using a spatial approach.

In the field of oncology, the French authorities (Law of 2016; Cancer Plan) prescribe the development of collaboration between healthcare professionals in a given territory according to the patient care pathway. The integration of patient care pathways in their territories is an organizational and medical ambition that is still difficult to achieve. To contribute to this aim, we are studying the case of a French cancer diagnosis, treatment and research center (CLCC). Our methodological approach combines a qualitative methodology based on discourse analysis with the mapping of patient pathways.

3. Method

Our research was exploratory in nature (Gerring, 2001; Stebbins, 2001). It concerns the CLCC located in the former region Auvergne that is now the west area of the Region Auvergne Rhône Alpes, the 2nd largest French region. After a few background information on the French health care system and cancer care, we present the case study.

3.1. Presentation of the field

3.1.1. Context of the French healthcare system

Over the last thirty years, France has attempted to better articulate medical and care resources for territories. In 2009, the HPST (Hôpital Patient Santé Territoires) law sought to organize and coordinate health actors by introducing Local Health Contracts (CLS, Contrat Local de Santé) designed to coordinate health actors and stakeholders (users, elected representatives, associations) in a given territory. In 2016, new organizational forms appeared, the Territorial hospital groups (GHT, Groupement Hospitalier de Territoires), in order to build coordinated territorial healthcare offers and the Territorial Health Professional Communities (CPTS –Communautés profesionnelles territoriales de santé). CPTS is an organizational model which initiative belongs to urban health professionals to create bridges between hospitals and urban care.

In 2016, the law for modernisation of the health system introduced a certain number of territorial coordination tools. The aim is to facilitate the coordination of health professionals through patient pathways (Deneckere et al., 2012; Lalani, 2020), the development of territorial medical teams and the implementation of territorialized care processes associating hospitals and city health professionals.

The "Health 2022" plan, launched in 2019, has reorganized the supply of care at the territorial level with the establishment of local hospitals. It introduces the gradual development of hospital financing based on the care pathway model (Campbell et al., 1998), which has been tested in many English-speaking countries (USA, Australia, United Kingdom, New Zealand). This reform marks the French government's desire to territorialize the care pathway in a context where there are few theoretical and methodological benchmarks to define what an integrated care pathway could be in its territory. It seeks to respond to an observed lack of cooperation between healthcare professionals, as noted in a report of the French Senate in 2018 (Information Report No. 195, 2018-2019), despite the implementation of coordination mechanisms with the law of 2016. There is, therefore, both a scientific and empirical challenge in identifying the main features of integrated and territorialized care pathways, which the spatial approach could help to solve.

3.1.2. Background information on cancer care in France

In France, as in many countries, the fight against cancer is a priority. Cancer prevalence figures in the population show territorial inequalities. In 2003, French President Jacques Chirac launched the first Cancer Plan to improve patient care. Three successive cancer plans have been launched (2003-2007; 2008-2013 and the last one in progress since 2014). Each plan has distinct objectives, most of which are complementary to the previous plans.

The four main objectives of the last plan are to cure more patients, preserve continuity and quality of life, invest in prevention and research, and optimize the management of organizations. Carried mainly by the National Cancer Institute (Institut National du Cancer) the Cancer plan seeks to optimize coordination between all healthcare professionals through the Regional Cancer Networks (Réseau Régional de Cancérologie).

However, by the very admission of its prescribers, this form of intra- or inter-institutional coordination remains to be perfected in terms of overall efficiency ("e-cancer 5th report to the president of the French republic", 2019, April). Coordination at the RCC level is essentially carried out between physicians and less often with all the health professionals in the institutions (nurses, orderlies, support staff), and much less so with patients.

However, it would be inaccurate to consider that there is no coordination between these actors. Every day, health workers meet with patients and their families. They coordinate with their colleagues or colleagues in partner institutions. These exchanges take place in a more or less formal way in the context of everyday interactions without any real organization depending on the care provided and patient mobility.

3.1.3. Presentation of the CLCC involved in our study and of its location area

In October 1945, CLCCs were created. They are private, non-profit health establishments totally dedicated to the fight against cancer that participate in the public hospital service in France. They are financed by health insurance and are controlled by the Ministry of Health under the same conditions as public hospitals. The particularity of the CLCCs lies in their model of comprehensive and multidisciplinary care for people with cancer. More than anywhere else, this requires interaction and communication between a variety of players. The first cancer plan in France had introduced a Cancer Communicating File (Dossier Communicant en Cancérologie), but most of the information concerns only appointment reports and the history of visits made in the establishment. Thus, CLCCs have only a very partial view of the care and movements made by its patients outside the establishment. Hovewer, this information is fundamental to develop the integration of patient care pathways and to establish links among healthcare professionnals within this territory.

The CLCC studied, founded in 1973, is one of 18 CLCCs, grouped under the aegis of the national federation Unicancer. It has 750 employees (including 180 doctors or interns) and carries out an average of 4,500 hospitalizations per year. Every year, about 30,000 patients consult the establishment's professionals and about 15,000 patients are treated or hospitalized. Breast cancer treatment accounts for 21% of the CLCC's total care - it is the main activity.

The CLCC is located in a city in the centre of France in the Puy de Dôme department, one of the four departments of Auvergne Region. Auvergne Region is characterized by a medium mountain topography and a network of small towns, some of them with local hospitals. Its population density is 20% lower than national.

The health professionals are concentrated in the Puy de Dôme department (Figure 1). The CLCC is located in the same area as the university hospital centre with which it shares material resources (technical platform) and human resources (surgeons working in both establishments). The two establishments take care of almost all cancer patients. The city also has two private clinics belonging to the same group not very involved in cancer care.

