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The work and information practices of allergy professionals: characteristics, enactment, implications [preprint]

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Abstract

Introduction. This study investigates how the work of allergy professionals influences their information practices. Allergies represent a major public health issue, and both allergology and the professionals practicing it have received little attention in information-seeking research.

Method. Our research was based on 20 interviews and 16 observations on the information practices of 39 professionals working in an allergy unit of a French university hospital.

Analysis. We ran a thematic content analysis through the Cognitive Work Analysis framework.

Results. Allergy professionals' activities are driven by multiple, overlapping goals leading to sequential, nested, and simultaneous information-seeking and information-management practices, all deeply embedded in their daily work. These practices rely on dense and interwoven information targets, needs, and resources. They are further shaped by the temporal, spatial, personal, and organisational conditions in which allergy tasks are performed, as well as by specific attributes of the activity itself—such as its multidisciplinary nature, potential iatrogenicity, and hierarchical authority.

Conclusion. The complexity of the work of allergy professionals requires to continuously adapt their information practices to diverse contextual factors across varying situations and environments. This adaptation demands several abilities: situational awareness, selective attention, prioritisation, reinterpretation, calibration of information representation, sociability, cross-disciplinary reasoning, and sophisticated decision-making.

Introduction

Allergies have become a major public health concern, both for care and prevention, with substantial impacts on individuals' quality of life. This growing epidemic affects up to 20 percent of the general population, and its prevalence continues to increase (Matricardi, 2014). Allergology—the domain related to the study, diagnosis, and treatment of allergic diseases—has been recognised as a medical specialty in many countries (Fyhrquist et al., 2019; World Allergy Organization, 2025). In France, however, it was formally recognised only in 2017, and both the nature of the work and the associated information practices in this domain still lack visibility (Author, 2023b; Demoly, 2017). Our doctoral research (Author, 2023) was therefore undertaken to identify and better understand the information work (Huvila, 2006) in this domain, and to make it visible and valued in light of its societal impact.

The information activities of healthcare professionals are occupying an increasingly significant place in their work and are becoming progressively more complex (Author, 2023a). Numerous factors may influence these activities—cognitive (Sundin, 2001), demographic (Naeem & Bhatti, 2016), affective (Fourie, 2009), organisational (Nordsteien, 2017), as well as those related to work activities and tasks (Isah, 2012). *Taks-oriented* researches conducted in healthcare settings commonly show that information interactions are prompted by and enable the work activities of professionals (Clavier, 2023; Haigh, 2006; Isah & Byström, 2017; Landry, 2006; Leckie et al., 1996; Mounier & Paganelli, 2009; Roos, 2012). However, detailed descriptions and analyses of the complex nature of healthcare work—and of how this influences information use, particularly in the domain of allergology—remain scarce in the existing literature. Consequently, our analysis aims to examine how the characteristics of allergy professionals' primary activities enact their information practices, and with what implications.

Literature review

Studies examining the information-related activities—such as searching, producing, processing, and sharing—of healthcare professionals fall within the broader field of *health information-seeking* (Lambert & Loiselle, 2007). Research in this area contributes to a deeper understanding of the use and role of information within healthcare work contexts. Specific occupational groups—such as physicians, nurses, and surgeons—have been analysed across various medical specialties, including—for instance— ophthalmology, paediatrics, internal and general medicine, dermatology, dentistry, and nutrition (Clavier, 2019, 2023; Isah & Byström, 2017; Landry, 2006; Le Cleach et al., 2016; Mounier & Paganelli, 2009; Nordsteien, 2017; Paganelli, 2017; Woolf & Benson, 1989).

Information activities of allergy professionals: an underexplored topic

The information interactions of allergy professionals have received no attention within the field of information science, and only limited interest from medical researchers. The literature authored by allergists themselves tends to include non-empirical contributions, often comprising opinion pieces and reviews of information and communication technologies, trends, and digital resources that may support allergy practice (Alvarez-Perea et al., 2018; Bell, 1996; Carlisle et al., 2020; Dimov & Eidelman, 2015; Gupta et al., 2024; Masson & Dutau, 2016; Taylor et al., 2019). Two netnographic studies examine the use of Twitter for allergists' professional purposes (Fenny et al., 2012; Mehrotra & Dimov, 2013).

Existing literature suggests that both hospital-based and private allergists seek and use information to make diagnoses, prescribe treatments, answer patients' questions, update and disseminate their knowledge, and manage their daily practice (Alvarez-Perea et al., 2018; Dimov & Eidelman, 2015; Fenny et al., 2012; Masson & Dutau, 2016; Mehrotra & Dimov, 2013). They search for information both outside consultations and in the presence of patients (Masson & Dutau, 2016).

A variety of resources is available to them, including scientific and professional journals, dictionaries, and databases, institutional websites, professional training materials, general and specialised search engines, social media, digital health applications, and medical congresses (Dimov & Eidelman, 2015; Fenny et al., 2012; Gupta et al., 2024; Masson & Dutau, 2016). In relation to the documentation of allergy activities, such as medical records, both paper-based and digital formats are still in use (Carlisle et al., 2020). Furthermore, allergists use email and online calendars to communicate with patients and schedule appointments, and they employ specialised software to access laboratory tests results and manage treatment prescriptions (Masson & Duteau, 2016).

Existing studies focus exclusively on allergists and do not consider other occupational categories working in allergology, such as nurses and medical secretaries. Moreover, there is limited knowledge about the work roles and activities in allergy units, as well as about the contributions and repercussions of professional situations on information-related work. There is also little research on the different processes involved in working with information or on information resources and documentation actually used by allergy professionals to perform their activities. These questions were addressed and empirically examined in our study, as part of a doctoral thesis in Information, Communication and Documentation Sciences, funded by the Occitanie Region of France between 2019 and 2023 (Author, 2023b).

Activity-oriented research in the field of health information-seeking

Studies in the field of health information-seeking are often situated within specific contexts (Lambert & Loisel, 2007). *Context* can be considered as both a theoretical and an empirical construct, shaped by the researcher's specific purpose: to situate collected data within a professional reality, to generate and apply analytical variables, or to refine and assess existing findings and models (Courtright, 2007; Paganelli, 2016). In research examining how healthcare professionals use information, the contextual factors typically fall into four main dimensions:

- 1) *actors within organisations*, together with variables linked to their situation—cognitive (e.g., work role, status, identity, expertise, universe of knowledge, know-how), demographic, and affective (Fourie, 2009; Gallagher & Olsson, 2019; Landry, 2006; Naeem & Bhatti, 2016; Nordsteien, 2017; Sundin, 2001);
- 2) *work activities and related tasks*, which form the basis of professional information needs and uses (Clavier, 2023; Isah & Byström, 2017; Landry, 2006; Mounier & Paganelli, 2009; Roos, 2012);
- 3) *the informational environment*, composed of documents and technological tools that organise the communication, access, and flow of information (Borycki et al., 2009; Isah & Byström, 2020; Morquin & Ologeanu-Taddei, 2018);
- 4) *the socio-organisational environment*, encompassing rules, norms, policies, procedures, resources, networks, and cultures developed within the workplace (Clavier, 2019; Lekic-Savatic & Lezon-Rivière, 2022; Nordsteien, 2017; Perley, 2006).

