

BRIEF REPORT

Artificial Intelligence in Family Medicine: A Comparative Study of Use, Attitudes, Ethics, and Training Needs Between Residents and Supervisors

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ABSTRACT

Background and Objectives: Artificial intelligence (AI) offers significant potential to support various aspects of general practitioners' (GPs') work but raises important ethical questions. This study explored and compared AI use and the related attitudes, ethical concerns, and training needs of GP residents and supervisors.

Methods: We conducted a cross-sectional, self-administered online survey among second- and third-year GP residents and supervisors in Toulouse (France). The survey examined AI use, attitudes, ethical considerations, and training needs. We compared groups using bivariate analysis to explore potential generational differences ($P < 0.05$).

Results: A total of 175 GP residents and 402 supervisors responded. Overall, 21% of respondents reported using AI in medical practice. Residents expressed greater familiarity with AI and less need for control and transparency than supervisors. Top ethical concerns included plagiarism, cognitive off-loading, and reasoning limitations. Training was desired by 91% of supervisors and 71% of residents.

Conclusions: Our results highlight generational differences in technology acceptance and a strong demand for AI training. Study limitations included risk of data obsolescence, nonresponse, selection bias, and a monocentric sample. These findings underscore the need to develop targeted AI training programs and implement formal safeguards to regulate AI use in academic settings.

INTRODUCTION

Artificial intelligence (AI) and large language models are evolving rapidly, offering promising prospects in health care.^{1,2}

AI appears to be highly relevant for general practitioners (GPs), with potential targeted uses including documentation, triaging results, managing patient messages,³ and diagnosis.^{4,5} Ambient AI documentation tools provide a concrete example of clinically relevant AI use, with studies reporting reduced time-in-note and potential improvements in burnout, task load, and work exhaustion⁶ alongside reductions in administrative burden and enhanced patient-clinician interaction.⁷ Additionally, AI could assist in mitigating cognitive biases⁴ and offer support

in managing clinical uncertainty⁸ and transcribing medical reports.⁹ Finally, AI may support patient-centered care by enhancing patient health literacy, self-management of chronic conditions,¹⁰ and autonomy.¹¹

Ethically, questions remain regarding algorithm transparency, because the reasoning behind large language model responses is often unclear,¹² along with biases^{12,13} and accuracy issues.^{5,14}

AI holds promise to enhance formative exercises, advance medical education, and support GPs' continuing learning. In France, family medicine training follows a national pathway combining 6 years of undergraduate medical education with a 3 year residency (to be extended to 4 years for students who started residency in

TABLE 1. Descriptive Statistics by Population Group

Characteristic	N	Residents N = 175 n (%)	Supervisors N = 402 n (%)	P value ^a
Respondent profile				
Gender	538			
Female		112 (68)	222 (59)	
Male		52 (32)	152 (41)	
Not applicable		11	28	
Practice area type	393			
Rural		–	86 (22)	
Semirural		–	187 (48)	
Urban		–	120 (31)	
Not applicable		–	9	
Years of medical experience	393			
<5 years		–	40 (10)	
Five to 14 years		–	187 (48)	
15 to 30 years		–	120 (31)	
More than 30 years		–	46 (12)	
Not applicable		–	9	
Involved in thesis supervision	384			
No		–	316 (82)	
Yes		–	49 (13)	
Not yet, but interested		–	19 (4.9)	
Not applicable		–	18	
Current internship semester	169			
2nd semester		94 (56)	–	
4th semester		52 (31)	–	
Other semester		23 (14)	–	
Not applicable		6	402	
AI use				
Familiar with AI in clinical practice	551			<0.001
Uncertain		29 (17)	52 (14)	
No		62 (37)	227 (59)	
Yes		75 (45)	106 (28)	
Not applicable		9	17	
Familiar with AI in academic settings	545			<0.001
Uncertain		26 (16)	41 (11)	
No		71 (43)	305 (81)	
Yes		70 (42)	32 (8.5)	
Not applicable		8	24	
Familiar with AI for personal use	551			<0.001
Uncertain		13 (7.8)	35 (9.1)	
No		41 (25)	176 (46)	
Yes		112 (67)	174 (45)	
Not applicable		9	17	
Number of AI platforms known	498			<0.001
0		10 (6.1)	76 (23)	
1		104 (64)	167 (50)	
2		30 (18)	51 (15)	
Three or more		19 (12)	41 (12)	
Not applicable		12	67	

(Continued)

TABLE 1. Descriptive Statistics by Population Group (Continued)