[Insert Table 1 here]

3.2. Research design

From the case of the CLCC just presented, we study how the concept of ICP is understood in a given territory by healthcare professionals and their patients. Our research was conducted in three steps. The first step was to identify and build the research materials needed to study the integration of care pathways in a territory. The second step, through coding and analysis of research materials, consists of observing the criteria for identifying the care pathways chosen by the stakeholders (patients, healthcare institutions, inner-city medicine). The third step consisted of representing on a geographical map the elements related to the different criteria observed during the second step through the study of a cohort of 1,798 patients managed by the CLCC.

3.2.1. Research design and analytical process of the 1st step

Our work is the subject of an intervention research agreement (Shani et al., 2007) with a CLCC. We collected empirical material from September 2017 to November 2019. We were associated with the steering committee of the patient pathways (CoPil, in French, *Comité de Pilotage*) by the director of the Center. This committee met five times over the period from March 2018 to July 2019. It was created at the initiative of the Center's management to reflect on the management of the patient pathway for breast cancer patients in order to improve its fluidity. It was composed of 16 people: internal and external stakeholders (Table 2). On average, about ten people were present at the 2-hour meetings that took place approximately every three months. One of the authors of the research took part in this committee and was able to attend all the meetings. She took very detailed notes in addition to recording exchanges when possible in order to write minutes shared with all committee members.

[Insert Table 2 here]

At the same time, both authors of this research took part in the desk review (Table 3) and semi-structured interviews with representatives of the physicians, executives and nursing staff of the CLCC (Table 4). The interviews focused on their activities in order to identify whether they mentioned the ICP and to assess its reality. Each interview lasted between 28 minutes and 155 minutes. They were recorded and transcribed.

[Insert Table 3 here]

[Insert Table 4 here]

3.2.2. Research design and analytical process of the 2nd step: coding and analysis

The researchers conducted a thematic content analysis on both types of materials: CoPil and semi-structured interviews. Each of the two researchers developed a coding grid as they took notes and read the transcripts of interviews (Charmaz, 2008) while relying on information from the desk research. The researchers compared their grids to stabilize the one used (Weiss et al., 2000) in order to code all the comments collected using the qualitative data analysis Software NVivo 8. Three categories of codes were used (Table 5): 1°: the approach to the patient pathway (centred on the clinical dimension - pathology, centred on the social dimension - the patient as a person); 2°: the geographical dimension of the pathway; 3°: the relational dimension of the pathway (collaboration with other professionals or with patients).

[Insert Table 5 here]

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3.2.3. Research design and analytical process of the 3rd step: cartography

The third step consists of representing in map form the different criteria for identifying care pathways in their territories revealed by relational analysis. A first work consists in representing one by one these criteria on a specific map in order to test their cartographic representativeness and their potential cross-referencing with the other criteria. A second work consists in cross-referencing all of the cartographically representative criteria in a single map that makes it possible to identify a categorization of the care pathways followed by the entire cohort of patients.

To position the health resources, we used the databases of institutions and health professionals from public agencies, whose reliability is not in question. To place the 1,798 patients in the cohort, we used their residential addresses. This address is on the medical record. The methodology for collecting patient data in this research was approved by our university's convention commission and by the data protection and ethics delegation of the CLCC. An information note explaining the research protocol was sent to patients by the CLCC to ask them not to oppose the collection and processing of their data. The maps were produced using ChronoMap software.

4. Results

Initially, the qualitative phase of our study aims to identify the manifestations of ICP from the discourse of healthcare professionals and patients. In a second step, coding the content of these speeches allows us to identify the main criteria for identifying the care pathways enumerated by facility staff or their patients.

4.1. Exploratory qualitative phase: realities and manifestations of the ICP

4.1.1. A narrow approach to the territorial dimension

An analysis of the discussions made during the steering committee (CoPil) shows that the CLCC is faced with the managerial need to "*go beyond the internal organization of care because at present, the time of contact with the institution is becoming shorter and shorter. Most of the patients' lives are spent outside the hospital*". (I4). This idea of a short period of patient presence in hospital is also very present in individual interviews: "*the time spent in hospital is relatively ephemeral because of therapeutic developments, so the patient escapes from the professionals and spends more time outside"* (I3). A first criterion for identifying integrated patient care pathways therefore concerns the location of patients outside the institution (Table 6). The establishment has essentially concentrated on strengthening the patient's trajectory by working to make care more fluid within the hospital walls, but without really integrating acts and care carried out outside the hospital. Nevertheless, the exchanges during the CoPil are clearly anchored in an approach centred on the CLCC of what it calls the care circuit or care trajectory. One oncologist says "*it's true that all these patients who come from far away, when they come we keep them, to offer them as much as possible in one day. It's a complicated organization."* (I8). And this, even for patients who arrive at the hospital already very tired from the journey: "I am *already tired when I arrive at the Center and my husband drives me*" (E1).

Even if doctors distinguish between the care pathway, which includes an external dimension of the care circuit: *"there is the temporal pathway of a day, and the global care*

pathway which integrates interactions with health and care professionals outside the centre" (I7), the action focuses on the first. This phenomenon of temporal and geographical concentration is all the more marked because when they come to the CLCC, patients also seek to benefit from supportive care or information workshops. Surprisingly, CoPil members did not mention the possibility for patients to find such care or information close to where they live, or even the possibility of being able to benefit from it at home. It is thus clear that there is a difficulty for the CoPil's stakeholders to integrate the care pathway in its territorial dimension.

4.1.2. Underdeveloped hospital-city relations

The links with stakeholders in the care pathway are primarily through the coordinating nurse, who plays a key role. She acts as a relay between the medical team and the patient. "*She acts as an interface and coordinates the care pathway. She checks that the times are on schedule and that coordination is optimal*" (I11). But it could also be the link between the CLCC and professionals from outside the establishment (general practitioners, pharmacists, private nurses), but as the care director points out: "*we only have an internal view of the patient's agenda."* (I3).