Researchers often focus on one of these factors or combine several within the same study. In line with the second, *task-oriented* dimension (Byström, 2007), many investigations explore the relationship between work activities and professionals' need to access, manage, and make sense of information in the course of their daily practice.

Models of information-seeking in the context of work (Byström & Järvelin, 1995; Leckie et al., 1996), along with studies analysing occupational activities in healthcare settings (Clavier, 2023; Haigh, 2006; Isah, 2012; Isah & Byström, 2017; Landry, 2006; Mounier & Paganelli, 2009; Pilerot & Söderholm, 2019; Roos, 2012), show that information activities are both triggered by—and in turn enable—the core responsibilities of professionals. For physicians, information work underpins patient care, research, teaching, administrative tasks, and responses to patient inquiries (Clavier,

2023; Isah & Byström, 2017, 2020; Mounier & Paganelli, 2009). Their information interactions are enacted through the activities such as diagnosing patients, prescribing treatments, writing scientific papers, and managing healthcare reimbursements. These tasks are influenced by multiple contextual factors—including situational (e.g., urgency) (Pilerot & Söderholm, 2019), personal (e.g., cognitive or demographic characteristics) (Landry, 2006), and organisational (e.g., hospital hierarchies, culture of sharing) (Isah & Byström, 2017; Lekic-Savatic & Lezon-Rivière, 2022; Mounier & Paganelli, 2009). Each of these factors generates specific information needs and uses (Isah & Byström, 2017, 2020). General practitioners, for example, who mainly treat common diseases, tend to keep themselves informed about general medical news, whereas hospital specialists, who deal with specific or rare conditions, are more likely to consult research updates (Author, 2023a). The type of task associated with a work role may also guide information activities: dentists engaged in patient care prefer different documentary resources from those used by dental students or educators (Landry, 2006). Task complexity (Campbell, 1988) likewise influences information use (Byström, 1999); in physicians' work, increasing complexity tends to heighten reliance on human expertise (Gorman, 1995).

To analyse how healthcare work influences information activities, some researchers (Isah, 2012; Isah & Byström, 2017; Roos, 2012) draw on cultural-historical activity theory (Engeström, 1987; Leont'ev, 1978). According to the triadic hierarchical model of activity–action–operation, actors' main activity comprises a set of actions, among which information-related actions are regarded as subordinate '*lower-level of actions and operations*' that contribute to the broader activity (Roos, 2012). We consider that information activities should be understood not as subordinate sub-tasks within broader work tasks, but rather as '*independent*' activities that support and facilitate the performance of primary work activities, arising and depending from the principal work (Paganelli, 2013; Vakkari, 2003, p. 417). This activity-oriented perspective was consequently applied to examine allergy professionals' information practices. In light of existing research, we sought to identify and characterise which work-related contextual factors—and how task complexity—shape the practices of this occupational group.

Theoretical framework

To analyse the primary activities of allergy professionals, we adopted the view of *activity* as a conscious and purposeful form of doing, performed within a specific context and shaped by participation in a social practice (Leont'ev, 1978; Engeström, 1999; Kuutti, 1996). Consequently, *work tasks* were understood as purposeful sets of concrete, cognitive, physical, and dynamic interrelated actions—'*units of activity*'—that have a meaningful goal and a clearly identifiable beginning and end (Byström, 2007; Fidel & Pejtersen, 2004; Paganelli, 2016; Stammers & Shepherd, 1995, p. 148; Vakkari, 2003). The notion of a *work task* was seen as closely related to that of *work* itself, the latter conceptualised as '*an upper-level activity that ties individual work tasks together and makes them work tasks instead of mere tasks*' (Huvila, 2006, p. 21).

Our analysis focused on several dimensions of the task: teleological, human, organisational, material, operational, and temporal (Byström, 2007; Fidel & Pejtersen, 2004; Paganelli, 2016). Each task typically involved one or more objectives to be achieved and decisions to be made, along with requirements concerning the quality of outcomes, priorities, assessment methods, and resource constraints. We also examined the conditions that guided task performance—whether the task was carried out individually or collectively, and whether it involved internal or external actors—as well as sequential and temporal factors, including task flow, duration, rhythm, and repetitiveness. Additionally, we analysed the position each task occupied within the organisation, defined by its articulation with other activities and its relative importance. In carrying out these tasks, actors played different roles. A *role* was understood as the relationship between a task—or, more broadly, the work—and the actors who perform it (Huvila, 2006). The development of roles was linked to the functioning of the organisation—its hierarchical structure, relationships, collective

responsibilities, and personal intentions—as well as to temporal factors, such as the evolution of tasks over the course of a career (Paganelli, 2016).

To analyse the information practices of allergy professionals, we developed an activity approach accordingly to an interpretivist, actor-oriented paradigm of information-seeking (Ingwersen & Järvelin, 2005). This conceptual stance led us to view their information activities as human and social practices that are situated in—and enacted through—the material and social circumstances of their work context (Suchman, 1987). Such a perspective enabled us to analyse the processes arising from the mutual interactions between allergy employees and their work environment in specific daily situations. We examined the point of view of these actors on their work activities at both individual and social levels, as well as in relation to their informational and socio-organisational environments (Paganelli, 2016). We also considered that professionals continuously produce and interpret their own information activities through ongoing communication, thereby shaping, maintaining, and reproducing their work context (Béguin & Clot, 2004). Consequently, information activities were not viewed as static, rule-bound components of work, but as contextually adaptive, meaning-making processes embedded in professional practice.

These assumptions guided our empirical analysis of the context surrounding information practices of allergy professionals. Through studying information practices, our objective was to understand *'the way in which devices, formal or informal sources, tools, [and] cognitive skills are effectively used'* by allergy employees *'in different situations of production, research, organisation, processing, use, sharing, and communication of information'* (Chaudiron & Ihadjadene, 2010, §7). Practices were understood as encompassing the uses, behaviours, attitudes, and representations of individuals, related to information and communication tools, resources, and processes (Jouet, 1993).

Method

The study was conducted in 2020–2021 in an allergy unit of a university hospital in France. The hospital employs approximately 11,000 staff members, has a capacity of 3,000 beds, and comprises five hospitals, three specialized centres, and several additional facilities. Importantly, allergy professionals were already familiar with us, as we had been working in the unit for a year prior to the study as a research associate. This earlier experience enabled us to build trust with the staff and to develop a preliminary, reflexive, and broader understanding of the work processes, organisational dynamics, and domain-specific knowledge.

Participants, recruitment and consent

A total of 39 participants took part in the study. These included 33 physicians—comprising 11 attending doctors (five hospital practitioners, one research doctor, four junior specialists, one part-time doctor), 22 residents and students (14 interns, seven trainee doctors, one medical student)—as well as six members of the healthcare support staff (one nurse, one nursing assistant, one childcare worker, one medical secretary, one clinical research nurse, one clinical study coordinator) from the allergy unit. All participants provided informed consent. The study received formal approval from the hospital Ethics Committee (IRB-MTP_2021_05_202100824) and was registered on ClinicalTrials.gov (NCT04887441). Personal data appearing in the survey corpus were anonymised, and all collected data were stored on a secure server maintained by our university.