Characteristic	N	Residents N = 175 n (%)	Supervisors N = 402 n (%)	P value ^a
Already used AI in medical practice	547			.3
No		126 (76)	307 (80)	
Yes		39 (24)	75 (20)	
Not applicable		10	20	
Domains where AI could be useful (yes)				
Filling the patient's medical record	577	97 (55)	207 (51)	.4
Patient follow-up	577	49 (28)	137 (34)	.2
Diagnostic assistance	577	82 (47)	201 (50)	.5
Decision support when uncertain	577	67 (38)	165 (41)	.5
Managing care: ordering tests and treatments	577	72 (41)	172 (43)	.7
Explaining information to patients	577	52 (30)	99 (25)	.2
Already used AI for therapeutic decisions in a complex therapeutic case (yes)	527	18 (11)	26 (7.1)	.13
Not applicable		13	37	

^aPearson's χ^2 test

Abbreviation: AI, artificial intelligence

2023, with the first fourth year implemented in the 2026–2027 academic year); the training is organized into 6 month clinical rotations and around 200 hours of coursework. Assessment is mainly formative and based on structured written work compiled in an electronic portfolio. In Toulouse, residents regularly produce brief records focused on a single clinical question from a consultation, alongside longer narrative reports on complex cases integrating biomedical, psychosocial, ethical, or organizational issues. These reports include the residents' own reflections and the results of a narrative review, and are discussed with a family physician supervisor.¹⁵

AI therefore introduces new opportunities but also raises ethical concerns that present significant educational challenges. While medical students generally have a positive attitude toward AI,^{16,17} the lack of structured training remains a major issue.^{18,19} Ethically, concerns about students' use of AI include risks to academic integrity,²⁰ its impact on critical thinking,²¹ and cognitive off-loading.²²

To our knowledge, no study has examined the use, attitudes, ethical concerns, and training needs regarding AI among general practice residents and their supervising physician. We hypothesized that generational differences may exist in this domain.

The study's primary aim was to characterize the use of, attitude toward, and ethical concerns about AI and related training needs of GP residents and their supervising physicians. The secondary aim was to compare these factors between our two populations.

METHODS

This was a cross-sectional observational study conducted using a self-administered questionnaire. This study followed the STROBE²³ and CRISP²⁴ recommendations.

The questionnaire was developed on LimeSurvey (LimeSurvey GmbH) by members of the University Department of General Medicine in Toulouse. The regulatory authorizations from the CNIL (France's data protection authority) were requested and approved by the university's data protection officer (September 2, 2024, for residents; October 2, 2024, for supervisors).

Variables included sociodemographic data (gender, years of practice for supervisors, year of internship for interns), use of AI in medical, academic, and personal practice, as well as perceptions of its usefulness, impact (time-saving, quality, relevance), and ethical issues. We assessed the reliability and relevance of AI in supporting residents' written academic work using 5-point Likert scales (1 = not at all reliable/relevant; 5 = extremely reliable/relevant). Participants also expressed their opinions on AI training and rules to be developed to regulate AI's use.

The questionnaire was administered to general medicine residents in Toulouse at the end of their first and second internship years; it was distributed through a QR code during welcome meetings in September 2024 and November 2024. It also was administered to university supervisors during pedagogical meetings over three sessions in October 2024. The response rate was estimated using, for residents, the official list of enrolled students for the relevant academic year and, for supervisors, attendance lists from these pedagogical meetings.

To avoid selection bias, we surveyed all residents and supervisors meeting the inclusion criteria. Residents who had not yet started their internship were excluded because they had not yet had to produce written records. Residents nearing

the end of their internship were excluded because they were no longer concerned with the development of regulatory rules.

Given the very low proportion of missing values, missing data were excluded from statistical analyses.

We compared AI use, attitudes, and ethical considerations by resident or supervisor status to explore generational differences using χ^2 tests. Tests with $P < 0.05$ were considered statistically significant.

RESULTS

A total of 175 GP residents and 402 supervisors responded, corresponding to response rates of 58.7% among residents (175/298) and 77.0% among supervisors attending the pedagogical meetings (402/522). Missing data accounted for less than 5% of responses for each variable and were excluded from the analyses. Demographic characteristics are presented in Table 1, with 62% being female ($n = 334$). A

total of 33% ($n = 181$) reported familiarity with AI applications in clinical practice, 19% ($n = 102$) in academic settings, and 52% ($n = 286$) in personal use, with residents showing higher awareness ($P < 0.001$). A total of 21% ($n = 114$) used AI in medical practice and 8% ($n = 44$) for complex therapeutic decisions.