The action of the city's health service providers is largely seen from the perspective of addressing the CLCC. They turn to the CLCC for care that they could provide themselves*: "I currently see 1,500 patients a year; I hospitalize 2% of them. That's really very few. For 98% of people, we can manage at home, but general practitioners send the patients directly to us."* (I12). Patient mobility (number and type of mobility) is a criterion for identifying care pathways that is recognized as important but is not well known. Relationships are built up little by little according to the services rendered. *"We have a network, we have providers, with our colleagues in the private sector and home hospitalisation structures, I can call them to tell them what I have set up for a patient and ask them to have a look*" (I12). The location of health care professionals is another important criterion for the integration of care cited by respondents, but is often not well known (Table 6).

The director of the department's "League Against Cancer" (an association whose action covers a large part of the area studied) notes that patients who are geographically distant from the centre have difficulty finding contacts and relays close to where they live. For her, there is *"a need to consider GPs and other medical and paramedical professionals as intermediaries in areas that are geographically distant from the centre*" (E4) for the comfort of patients.

It emerges that, since hospital-city relations are considered essential, in practice, the provision of care is very much centred on the CLCC and has little integration of the external approach to medical resources that can be different depending on the type of pathology being treated. The type of pathology managed is another criterion for identifying patient care pathways outside the main institution (Table 6).

4.1.3. Essential but insufficient city-hospital relations

Despite the existence of the DCC, which allows the exchange of information between GPs and the CLCC, patients describe the link between these two interlocutors as insufficient ("*I find that my GP is not aware of it"). "Finally, she is aware, but long afterwards."* (E3). The exchanges between CoPil members show the importance of the involvement of GPs in the coordination of hospital-to-town care but also in the city-to-hospital direction, as a large part of the information passes through them. In this respect, they are a key element of an integrative approach to the care pathway. The location of healthcare professionals, in close association with the amount of patient mobility to these professionals, is here again an

important criterion for the integration of care (Table 6). In addition, the rapid evolution of cancer treatments requires highly technical information that is constantly evolving. This information is not always available to healthcare professionals in the city. The types of treatments have a real influence on patient mobility and care pathways. *"Patients experiencing the disease sometimes have a better knowledge of side effects and are sometimes more informed about the disease and treatment than their GP*" (I8). Thus, the integrated approach requires taking into account the knowledge that patients may have of their disease and treatment. The type of treatment, because it conditions patients' mobility, is also an important criterion for identifying and distinguishing patient care pathways (Table 6). The CLCC staff are struggling to break away from a model in which the CLCC strongly concentrates medical acts related to cancer care.

4.1.4. The patient's relation with his or her pathway

The patient is the essential link in his or her care, but he or she remains little listened to and his or her medical activities outside the hospital are little known. Some participants are sensitive to the need to develop the *ability to* listen to the patient as a means of orienting care: *"if we want the patient to finally participate a little in the making of the care offer and finally in the organization, we must be able to take his opinion into account. Taking care of the patient is not just a matter of reading a lot of medical information"* (I4). The idea of the patient as an actor is still not very present even if *"the patient acquires knowledge and understanding over the months of his care, because he has access to a great deal of knowledge"* (I3). The patient is seen as a central element of the operating principles, but this point raises the question of his autonomy and his ability to move around. *"Overall we have three groups of patients. I would not be able to say their percentage breakdown. But, we have patients who are completely autonomous quickly, patients who are in between, and then others who have to be carried throughout the journey. Depending on the level of autonomy, we have to see whether we are the ones who are piloting it or whether they can do it themselves."* (I4). Patient autonomy in their choices is an important criterion in the design of their care, particularly outside the health care institution (Table 6).

For those who are less autonomous, it is up to the CLCC to intervene: *"we must be able to pick up the patient, to go and get him/her at a critical moment when he/she is not here"* (I2). The qualitative analysis of the discourse highlights the need for the establishment *"to control and support the patient's progress during their care"* (I1). As indicated above, this requires a precise knowledge of the location of the patients taken care of by the CLCC and the health service providers in the patients' living area (Table 6).

[Insert Table 6 here]

4.2 Context of the mapping study

The relational approach of these discourses allowed us to identify three forms of relationships essential to the cancer care pathways in their territories (hospital-city, city-hospital, patient-course relationships) and six criteria for the integration of these pathways (type of pathology; patient location; type of treatment; patient mobility; location of healthcare professionals; patient choice – Table 6).

We carried out the mapping work by representing the different criteria identified in our relational approach based on the case of a cohort of patients (1,798 patients) treated for breast cancer for the years 2017 and 2018 in the studied institution.

4.2.1. The study sample

The type of pathology represents one of the first criteria for identifying care pathways revealed by our relational approach (Table 6). Breast cancer presents specificities that the cohort analysis studied here reveals and which frames all the maps elaborated thereafter.

As required by the regulations in force in Europe and France concerning the protection of medical data (European Union General Data Protection Regulations - EU-GPDR). We mainly have socio-demographic information on patients reduced to their age (Figure 1) and their geocoded geographical location. The 1,798 patients in the cohort studied are treated for the same pathology (breast cancer) and are between 40 and 80 years of age, which is fairly consistent with the average prevalence of this pathology. We observed a certain homogeneity of travel according to the age of the patients, notably because the French Social Security system allows 100% funding of the travel of cancer patients to their care institutions.

[Insert Figure 1 here]

4.2.2. Geographic location of patients in relation to the CLCC

Subsequently, in conjunction with the pathology studied, the other criteria used to identify the pathway revealed their cartographic representativeness and were analyzed.