Observations

We employed methods grounded in a qualitative research approach (Cisek, 2013). As a first step, we conducted a case study to analyse the information practices and interactions of professionals in actual situations of their daily work, focusing particularly on collective meetings. In total, we carried out 16 observations: eight journal club meetings, devoted to the presentation and critical

analysis of recent scientific articles and conference presentations, and eight clinical meetings centred on the presentation and discussion of patient medical records.

An observation grid was developed to guide data collection, structured into two categories. The *Practical Modalities* category captured contextual features of the meetings, including time benchmarks and task durations, the practical organisation of the meeting, the configuration of space, and the position occupied by participants. The *Forms of Interaction* concerned the informational and communicative aspects of the meetings, including: (i) the information presented (theme, actor communicating it, and communicative purpose); (ii) resources (documents, tools); (iii) ways of using information; (iv) speaking and discussion patterns (who addresses whom, and on what basis); and (v) the relationships established between participants.

During the observations, we recorded both verbal and non-verbal interactions between participants. Notes were taken in condensed form, aiming to transpose situations, objects, themes, and specialised terminology as faithfully as possible.

Interviews

Following the observations, 20 semi-structured interviews were conducted with professionals working in the allergy unit. The interview guide was developed on the basis of a review of information trends and activities in healthcare (Paganelli, 2018)—and more specifically in allergology (Alvarez-Perea et al., 2018; Bell, 1996; Carlisle et al., 2020; Dimov & Eidelman, 2015; Gupta et al., 2024; Masson & Dutau, 2016; Tanno et al., 2016; Taylor et al., 2019)—combined with insights from our case study. It consisted of 14 questions grouped around themes relating to the context of information searching and management, to allow professionals to describe practices in their own terms. The main categories were connected to both routine and exceptional cases:

- professional context: role, status, activities, workplace;
- information-seeking: type of information sought, accessibility, documents and devices used, ways of consulting documents, evaluation of reliability and quality, and time spent on each task;
- document and database practices: production, processing, storage, archiving, dissemination, sharing, searching, and access;
- data use: situations leading to the exploitation of data corpora, types and origins of data, tools used for processing, and methods of evaluation; practices related to big and open data;
- other practices: medico-economic and epidemiological coding; awareness and use of existing knowledge organisation systems in allergology.

The interviews were conducted on-site in the offices and archives. The interviews lasted an average of 47 minutes, ranging from 25 minutes to 1 hour 45 minutes. All interviews were recorded with a dictaphone and subsequently transcribed using NVivo Transcription® software.

Data analysis

In total, observation reports amounted to 19,470 words, and interview transcripts to 121,203 words. The accuracy of specialised terminology, medical situations, and themes in both observation notes and transcripts was validated by professionals from the unit.

We carried out a thematic content analysis to identify significant ideas within fragments (words or sentences) drawn from observation reports and interview transcripts, to categorise them into themes, and to interpret them. The categories were constructed and readjusted several times

during the reading process. For data categorisation, we relied on the Cognitive Work Analysis (CWA) model, developed to examine individuals' interactions with information within work contexts (Fidel & Pejtersen, 2004). The CWA framework enabled to structure our analysis around the *Activity analysis* dimension, focusing on the actions undertaken by allergy professionals to accomplish specific tasks:

- *in work domain terms*. Examination of the daily tasks, considering the professional objectives achieved through information use, as well as the constraints, priorities, functions, processes, and resources mobilised;
- *in decision-making terms*. Analysis of the types and processes of decisions made by actors in the course of their activities. The focus was placed on the nature of these decisions and the information required to support them, the methods of evaluation employed, the documents and tools used for information searching, and the availability—or absence—of information necessary to accomplish the task;
- *in terms of information-seeking and use strategies*. Examination of the strategies employed to find information supporting decision-making, including mobilised documents and tools mobilised, types of carried out searches, and modes of document consultation.

The leading dimension was situated within, and constrained by, other dimensions operating at the mezzo and macro levels:

- *organisational analysis*: focused on how tasks are distributed among actors and on the nature of their work. Elements considered included organisational structure, management style, organisational culture, and the allocation of roles;
- *work environment analysis*: examined external factors influencing the domain of allergology, including discourses, bodies of knowledge, public policies, publishing trends, and professional events.

The activity dimension, in turn, shaped practices at the micro level:

- *resources and values analysis*: analysed the actors' resources and values. Elements considered included professional status, role, goals, domain-specific experience, expertise, training, and knowledge, as well as documentary preferences.

The results of the analysis were reviewed by a hospital practitioner of the allergy unit, who verified the accuracy of medical concepts, terminology, and situations.

Findings

A wide range of situations trigger information work of allergy professionals, including clinical care, scientific and clinical research, training, the provision of expert opinions, as well as administrative and managerial responsibilities. The nature of these activities and their associated tasks—along with the conditions under which they are performed and their specific attributes—influences how allergy-related information is sought and managed, including its production, processing, archiving, dissemination, and sharing.

Practices driven by multiple and overlapping goals

The work activities of allergy professionals involve both physical tasks (e.g., performing a skin test) and cognitive tasks (making diagnostic decisions or supervising students' doctoral research). These activities are driven by multiple and overlapping goals, summarised in Table 1 (Appendix A). Clinical tasks—including patient case analysis and various processes of allergy investigation and treatment—simultaneously aim to deliver patient care, coordinate with other specialists, ensure legal and clinical traceability, support the teaching and learning of junior staff, and contribute to

research. Research-related activities, including managing and executing research projects, as well as writing and publishing academic work, serve several purposes at once: producing and disseminating scientific knowledge, improving clinical practice, progressing in professional and academic careers, fulfilling training requirements.

The allergy activity encompasses a wide spectrum of conditions—food, drug, respiratory, skin, occupational, and insect allergies—affecting diverse patient populations, including infants, children, adolescents, adults, and older patients from different hospital units and various parts of the region. It also involves multiple physiological systems and body parts that are affected by allergies and their comorbidities. This plurality of care targets significantly increases the complexity of professional goals and tasks. For instance, the approach to allergen immunotherapy for respiratory allergies is different in a child than in an adult, and venom immunotherapy cannot be delivered in the same manner as food oral immunotherapy. Similarly, the management of a young patient with food allergy requires an integrated view across several disciplinary perspectives: allergology, pneumology, gastroenterology, paediatrics, and psychology. If allergic patients are hospitalised in other units—for example, in oncology—their medical care must take into account both allergy-related comorbidities and the patient's overall healthcare pathway.

Clinical heterogeneity also affects research activities. Professionals design studies that focus on finely delineated patient subgroups, such as *'peanut allergy in children aged 5 to 11 who are sensitised to specific proteins, who do not have asthma, and who have never moved out of the region'*. Such precision is essential to isolate relevant variables, identify patterns, and generate clinically actionable knowledge.

Sequential, nested, and simultaneous information interactions

Numerous and overlapping goals in the allergy professionals' activity render their information practices sequential and nested, with one activity naturally leading into—or becoming embedded within—another. For example, clinical information collected to manage a patient case may later support different goals: traceability-information tasks (writing medical reports, nursing notes, coding procedures), writing and publishing a case report in a specialised journal, updating professional knowledge, or illustrating an educational point during teaching sessions with students or private allergists. In this way, informational outputs generated for one purpose become inputs and resources for subsequent tasks. Allergy professionals therefore continuously change their roles (information seeker, producer, sharer, etc.) and recontextualise information, adjusting its meaning, granularity, and relevance to new situations, objectives, resources, and audiences.