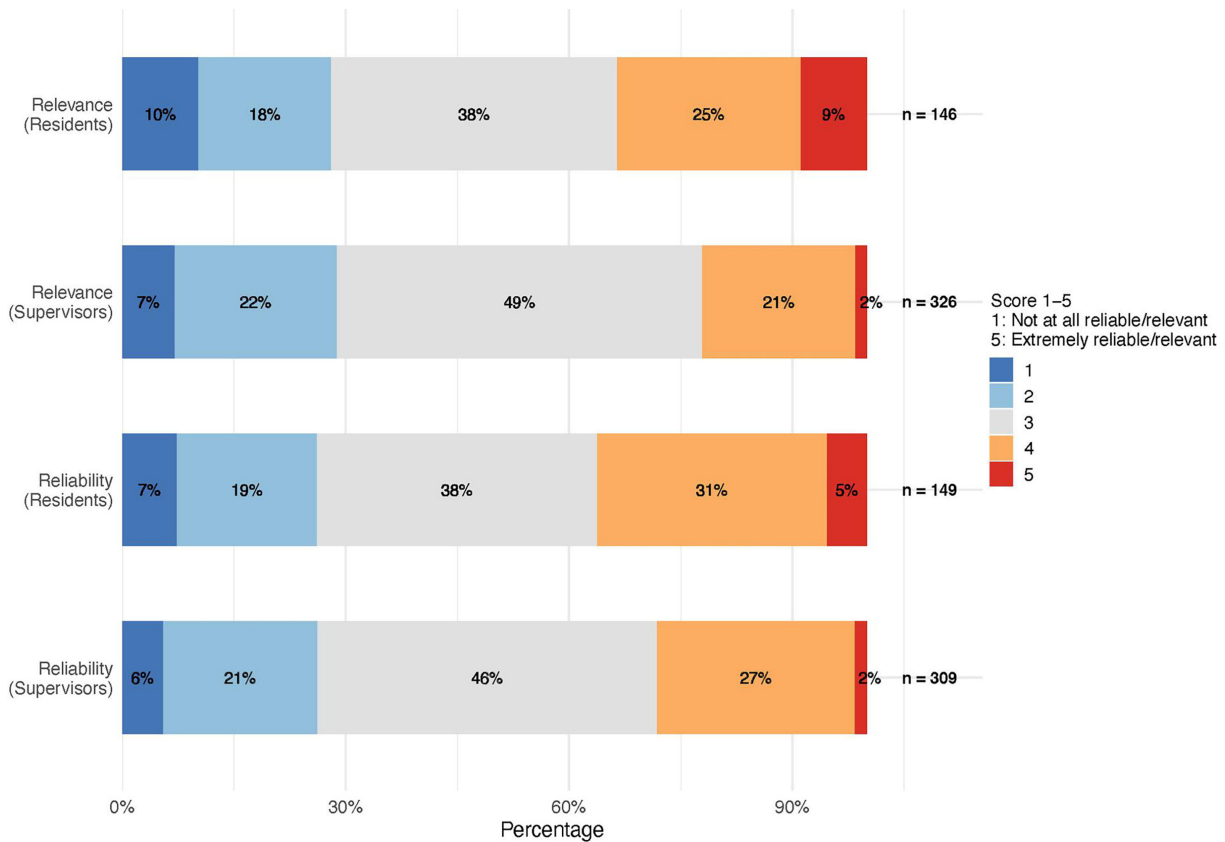
Table 2 outlines attitudes, ethical concerns, and training needs regarding AI. For written clinical tasks, 78% ($n = 374$) perceived quality improvement, 91% ($n = 456$) time-savings, and 49% ($n = 227$) enhanced relevance. Ethical concerns regarding the use of AI in academic writing were reported by 83% ($n = 406$) of respondents, more among supervisors than residents (72% residents vs 87% supervisors, $p < 0.001$). The most frequent ethical concerns were the risk of plagiarism, cognitive off-loading, and reasoning limitations, with higher rates among supervisors (79% vs 89%, $P < 0.001$; 75% vs 81%, $P = 0.004$; 83% vs 89%, $P = 0.002$). Regarding regulation,