First, thanks to the mapping approach, the location of patients in the study cohort can be defined in terms of travel time. This is particularly important in mid-mountain areas such as the Auvergne region, which presents very significant geographical disparities linked to the topographic relief. Analysis of the different geographical isochronous plots shows that almost all breast cancer care pathways in this institution are carried out within two hours of the institution (Figure 2 - Map 1) with a high concentration of pathways in a perimeter located less than one hour from the CLCC. Furthermore, analysis of the location of patients shows that they are concentrated around the central pole represented by the city where the CLCC is located (Figure 2 - Map 2), but also around several large peripheral poles where there are hospital support centers that provide certain types of care belonging to each of the care pathways. In addition, a significant proportion of patients are located in areas isolated from any centre. It can thus be seen that geographical mapping makes it possible, in the first instance, to make an exhaustive inventory of the diversity of constraints on patient location.

[Insert Figure 2 here]

4.2.3. Main geographical criteria for breast cancer care pathways

The relational approach of these care pathways has made it possible to identify, beyond the type of pathology treated and patient location, four other criteria for identifying the care pathways of the patients in the cohort studied (type of treatment, location of healthcare professionnals, patient mobility, patient choice; Table 6). We also make a cartographic representation of it.

Firstly, the type of treatment provided and the patient mobility in relation to these treatments are two important criteria for the geographical identification of care pathways. In the cohort studied, there were a total of 32,677 trips to the CLCC over the years 2017-2018. Radiotherapy trips represent more than 50% of the trips (17,559 trips). This is followed by outpatient trips (10,061 trips), outpatient trips for chemotherapy (4,341 trips), and finally inpatient trips (716 trips). For radiotherapy, the trips are concentrated within one hour of the CLCC (Figure 3 - Map 1). On the other hand, we note that for outpatient, ambulatory and inpatient consultations, distance is not an obstacle to travel. Patients are cared for by the CLCC, the pivotal institution in their care pathway. Travel times can be well over one hour (Figure 3 - Map 2).

[Insert Figure 3 here]

Secondly, the location of healthcare professionals and patient mobility in relation to these professionals largely shapes the patient care pathway. Rural and peri-urban areas require longer travel times, particularly to the CLCC (Figure 3 - Maps 1 and 2) but also to local health services (Figure 4 - Maps 3 and 4). On the other hand, some patients in the north of the region, far from the CLCC, have reduced access times to community health services (private nurses, physiotherapists, pharmacies). In the south of the region, in less remote mid-mountain areas, access times are longer. The topographic relief more than the distance seems to have an impact on patient travel times.

Thirdly, we found that the characteristics of care pathways may be determined by some of the choices of patients who may use GPs further away from home, particularly in urban medicine (Figure 4 - Maps 1 and 2).

[Insert Figure 4 here]

4.2.4. Categorization of care pathways in breast cancer care

Combining these criteria allows us to identify four main types of care pathways for patients (Figure 5) in the study cohort. First, "close" pathways (less than 20 minutes - category 1) and "distant" pathways (more than 60 minutes - category 4). Then, pathways differing either by a significant distance from the health care establishment (category 3) or from community medicine (category 2). The distinction between these four categories is made on the basis of the distance of the patients from the health care institution and from the local medical services (GPs, pharmacists, private nurses, physiotherapists, radiologists). In this way, these four categories integrate the relationships essential to the integration of care at the territorial level and the six integration criteria highlighted by our relational approach.

[Insert Figure 5 here]

5. Discussion

By carrying out a geographical and relational analysis of patient pathways, our work offers two types of contribution. First, our theoretical contribution focuses on the spatial approach (geographical and relational) of care pathways for their full integration in their territory. Secondly, on a practical level, by characterizing four types of care pathways in breast cancer, our study offers the managers of this CLCC the first elements of a progressive approach of ICP to their territory.

5.1. The relational dimension inseparable from the geographical approach

Our study provides empirical evidence that the interindividual relationship is the basis for the implementation of integrated patient pathways beyond the purely institutional approach linked to political orientations. Our work highlights the difficulty of moving from a management approach focused on the establishment of reference to an approach to management that is co-constructed and shared by all the health actors in the patient's life territory (Huby and Rees, 2005). This can be explained by a very partial knowledge of the territorial health ecosystem and the resources that can be mobilized (Allen, 2009; Vanhaecht et al., 2007).

Furthermore, our work highlights an imbalance in the relations between hospital professionals and health actors in the city to the benefit of the former, which does not allow for the fruitful collaboration that the idea of the patient pathway carries (Deneckere et al., 2012). This finding corroborates both the work on the fragmentation of healthcare provision

(Goodwin el al., 2017) and that on the excessive importance of temporality in the management of cancer care pathways (Pedersen and Obling, 2020). The case studied here allows us to formulate the hypothesis that a better knowledge of the health actors on the territory and their location is a prerequisite for the development of ICPs for an open approach to the care pathway and a truly patient-centred pathway. Our results show that in order to build efficient ICPs, it is important to read the relational but also geographical proximities between healthcare stakeholders.

Finally, our results shed new light on work on the geographical conceptualisation of care pathways (Nuemi et al., 2013; Nuti et al., 2016; Yu et al., 2017) by showing the need to integrate inter-individual relations in the analysis of spatial collaborations and the limits of a prescriptive approach of collaboration that health authorities might be tempted to adopt.