Similarly, the clinical databases developed within the unit compile data on patients, allergens, and clinical events performed in the service: tests, treatments, reactions, symptoms and risk factors. These data are repeatedly (re)used in line with multiple objectives: answering punctual clinical or research questions (e.g., *'What threshold amount of cashew proteins is typically ingested during an oral food challenge?'*), forming patient cohorts for various studies, or evaluating the unit's current activity and performance metrics. As one attending physician explained: *'You just have to find the right angle. It's the same data, but each time you look at it differently'* (attending physician). This versatility of data also applies to scientific information:

We try to see what has been published in the literature to understand what other teams are doing. We then adapt it to our population, our methods, our staff, the equipment, and the resources available in our hospital. We always strive to improve our algorithms, protocols and technical procedures based on the experience of national and international colleagues, but also according to what we can realistically implement in our daily practice (another attending physician).

Doing so requires making decisions about which sources to prioritise, how to interpret and adapt them in relation to the specific goal and available resources, and how to represent and share them appropriately.

Moreover, information practices support the simultaneous pursuit of multiple goals. The coexistence of clinical, educational, and research activities generates overlapping and sometimes competing demands. During a food allergy clinical meeting, for example, residents and students analysed clinical cases from patient records and summary sheets while simultaneously recording the discussion on a dictaphone, taking notes in their notebooks, and searching information about a new allergen on their smartphones. At the same time, a supervising doctor asked one of them to include data from two cases in their ongoing research project. In such situations, professionals must constantly arbitrate between competing priorities, making rapid, situational judgments about which task or informational demand to address first and how to manage multiple forms of information concurrently.

Dense and interwoven information targets and needs

The complexity of work goals generates a dense, interwoven network of information targets that must be met to accomplish allergy-related tasks. This becomes evident in professionals' information use processes, which include—for instance—selecting keywords to formulate queries, producing summary documents for collective meetings, classifying work files, and managing controlled vocabularies within in-house clinical databases. These targets relate mainly to diseases and patient care. Professionals do not only inform themselves about and handle information on domain-specific themes such as allergens or allergies, but also on people (specialists, patients, populations), events (clinical, everyday, and institutional), logistics (procedures, food recipes), and information artefacts (scientific studies, datasets, protocols).

Information used in allergy work encompasses a wide range of social, biological, medical, and psychological characteristics that enable sophisticated investigations essential for both patient care and research. These include personal data—such as pregnancy status, name, age, contact details, sex, ethnic background, or psychological profile—and reasons for medical visits—for example, allergic reaction to chemotherapy or oral food challenges with peanut. Clinical anamneses provide further layers of information, including:

- medical history: diagnosed allergies, comorbidities, addictions, mental health conditions, presence or absence of an atopic background (e.g., asthma, eczema, rhinoconjunctivitis), and past or ongoing therapies, including avoidance measures;
- previous consultations and hospitalizations, providing a longitudinal view of the patient's allergic trajectory;
- illness histories, detailing the context of allergic reactions (timing, causative allergens, symptoms, and severity), aggravating factors (such as exposure to animals, pollen peaks, or cannabis consumption), and prescribed treatments (e.g., emergency kits);
- ongoing and planned management, including screening tests (skin tests, specific IgE assays), allergen concentrations, protocols for dose escalation, diagnostic and therapeutic decisions.

Professionals also observe and document patient behaviours during care, such as anxiety or stress responses during testing—an informational dimension that contributes to both clinical understanding and patient-centred care.

Considering specialised information use, professionals focus on both common allergies—food, drug, respiratory, occupational, cutaneous allergies, insect venom allergy, anaphylaxis—and rare conditions, such as mast cell activation syndrome or food protein-induced enterocolitis syndrome. These inquiries target multiple dimensions of allergy domain information:

- responsible allergens or proteins;
- aggravating and environmental factors;
- symptoms and clinical manifestations;
- underlying immunological mechanisms;
- prevalence, severity, and mortality rates;
- diagnostic procedures and testing methods;
- therapeutic recommendations and treatment options;
- preventive and risk-reduction measures;
- socioeconomic dimensions, including quality of life and healthcare costs.

The information landscape that allergy professionals navigate is inherently multidisciplinary. Their sources span allergology, dermatology, pathophysiology, pneumology, gastroenterology, paediatrics, immunology, psychology, and public health. Beyond medical domains, their searches extend to chemistry and pharmacology, encompassing the nomenclature of allergen molecules, drugs, and chemical compounds—essential for both identifying allergenic substances and prescribing safe treatments.

The information needs expressed by allergy professionals are closely tied to specific tasks and reflects broader professional goals:

- bibliographic needs are primarily expressed by physicians engaged in research, teaching and learning activities. These needs arise in the course of conducting literature reviews, preparing theses, journal club presentations, writing articles, and updating teaching materials. The underlying goal is to advance knowledge and ensure that clinical and research practices are evidence-based;
- needs for precise, evidence-based and empirical information are embedded in daily clinical, expertise and research routines. They emerge from diagnostic and therapeutic tasks, such as determining appropriate testing procedures to identify allergens, or adapting treatment protocols to personal needs (precision medicine). These needs serve the goal of improving patient care and refining professional expertise through comparison with 'similar cases' and standards to reduce hypothetical risks of allergic reaction;
- occasional verification needs accompany most routine clinical, administrative, organisation and research tasks. They ensure accuracy in patient identification, reasons of consultation, test parameters, results, symptoms, prescriptions, pharmacological and aerobiological data, ongoing studies in which the patient is enrolled. Such verifications aim to maintain data integrity, traceability and ensure patient care and safety.

Together, these information needs structure the flow and rhythm of information activities.

Multiple and various information resources

To meet their goals, allergy professionals frequently manage and search for evidence from multiple and various resources of three kinds: clinical documents and tools, scientific and professional resources, as well as generalist resources, shown in Table 2 (Appendix B). Allergy domain documentation is dominant, but not exclusive. Physicians also use articles published in journals in dermatology, internal medicine, gastroenterology, or paediatrics.

To propose a relevant and personalised protocol of allergy exploration, for instance, allergists need first to understand patient medical condition and clinical history. They use paper and electronic documents resuming these elements, patient files produced in the unit or other units and institutions (e.g., private clinics, medical test laboratories), as well as e-mail messages from patients. Simultaneously, if the case is rare and non-standardised, they go to consult their colleagues, clinical and scientific databases, a professional forum, as well as read found articles to see how similar cases were handled. Clinicians also draw on generalist resources, such as the Food

Facts database, to verify food ingredients. They consult general search engines, forums, and social media to gain insight on non-conventional therapeutic practices of allergic individuals and to assess the types of information to which patients may be exposed. This helps them tailor their explanations and guidance during consultations. Next, to locate the appropriate protocol document, they consult the document management system (DMS) or their email inbox, then print and complete the form.

In allergy research, allergists affiliated with a research laboratory in epidemiology and public health try to cross and analyse exposomic (Wild, 2012) big data originating from multiple sources. These include clinical databases or the hospital data warehouse, as well as national pharmacovigilance systems, health insurance databases, environmental datasets, and even web-based sources such as Google Trends. The aim is to construct large and diverse samples that reflect different populations and contexts, and to analyse them using supervised and unsupervised statistical methods. By doing so, researchers can identify sensitisation patterns and patient profiles—for example, individuals suffering from allergic rhinitis living in different geographic areas—as well as relevant risk factors and the clinical manifestations associated with particular allergens.

This interweaving of multiple goals requires professionals to be familiar with all relevant information resources and to know how to access them—particularly when they are paywalled or produced outside the hospital, such as in private clinics. Residents and students report that they are not always aware of all existing systems (e.g., the DMS, in-house databases) or do not know how to access them. As a result, over the past several years they have worked around these limitations by creating and using their own collaborative system (Google Drive) to produce and share protocols, case syntheses, and slides—tools that have not been formally approved by supervisors.

Practices shaped by specific conditions

The information practices of allergy professionals are further influenced by temporal, spatial, personal, and organisational conditions under which their tasks are performed.

Highly-constrained, evolving, and fragmented temporalities

As we have already saw, allergy practices are driven by numerous goals that have to be accomplished during daily work. Consequently, tasks performed in the allergy unit are highly constrained by time and different deadlines.

Time constraints naturally shape information-seeking and information-sharing activities during collective meetings. For example, in food allergy meetings—where decisions must be made for approximately 27 patients per session—professionals have, on average, four minutes to both present each case to colleagues and take a decision. Within this brief interval, they must also conduct occasional verification searches in paper files, electronic health records (EHR) system, clinical databases, e-mail boxes, allergen catalogues, and medical dictionaries, as well as provide both experiential feedback and evidence coming from scientific articles.

Given the strict time constraints under which patient cases must be analysed and extensive data contained in patient files, professionals are compelled to produce and share synthesis sheets, timelines, and summary slide presentations, communicating information that has already been filtered—that is, selected as the most essential for their activities. These tertiary documents—created from an organised and synthetic use of primary sources—serve to compile and condense the data collected on individuals scheduled for consultation or in the day-hospital procedures. The sheets are collaboratively prepared by residents and trainees who, on the day before food-allergy meeting, read, extract and condense the information contained in patients' files. They record these data in a tabular form. Timelines are used to gain a clearer understanding of complex cases. These graphic documents, on paper or in digital form, present the key episodes of a patient's clinical

history in a chronological and synthetic manner—for example, allergen intake, allergic symptoms, test results—each accompanied by temporal details. Summary slide presentations highlight the most important elements of a patient’s clinical history and often include timelines as well as photographs of body areas affected by allergic reactions. These medical synthesis documents save time that would otherwise be spent searching for documents and information, allowing that time instead to be devoted to sharing, understanding, and analysing clinical cases. By filtering and condensing data, they facilitate medical reasoning and enhance clinical decision-making.

Moreover, during the training of allergy residents and students, their information needs, sources, strategies and literacies evolve over time. At the start of their specialty training, they typically consult the French educational website e-Allergie and university courses offered through diploma programs to acquire foundational knowledge of allergy practice, explore the specialty, and access comprehensive bibliographies. They often print multiple webpages to highlight and annotate documents. After a period necessary to assimilate this material, trainees begin studying more specific and advanced cases and take on roles as presenters during collective meetings. At this stage, they transition away from paper-based resources and become familiar with international abstracting and indexing databases, medical portals, and scientific journals in allergy and immunology. Later, when preparing their doctoral thesis, some trainees develop expertise in advanced search strategies, including the use of Medical Subject Headings (MeSH) and Boolean operators to perform systematic reviews. Certain sources, however, remain consistently used over time. Regardless of experience level, junior staff frequently seeks the opinions of attending physicians when they face uncertainty regarding clinical decisions.

The dynamics of patient care workflows, high workload of clinical activities, and multiple simultaneous tasks in allergy practice lead to fragmented periods of information searching, reading, and writing, carried out in short, rather than long, uninterrupted sessions. Trainee physicians report that while conducting bibliographic research in the hospital, they are interrupted ‘*every five minutes*’ by colleagues. Similarly, nurses’ information work is frequently interrupted by colleagues seeking help in locating paper files. Physicians also conduct literature searches during lunch breaks—which are themselves interrupted by afternoon consultations—and then resume the work afterward. This workflow dynamic often results in information task ‘parking’, where tasks or unfinished searches are temporarily set aside to be resumed later.

Distribution of activities across multiple settings

Although core allergy activities are usually tied to fixed times and places, they are often distributed across multiple settings, taking place in professional, online, and private environments that provide different constraints and affordances.

The degree of spatial distribution of work varies among professional groups according to their status, roles, associated responsibilities and evolving professional and informational culture. This phenomenon is most pronounced among attending physicians, who engage in, supervise, and make final decisions for all types of unit activities. They remain in constant contact by phone with residents and nurses when actions require validation or in emergency situations. Consequently, their tasks, as well as the related information activities, often transcend institutional boundaries and extend into personal spaces. For example, the analysis of urgent patient cases may occur during journal club meetings, in offices—where residents often consult supervising doctors between appointments—over lunch breaks, or even when physicians are at home or commuting. Consequently, these informal exchanges take place across a variety of communication spaces, including face-to-face conversations, e-mail, telephone calls, professional online forums, and social media messaging platforms.

Additionally, since the Covid-19 pandemic, attending physicians have been exceptionally authorised to access and consult the EHR system remotely, allowing them to participate in clinical

meetings and conduct teleconsultations from home. In such cases, traceability activities—such as writing medical reports and coding—are carried out both within the hospital and in personal workspaces. This distribution is less pronounced among healthcare support team who works exclusively on site and therefore access and manage documentation primarily within the hospital. Nevertheless, nurses and clinical research coordinators also report engaging in lifelong learning not only through in-hospital individual consultations and collective training sessions delivered by allergists but also independently. They occasionally search for professional information online from home, consult conference recordings and medical dictionaries, and attend medical conferences in various cities across France.

The dispersion of allergy-related activities is also shaped by task sequences, the resources available in each environment, and professionals' personal preferences and needs. For example, when conducting research for medical theses, allergy residents manually extract clinical data from paper patient records within the hospital and transfer them into spreadsheets. They may then analyse these data individually on personal computers at home. In later stages of the task—such as formulation and structuring of ideas—residents and students use hospital facilities to access scientific databases, enabling them to retrieve, download, and, if needed, print paywalled journal articles. During the final steps of paper writing, many prefer to consult these resources and continue seeking and collecting information at home, where they are less frequently interrupted by colleagues and patients, and where internet connectivity is often more reliable than in some unit offices.

Information use is also influenced by hospital policies and legal obligations. Consequently, paper patient files cannot be taken home and may only be consulted within hospital settings.

Individual and collective motivations

Information practices also articulate individual and collective motivations linked to work goals. Individual motivations relate to accomplishing personal objectives, such as progressing in medical training or advancing within the hospital or university hierarchy. These motivations drive autonomous information-seeking behaviour, constructing datasets for thesis work, as well as writing and publishing articles in high-impact journals to accumulate SIGAPS (Système d'Interrogation, de Gestion et d'Analyse des Publications Scientifiques) points—part of the French bibliometric system.