5.2. Towards territorialized ICPs

The initial categorization of breast cancer care pathways we propose here allows us to identify the role of geographic mapping in the development of integrated cancer care. Indeed, while many attempts have been made to shed light on the elements and conditions of integrated care systems, the mechanisms that make it possible to achieve the objectives for which integrated care is pursued have not yet been systematically studied in scientific literature (Van der Klauw et al., 2014). The result is a tangle of autonomous integrated care initiatives that do not provide a common and accurate basis for practitioners (Van der Klauw et al., 2014). The spatial identification of care pathways on their territory makes it possible to measure the level of integration of care for cancer patients by comparing the geographical location of the pathways and those of patients that analysis by pathology tend to make disappear. This offers opportunities for triangulation of the relational, medical and spatial perspectives of care pathways, making it possible to objectively assess the issues at stake but also the difficulties that these pathways suggest. Our work contributes to the definition and structuring of this approach by proposing a relational and geographical method to map the care pathways of a patient cohort. Indeed, healthcare pathways integrating a set of stakeholders in a given area require the mobilization of relationships adapted to the integration of care and accessible resources. The identification of four major types of care pathways that we have carried out in this study opens the way to a more precise identification of care pathways outside the institutions and their integration at the level of their territory. This makes it possible to reveal the collaborations that can reasonably be developed around these pathways (Nuemi et al., 2013) as well as the tools that can feed these collaborations as telemedicine, teleconsultation or the hub-and-spoke network (O'Kelly, 1998).

6. Conclusion

By taking a relational and geographical approach to patient care pathways, this research identifies the focal points needed to develop a genuine managerial approach to care pathways within and outside hospitals. Our study presents three significant contributions.

Firstly, we contribute to the literature by demonstrating the value of integrating relational and geographical dimensions into a spatial approach to care pathways in order to federate stakeholders around the definition and design of truly patient-centered care pathways. In our study, this relational and geographical approach allows us to identify four types of care pathways. Secondly, our study allows us to develop and apply a novel methodology for mapping integrated care pathways in their territories based on a spatial approach (relational and geographical). Thirdly, on a practical level, our study highlights the need to move away from a very hospital-centric culture to ensure the harmonious integration of all city and hospital stakeholders in the care process, but as we know, this evolution takes time.

A first limit to our contributions lies in the exploratory nature of our spatial approach, which will have to be applied in other health contexts, notably to test its replicability. A second limitation stems from our lack of knowledge of the perceptions of non-hospital healthcare professionals (general practitioners, pharmacists, physiotherapists, private nurses) and social workers (social assistants, psychologists, dieticians, etc.) whose opinions must be taken into account to develop our knowledge of the relationships they consider necessary for the integration of care pathways.

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Figure 1. Age of patients in the study cohort

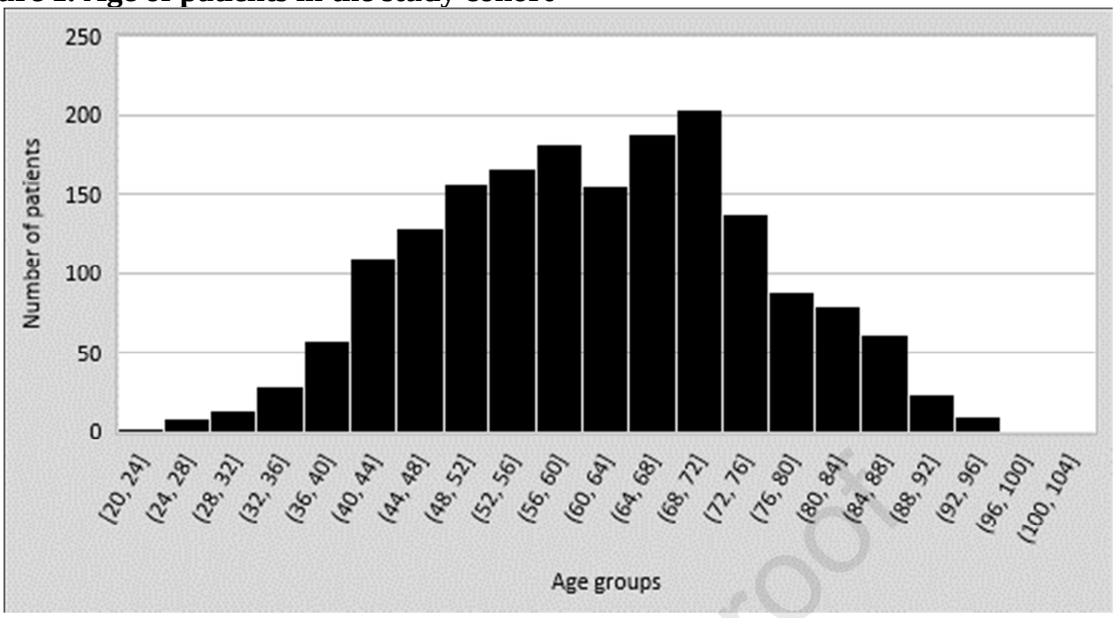
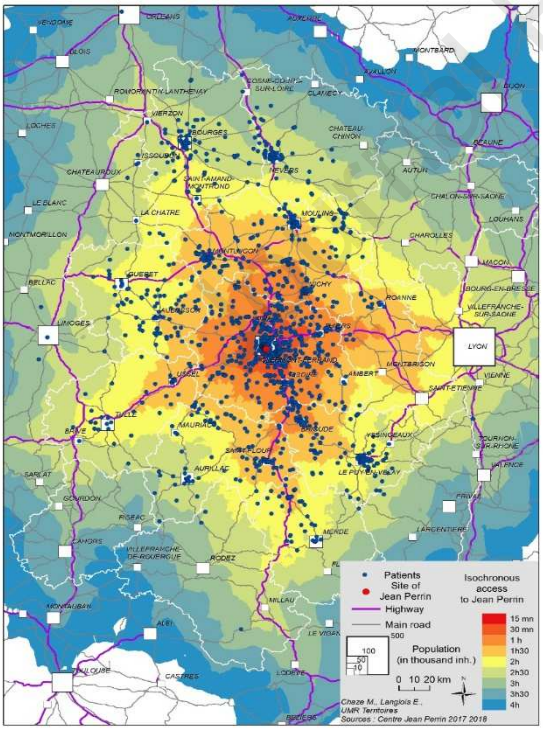