At the same time, allergy professionals are strongly driven by collective motivations, notably the shared commitment to delivering high-quality patient care and training. During collective clinical meetings, information sharing supports the construction of medical reasoning and enables collaborative discussions as well as formulation of testing, diagnostic, and therapeutic decisions. This strengthens a culture of exchanging experiential clinical knowledge—particularly between attending physicians and trainees—as well as documentary resources such as patient case presentation slides, summary sheets, timelines, and email correspondence. This culture of sharing extends beyond the unit: allergists provide advice to colleagues from other hospital units through the telephone consultation service and respond to requests from across France on a professional forum, where they share their expertise and experience on complex patient cases. Weekly journal clubs pursue the same objective: collectively producing and updating knowledge through the selection, presentation, sharing, comprehension, interpretation, and evaluation of recent scientific articles and conference presentations.

The shared goal of ensuring both traceability and patient care also drives the collaborative production of high-quality clinical documentation. Physicians write and dictate medical reports, attending doctors validate reports prepared by residents and students, and medical secretaries transcribe dictated content, correct grammar and spelling, and ensure proper formatting. To standardise and streamline this process, the unit uses shared templates for each type of visit.

Similarly, the organisation of patient files within the EHR is jointly defined by referent physicians and secretaries, who collaboratively develop categorisation schemes with the hospital's EHR administrators.

In research activities, professionals share bibliographical and clinical data, co-author and publish scientific papers to accumulate bibliometric points and secure public funding for the allergy unit. A major collective aspiration is to lead research projects of sufficient scope and quality to be published in leading internal medicine journals, such as *The New England Journal of Medicine*. Achieving such a goal would yield substantial bibliometric benefits and confer professional prestige within the hospital.

More broadly, the allergy team's healthcare, research, and teaching objectives align with those of the university hospital, whose mission similarly integrates patient care, scientific research, and the training of future professionals.

Practices characterised by specific attributes

Finally, allergy professionals' information practices are oriented by specific attributes of allergy work itself, such as its life-critical nature and the exercise of professional authority. These practices are also deeply embedded in daily activities.

Life-criticality and risk

In many situations, allergology care is centred primarily on diagnosis and allergen-avoidance strategies. As a result, allergology work practices are dominated by diagnostic procedures. The latter are potentially iatrogenic:

It's a strange specialty in the sense that it isn't really about providing care—it's almost systematic iatrogenesis. I think it's one of the specialties where, every time patients come in, they will have reactions (even if only on the skin or otherwise). There is always something we are going to induce, which is almost the opposite of typical care, where people come with a problem and you treat them. I'm not talking about the therapeutic part—I mean the diagnostic part. The procedure itself is simple, but the outcome can be disastrous depending on the severity. But behind all of this, in order to avoid danger, there is a substantial amount of reasoning that is very important and, in my view, is part of the care (attending physician).

Diagnostic work is therefore both life-critical and risky. Difficulties in proposing an appropriate patient management plan often stem from uncertainty or gaps in knowledge regarding which allergens should be explored. Clinicians must determine the correct dosages for allergens administered via skin tests or oral food challenges and identify which additional tests to prescribe. Across all these tasks, the primary objective is to minimise the risk of severe or even life-threatening reactions during day-hospital procedures.

For oral food challenges in particular, decisions must rely on both evidence-based and personalised information of high reliability and quality, with allergen doses adjusted to each patient's specific characteristics. Physicians must establish the most relevant diagnosis and define the appropriate therapeutic strategy. Beyond standard pharmacological treatments, allergists also administer allergen immunotherapy, which involves gradually delivering controlled doses of allergens to induce tolerance. These procedures carry inherent risks and therefore require standardised yet patient-specific protocols and close hospital monitoring. To support these high-stakes decisions, allergists must also determine which forms of evidence to prioritise—case reports, randomised controlled trials, meta-analyses, guidelines, or real-life observational studies—and integrate them with clinical databases data, professional experience, and the patient's individual characteristics. Their evaluation of scientific publications is highly sophisticated: they

examine paratextual elements (journal reputation and impact factor, authors' standing and geographical context, study type, bibliographic completeness, quality of the state of the art, publication date, citation count) and scrutinise methodological aspects, including statistical and diagnostic procedures—giving particular weight to studies where diagnosis relies on skin tests rather than on clinical history alone.

The life-critical nature of allergy work becomes especially visible during in-hospital allergy testing, where reactions may escalate within minutes. In such emergencies, decisions must be made instantly, requiring immediate access to key patient information. This urgency explains why paper files continue to be used alongside electronic records:

When we perform explorations, things can go wrong very quickly. When we have 14 or 15 patients, and two of them react, and we can only open one session per computer, it becomes too complicated to open a patient's file in an emergency. When a patient is not doing well, we can't just sit in front of a computer, re-enter their codes, open everything, and search through hundreds of items to find what we need. With a paper file, however—say, a day hospital file that we prepared the day before and set up in the morning—the important documents are already there. If an accident occurs, we take care of the patient and can immediately access the crucial elements in the file. There's no question of isolating ourselves at a computer. This is especially true if the Internet isn't working or if there are already three people using that computer because there aren't enough computers everywhere (attending physician).

Allergy-activity, despite the iatrogenic risk, is oriented toward patient care: allergy explorations aim to diagnose patients in order to give them relevant treatment allowing to avoid further potential reactions in their everyday-life.

Hierarchical authority

Work in the allergy unit follows a clear hierarchical structure, reflected in professionals' statuses, roles, and associated responsibilities. At the top is the head of the unit, followed by attending physicians, junior specialists, residents and students, and finally paramedical, administrative and clinical research staff. Management practices combine participative and consultative styles with paternalistic tendencies (Likert, 1967). Exchanges between supervisors and trainees flow both downward and upward, and decision-making is collaborative, though final responsibility for patient care rests with attending physicians and the unit head. Healthcare support staff research staff does not participate in medical decision-making.

Experienced physicians are considered authorities in different allergology sub-specialties—food allergy, drug allergy, insect venom allergy, etc.—and this status entails supervising and advising junior staff, as well as guiding and validating their clinical, research, and educational activities. During collective meetings, residents and students are encouraged to speak, propose ideas, or present cases, although they rarely do so spontaneously. The physical arrangement of meetings further reinforces hierarchy: senior physicians sit together at the front or behind a desk, while trainees typically occupy seats toward the back. Despite this structure, relationships remain collegial, supportive, and friendly.

Information practices within the unit reflect these hierarchical and authoritative dynamics. Attending physicians frequently review and refine the content presented by residents and students during journal clubs, clinical meetings, scientific papers, medical reports, and conferences, ensuring accuracy and quality. They also provide informal training on the use of scientific databases and the conduct of systematic reviews, particularly during thesis supervision. The rest of the team routinely seeks their advice and validation for patient care decisions. Consequently, attending physicians have access to all hospital information resources, including remote access to

clinical databases and the EHR, whereas junior staff and healthcare support personnel have access to a more limited set of resources.

For external actors, both senior and junior doctors are recognised as allergology specialists. Consequently, advising colleagues from other units and hospitals is a responsibility shared by both groups.

Invisibility, embeddedness, burden

Information work in the allergy unit is often perceived as invisible (Star & Strauss, 1999) because it is deeply embedded within clinical activity. In fact, information-related tasks can occupy a substantial portion of allergy professionals' daily work, sometimes exceeding the time spent on the primary clinical activities themselves. Interviewees report dedicating between 50% and 100% of their work time to these tasks, which are closely intertwined with their professional responsibilities: '100% of my work time. I practically live in my computer' (research doctor); 'At least 50% of my work time, maybe 50 to 75%' (attending physician); 'During a continuous shift as a nurse in programming, you're only managing information. That's information management all day' (nurse).

These tasks include retrieving and writing medical records, coding, collecting documentation from other hospitals, organizing incoming documents, scheduling visits, responding to emails, consulting and entering data into clinical databases, reading articles, and requesting expert opinions. Email management is particularly burdensome: 'I receive about 30 to 40 emails per day from patients. It's a lot, a lot, a lot', reports an attending physician.

Therefore, the time spent on information tasks is often comparable to—or exceeds—the time spent with patients: 'In a day, the actual time with patients is very small. For ten hospitalized patients, you might see them in the morning for an hour or two, then spend eight hours on the computer' (resident); 'I'm not with the patient because of that' (another resident);

Yesterday, I had four consultations, which is nothing. But then I spent an entire afternoon reviewing cases, requesting opinions, and writing reports. About 70% of my time was administrative and research work, 30% with patients. It's exhaustive and really burdensome (junior specialist).

Medical students often underestimate the daily impact of mandatory documentation. Physicians' information work is largely invisible to outsiders but highly time-consuming:

Before you start training, you have no idea what recording every action involves. Every decision must be recorded for others to understand your reasoning. You can't just do something and hand an order to a patient; everything must be documented. It's an invisible part of the medical profession. Administrative tasks like responding to emails and handling personalised car plans for children at school are also time-consuming (resident).

Nevertheless, these 'behind-the-scenes' information interactions play a crucial role in supporting and facilitating the performance of primary work activities.

Research- and education-related information work is similarly invisible. Physicians often carry out these tasks at home in the afternoons and on weekends, dedicating time to bibliographic searches, writing articles and teaching materials, and advancing research projects.

Conclusion

This study demonstrates how the complexity of allergy professionals' work significantly influences their information practices. Although often perceived as invisible, information work in allergology is neither marginal nor optional; rather, it is deeply embedded in—and supports—the performance of primary tasks. Consistent with previous studies showing that hospital activities are situated

within a broader web of interconnected clinical and training responsibilities (Isah & Byström, 2017, 2020), the work of allergy professionals in a university hospital is likewise driven by multiple, overlapping goals. These include not only patient care and training but also research, provision of expert opinions, and managerial, and administrative objectives, all of which give rise to sequential, nested, and simultaneous forms of information seeking and information management. These practices rely on dense and interwoven information targets, needs, and documentary resources, as well as on interpersonal sources such as colleagues and collective meetings—particularly in non-standardised or urgent situations. Similar patterns have already been observed among hospital practitioners in other specialties (Gorman, 1995; Isah, 2012; Isah & Byström, 2017, 2020; Lekic-Savatic & Lezon-Rivière, 2022; Mounier & Paganelli, 2009).

The reliance on people as information sources in rare or urgent allergic cases, alongside the expansion of external resources used, also confirms Byström's (1999) and Gorman's (1995) observation that increasing task complexity heightens dependence on human expertise while broadening the range of information consulted. Additionally, the ongoing complexity of allergy-related tasks leads professionals to continually produce and share synthetic in-house documentation—containing filtered and condensed data—to support medical reasoning and clinical decision-making.

Information practices in the allergy unit are further affected by the temporal, spatial, personal, and organisational conditions in which allergy tasks are performed, as well as by specific attributes of the activity itself—such as its hierarchical authority. These findings align with established models of information-seeking in the context of work (Byström & Järvelin, 1995; Leckie et al., 1996) and with empirical studies on health information use (Isah & Byström, 2017, 2020; Landry, 2006; Lekic-Savatic & Lezon-Rivière, 2022; Mounier & Paganelli, 2009; Nordsteien, 2017; Pilerot & Söderholm, 2019). The CWA framework (Fidel & Pejtersen, 2004) also helped illuminate external influences—such as medical paradigms (e.g., evidence-based and personalised medicine), allergology standards and national education, or research trends oriented toward the exposome and big/open data—that shape how professionals engage with information. Additionally, the specificity of allergy practice lies in its multidisciplinary nature and the high potential for iatrogenicity not only during treatment but also during diagnostic investigation, a combination less common in many other medical specialties.

Consequently, the complexity of allergy work requires professionals to continuously adapt their information practices to diverse contextual factors across varying situations and environments. This adaptation demands multiple abilities, including situational awareness, selective attention, prioritisation, contextual reinterpretation, calibration of information representation, sociability, cross-disciplinary reasoning, and sophisticated decision-making. Such a deep understanding of the complexity and specificities of healthcare providers' work—and its implications for information practices—can inform the contextual, user-oriented design of complex systems. In this regard, our findings have already contributed to the development of an allergy ontology, to support the work and informational practices of allergy professionals (Author, 2024).

The originality of this study lies in its examination of the full range of information used by allergy professionals—clinical, specialised, and generalist—while most existing studies focus on only one category of information (Clavier, 2023; Isah & Byström, 2017, 2020; Landry, 2006; Morquin & Ologeanu-Taddei, 2018; Paganelli, 2017; Pilerot & Söderholm, 2019). Moreover, we provide novel insights into allergy-related work roles, tasks, and goals, and into how these elements guide professionals' information practices. Beyond allergists themselves, it also includes other occupational groups involved in allergy care—such as nurses, secretaries, and clinical study coordinators—who have received little attention to date. However, because the study was conducted in 2020–2021, it does not reflect the recent adoption of generative artificial intelligence by healthcare providers (Shanmugam et al., 2025). Future research could investigate how allergy

professionals are integrating these tools into their daily work and what implications this may have for their cognition, decision-making processes, and overall information practices. These questions could be incorporated into a broader questionnaire aimed at assessing whether the findings of the present study are generalisable at national and international levels.