Figure 2: Mapping of patient location in the study cohort

Map 1.
Location of patients according to their access time to the CLCC



Map 2.
Patient location in urban zoning

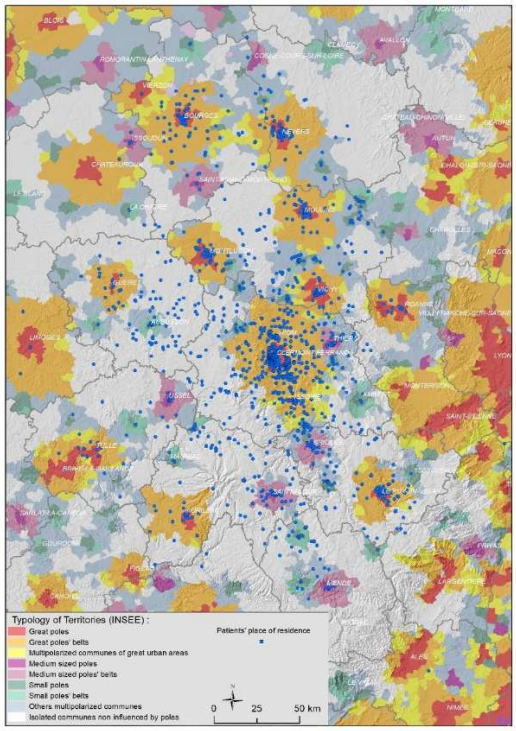
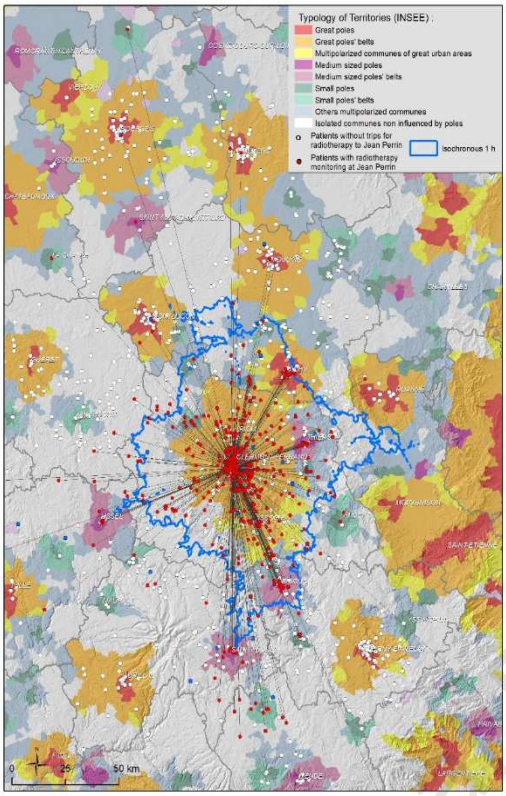
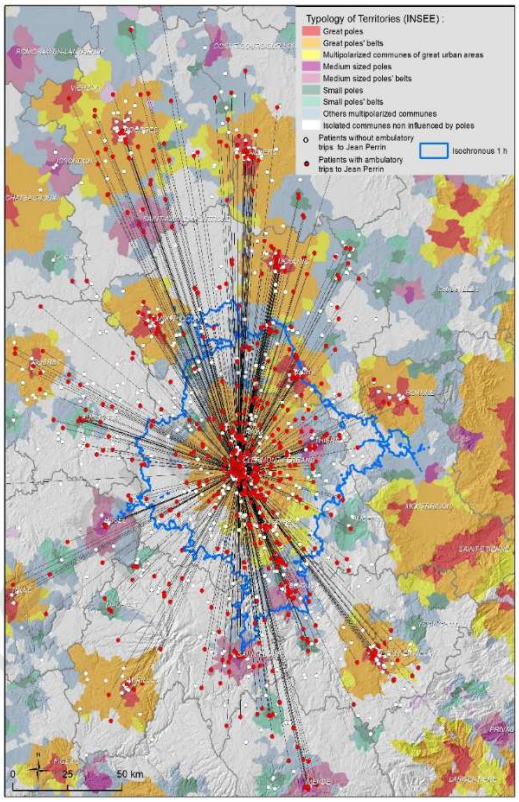


Figure 3: Mapping mobility as a function of treatment

Map 1.
Flow of patients treated in radiotherapy at the CLCC



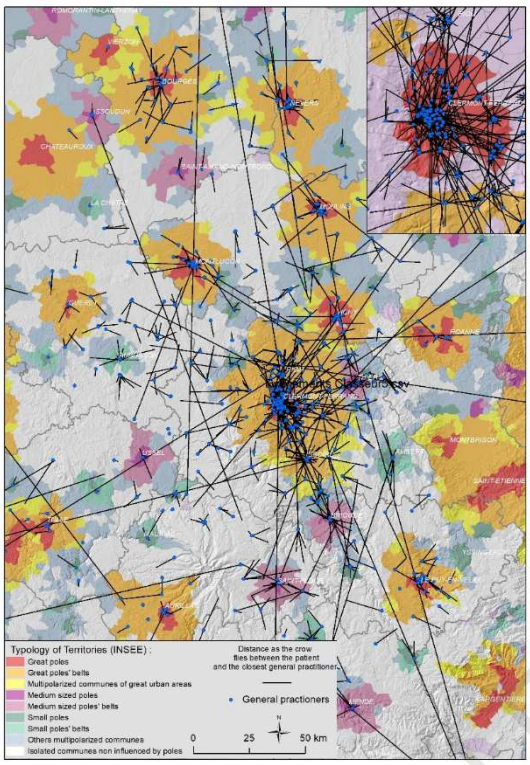
Map 2.
Flow of patients treated as outpatients at the CLCC