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<https://web.archive.org/web/20250808081812/https://www.worldallergy.org/wao/about#member-societies>)

Appendix A: table 1

Activity type	Task type	Goals
Clinical	Patient case analysis (clinical reasoning, making diagnostic decisions, planning treatment); Consultation and day-hospital activities: <ul style="list-style-type: none"> allergy exploration (skin tests, patch tests, food challenges, blood and enzymatic tests, respiratory functional explorations, stress test), patient examination, treatments (immunotherapy, oral tolerance induction, 	<ul style="list-style-type: none"> Performing patient care: understand patient condition, health history, needs and practices, establish accurate diagnosis, prescribe drugs, tests, and therapies; Patient reception (ensuring patients bring to hospital meals containing the relevant allergen, such as chocolate mousse, fish, or peanut crisps); Prevent severe or life-threatening reactions;

	<p>corticosteroid therapy, educational therapy, elimination diet, adrenaline injection),</p> <ul style="list-style-type: none"> • technical procedures (blood sampling, venous catheter insertion); <p>Preparing consultations and day-hospital visits:</p> <ul style="list-style-type: none"> • triage, programming appointments, lunch meals, • contacting patients, making them sign documents, • preparation for medical procedures (e.g., allergens to test) 	<ul style="list-style-type: none"> • Coordinate with other specialists; • Ensuring legal traceability; • Performing medical and economical coding; • Training (teaching, learning, updating knowledge); • Contributing to research projects: providing patient lists, organising consent signing, recruiting participants, collecting data corpora
Clinical and scientific research	<ul style="list-style-type: none"> • Design, management, and execution of applied and fundamental research projects, such as randomized controlled trials and post-marketing studies (analysis of data corpora, patient inclusion and following-up, etc.); • Academic writing, reviewing, and publishing; • Conference presentations; • Participating in research group meetings 	<ul style="list-style-type: none"> • Identifying patterns to advance understanding of allergic diseases, and circulating results; • Innovating to improve and personalize clinical practice (treatments, algorithms, protocols, analysis grids, prevention strategies); • Accumulate research metrics • Generate funding for the hospital through grants; • Advancing hospital and academic careers; • Prepare medical or scientific theses
Training	<ul style="list-style-type: none"> • Teaching tasks (e.g., slide and bibliography preparation, updating training websites, selecting recommended readings); • Supervising thesis, journal, and conference papers published by junior staff; • Learning and updating knowledge through thesis preparation, case observation, course participation; • Provide diplomas: Allergology Capacity, Cross-Curricular Specialist Training, Specialized Medical Degree in Allergology, Interuniversity Diploma in Allergy and Anaesthesia 	<ul style="list-style-type: none"> • Career progression; • Improving patient care and management; • Updating protocols, analysis grids, and medical classifications; • Fulfil administrative and management obligations • Respect the Medical Ethics Code (art. 11) and the French Public Health Code (art. R.4127-32) on continues professional learning
Expertise	<ul style="list-style-type: none"> • Responding to requests from colleagues, institutions, patients, and families; • Providing allergy services in other units (e.g., performing skin tests in nephrology) 	<ul style="list-style-type: none"> • Patient care; • Prevention; • Education; • Research;
Administrative and managerial	<ul style="list-style-type: none"> • Scheduling and organising human and material resources; • Activity evaluation; 	<ul style="list-style-type: none"> • Meeting institutional requirements; • Responding to patient needs; • Contributing to patient care;

	<ul style="list-style-type: none"> • Reporting to administrations; • Managing collaborations 	<ul style="list-style-type: none"> • Providing training in allergology; • Coordinating collaborating centres and projects with external institutions (e.g., World Health Organisation) and research labs
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Table 1. Illustration of the multiple and overlapping goals embedded in the allergy work activities.

Appendix B: table 2

Resource type	Examples
Clinical documents and tools	
Patient files (paper and electronic)	Test notebooks, allergy cards, consultation and hospitalization reports, e-mails, allergy and additional test results, day-hospital files, anaesthesia sheets, skin test sheets, exploration test prescription and scheduling forms; patient monitoring sheets, consent forms, medical images, medical notes and observations, individualized care protocols (PAI), prescriptions and medication orders, patient photos and videos, exploration and therapeutic protocols, patient and standardised questionnaires (e.g., ENDA form), nursing handover sheets and reports
Synthesis documents	Patient case presentation slides, patient case summary sheets, timelines
Activity-organisation documents	Agendas, medical procedure sheets (e.g., pain-free care, skin tests, etc.), stock and job management sheets, job descriptions, recipes, standard operating procedures, roadmaps
Training documents	Teaching and learning materials (e.g., slides, print documents)
Information management, sharing, and search tools	Electronic health records (EHR), patient-file search engine, consultation and meal-programming software, Document Management System—DMS—(SharePoint, Google Drive, local shared disk), e-mail inboxes (professional and personal), eCRF, research management platforms
Clinical knowledge organization systems	Common Classification of Medical Acts (CCAM), Diagnosis-Related Groups (GHM), in-house categorisation schemes to organise documents within the EHR
In-house databases and hospital repository	Drug Allergy and Hypersensitivity Database (DAHD), Food Allergy Hypersensitivity Database (FAHD), clinical datasets, hospital data warehouse
Scientific and professional resources	
Journals and articles	<i>Allergy, Annals of Allergy, Asthma and Immunology, Clinical & Experimental Allergy, Current Allergy and Asthma Reports, Frontiers in Immunology, Pediatric Allergy and Immunology, International Archives of Allergy and Immunology, Journal of Allergy and Clinical Immunology, Journal of Allergy and Clinical Immunology: In Practice, Revue Française d'Allergologie, Contact Dermatitis, The New England Journal of Medicine, The Lancet, Journal of Paediatrics and Child Health, The Lancet Gastroenterology & Hepatology, EClinicalMedicine</i>
Textbooks and dictionaries	e.g., <i>Middleton's Allergy: principles and practice, Insect sting allergy: clinical picture, diagnosis and treatment, Vidal</i>
Knowledge organisation systems	ICD-10 and ICD-11, Gell and Coombs hypersensitivity classification, Ring and Messmer anaphylaxis classification, Muraro severity classification, Johansson classification of allergic reactions, GINA and ARIA guidelines, MeSH thesaurus
Abstracting and indexing databases	PubMed, PubChem, SciELO, Embase

Library catalogues	Insermbiblio, University OPAC
Medical portals	UpToDate, ScienceDirect, Cochrane, EM-Consulte, <i>National Aerobiological Surveillance Network</i>
Digital libraries and repositories	HAL, Medica
National databases	Pharmacovigilance database; National Programme for Hospital Information Systems (PMSI); National Health Insurance database (SNIIRAM); environmental, biological and geolocalisation datasets
Specialized institutional websites and professional blogs	French Agency for Food, Environmental and Occupational Health & Safety (ANSES), AllerData, The French National Research and Safety Institute (INRS), Orphanet
Newsletters and alerts	Alerts from French National Agency for the Safety of Medicines and Health Products (ANSM), PubMed alerts, pollen bulletin, newsletters from the French Society of Respiratory Diseases
Speciality courses	e-Allergie, university courses provided through diploma programs
Personal libraries and notebooks	Paper and digital notes, textbooks, articles, slides, etc.
Pharmacological laboratories leaflets	Allergen lists
Professional social media	AdviceMedica forum, Facebook and LinkedIn professional groups, Twitter (X) accounts of journals and learned societies
Events	European Academy of Allergy and Clinical Immunology (EAACI) Congress, Groupe d'Etudes et de Recherche en Dermato-Allergologie (GERDA) Congress, Congrès Francophone d'Allergologie (CFA), Rencontres d'Allergologie du Grand Sud, Symposium du Cercle d'Investigations Cliniques et Biologiques en Allergie Alimentaire (CICBAA), World Allergy Congress (WAC)
Generalist resources	
Portals	Doctissimo articles
Pharmacological laboratories leaflets	Disease- or therapy-specific documentation
Forums and social media	Doctissimo forum, Facebook patients' groups, Twitter accounts of associations
Open databases	Open Food Facts, Google Trends
Search engines	Google

Table 2. Information resources used by allergy professionals.