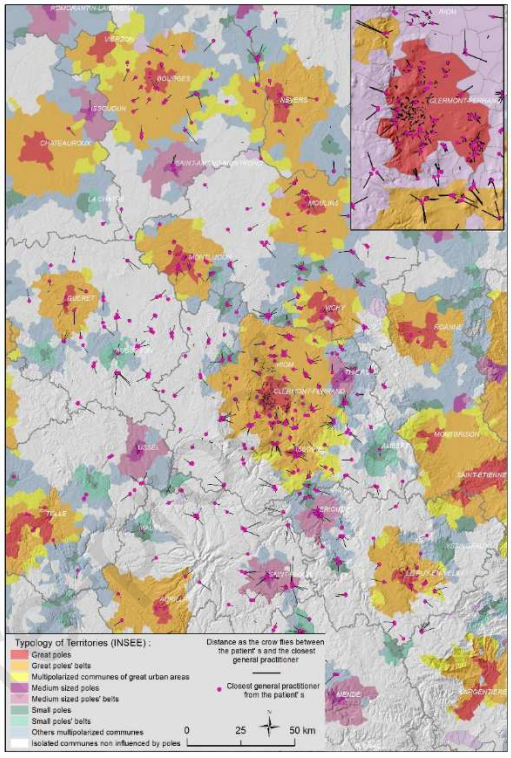
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Figure 4: Mapping of patient mobility to community medicine

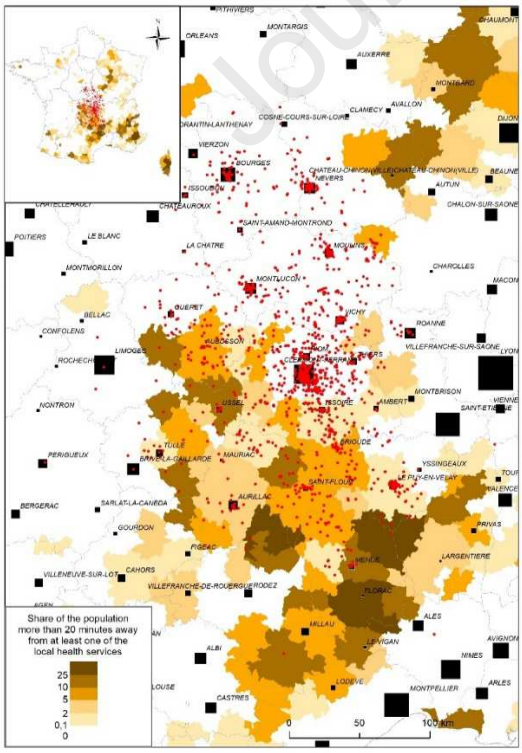
Map 1.
Flow of patients to their GPs



Map 2.
Theoretical flow of patients to the nearest GP



Map 3.
Location of patients based on accessibility to community health services



Map 4.
Patient accessibility to the nearest pharmacy

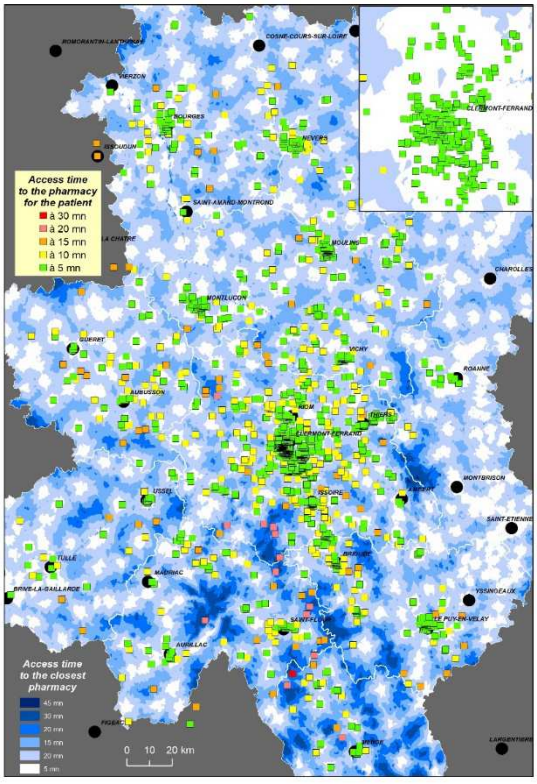
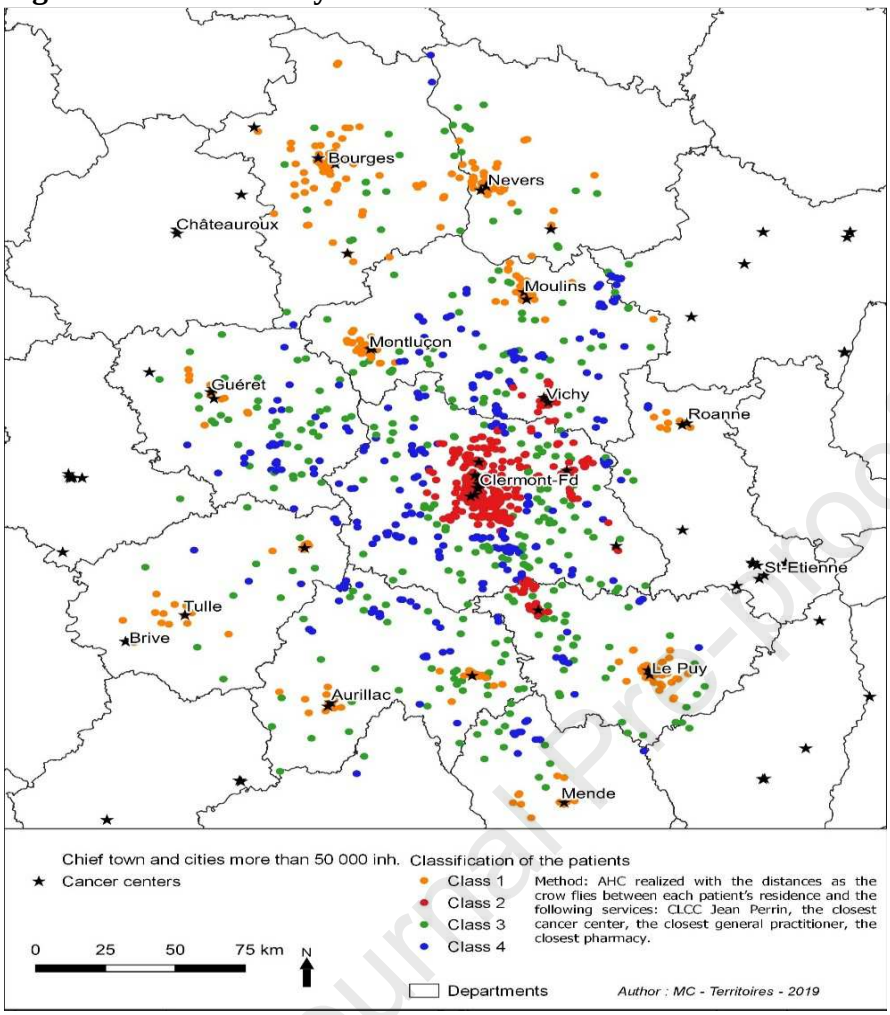


Figure 5. Care Pathways for Breast Cancer Patients at the CLCC



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Highlights

- Cancer care pathways extend beyond the boundaries of care facilities
- Their integration in their territory is analyzed in a disorganized manner
- We study a cohort of patients of a French senology service
- We construct a spatial approach (relational and geographical) of their pathway
- The application of this methodology identify several forms of integrated care pathways

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Table 1. Numbers of private and hospital health professionals in the four departments of Auvergne Region in 2017

	Department an number of inhabitants for 2020 (https:/ville-data.com/)			
	Puy de Dôme 660,240	**Allier 331,315**	**Haute Loire 226,901**	**Cantal 142,811**
- Specialist physicians	**554**	**253**	**94**	**84**
- Medical oncology	5	0	0	1
- Radiodiagnosis	49	34	10	7
- Radiotherapy	2	5	2	2
- Medical gynaeocology	23	8	3	3
General Practitioners	**670**	**318**	**223**	**149**
Pharmacists (per 100,000 inhabitants)	**51**	**56.8**	**48.8**	**66.2**
Liberal nurses and nurses sharing time with hospital	**1422**	**711**	**601**	**306**

Source: French Ministry of Solidarity and Health, http://www.data.drees.sante.gouv.fr

Table 2. Composition of the Patient Steering Committee (CoPil)

Internal stakeholders (I i)	External stakeholders (E i)
-Chief Executive Officer (I1) -Deputy Director (I2) -director of care (I3) -Director of Medical Information and Quality and Risk Management (I4) -Head of IT Services (I5) -Head of Logistics Services (I6) -3 medical oncologists (I7, I8, I9)	-3 patients (E1, E2, E3), one of which is located near the centre and 2 more distant. -Director of the League against cancer (E4) -2 teacher-researchers attached to a research center in the humanities and social sciences

Table 3. Desk research

Internal document	External document
-Activity reports 2017, 2018 -Settlement projects 2014-2018, 2019-2023 -Patient Welcome Booklet	-Cancer Plan 2014 -Unicancer annual reports Regional Health Agency: Lexicon of routes from A to Z 2016 - e-cancer 5th report to the President of French Republic, 2019, April - High Health Authority, patient pathway - French Senate report (Information report N° 195, 2018-2019)

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Table 4. Interviews

Persons status	duration
Director of Care, (40 years of hospital activity, initially trained in various positions in hospitals in France and abroad). Manages 400 people. (I 3)	1h 05
Oncologist (at the centre since 1982) in charge of numerous cross-functional functions (quality, risks) (I 4)	1h 20
Head Surgeon (I 10)	48 minutes
Executive nurse anaesthetist department (supervision of 100 paramedics, medical and technical staff, radio manipulators) (I 11)	58 minutes
Doctor in charge of the unscheduled entry units for 8 years (20 years of general medicine) (I 12)	53 minutes
Deputy Director (I 2)	2h35
Resuscitation nurse since 2004 (I 13)	28 minutes

Table 5. Coding grid

Coding Category	Coding Sub-Category
General approach of the patient care pathway	Clinical dimension (pathology)
	Social dimension (patient)
Geographical approach of the pathway	Medical dimension
	Geographic dimension
Relational approach of the pathway	Relations with health professionals
	Patient relations

Table 6. The criteria for identifying care pathways in their territories

Coding Category	Coding Sub-Category	Care pathway integration criteria
General approach of the patient care pathway	Clinical dimension (pathology)	Type of pathology
	Social dimension (patient)	Patient location
Geographical approach of the pathway	Medical dimension	Type of treatment
	Geographic dimension	Patient mobility
Relational approach of the pathway	Relations with health professionals	Location of health care professionals
	Patient relations	Patient choices

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