TABLE 2. Attitudes, Ethical Concerns, and Training Needs Related to AI

Characteristic	N	Residents N = 175 n (%)	Supervisors N = 402 n (%)	P value ^a
Perceived impact of AI on written clinical tasks				
Improves quality of written clinical tasks	482	108 (68)	266 (83)	<0.001
Not applicable		15	80	
Improves relevance on written clinical tasks	468	70 (45)	157 (50)	.2
Not applicable		18	91	
Saves time on written clinical task	503	145 (87)	311 (93)	.037
Not applicable		8	66	
Ethical concerns				
Perceived ethical concerns with AI for written academic work	492	110 (72)	296 (87)	<0.001
Not applicable		22	63	
Type of ethical concerns with AI for written academic work				
Risk of information bias	406	75 (68)	181 (61)	.6
Risk of plagiarism	406	87 (79)	264 (89)	<0.001
Cognitive off-loading	406	82 (75)	240 (81)	.004
Reasoning limitation	406	91 (83)	264 (89)	.002
Risk of dependency	406	72 (65)	210 (71)	.014
Confidentiality concerns	406	65 (59)	124 (42)	.14
Impact on research value	406	58 (53)	148 (50)	.4
Equity of access	406	42 (38)	131 (44)	.039
Not displayed		65	106	
AI regulation preferences				
Complete ban	577	7 (4.0)	17 (4.2)	.9
Regulated authorization	577	121 (69)	281 (70)	.9
Free use	577	25 (14)	21 (5.2)	<0.001
Detection software control	577	27 (15)	133 (33)	<0.001
Declaration of use	577	68 (39)	273 (68)	<0.001
Training needs				
Training during internship	523	113 (71)	330 (91)	<0.001
Not applicable		16	38	
Training for supervisors	359	–	326 (91)	
Not applicable		175	43	

^aPearson's χ^2 test

Abbreviation: AI, artificial intelligence

FIGURE 1. Reliability and Relevance of AI in Supporting Residents' Clinical and Research Writing Tasks

70% ($n = 402$) of respondents favored regulated authorization; residents were statistically more inclined toward uncontrolled use (14% vs 5.2%, $P < 0.001$), whereas supervisors preferred AI detection (15% vs 33%, $P < 0.001$) and declaration of AI use (39% vs 69%, $P < 0.001$). Training was desired by 91% ($n = 326$) of supervisors and 71% ($n = 113$) of residents. AI relevance in supporting residents' clinical and research writing tasks were rated high (4 to 5 on a scale of 5) by 26% ($n = 121$) of participants, while 31% ($n = 141$) rated its reliability as high; further details on these data are illustrated in Figure 1.

DISCUSSION

This study provided early insights into perceptions and emerging use of AI in French general practice. While most respondents recognized AI's potential in clinical and academic contexts, AI's widespread adoption remains limited. Notably, residents showed greater familiarity with AI and less demand for control and transparency than supervising physicians, highlighting important generational differences in technology acceptance. A strong desire for targeted AI training also emerged.

Our findings align with international trends showing cautious optimism toward AI in primary care.^{25,26} Generational differences in digital health technology use have been described among patients²⁷ but, to our knowledge, no prior data allow comparison with residents' and supervisors' use

of AI. The need to adapt medical education to the realities of the AI era is widely acknowledged, with several authors emphasizing the importance of comprehensive curricular reform to equip future physicians with the necessary skills and ethical frameworks for responsible AI use.^{28,29}

Environmental considerations, such as AI's energy consumption and carbon footprint, were not addressed but are increasingly relevant for sustainable health care.³⁰

Strengths of our study included a large sample and early data capture, establishing a baseline for AI uptake in primary care. Limitations included potential data obsolescence, item nonresponse, selection bias from voluntary supervisor participation, and a limited sample size due to monocentric recruitment from a single department of general practice in France. Although the proportion of missing data was low (below 5% for each variable), this remains a potential source of bias and may have slightly influenced our estimates.

In response to identified needs, our department has implemented targeted AI training and formal safeguards regulating academic use. Evaluation is still required to determine which teaching formats and points in the curriculum are most effective. Strengthening transparency around AI is essential, and specific strategies are needed to help students appreciate its value. Supervisors also may need to define which clinical competencies should deliberately

remain free of AI support in order to safeguard core professional skills. Given rapid technological evolution and emerging ethical issues, periodic reassessment of attitudes and practices seems essential to ensure safe, effective, and patient-centered integration of AI in family medicine. While AI might risk diminishing human connection, integrating AI education could enhance future doctor-patient interactions.¹¹ Future research should explore this critical dimension.

CONCLUSIONS

Our results suggest that, although most respondents recognize the potential of AI in clinical and academic settings, its adoption remains limited. We identified generational differences, with residents more familiar with AI and supervisors seeking more control and transparency. Both groups expressed strong demand for AI training. These findings underscore the need to develop targeted AI training programs and implement formal safeguards to regulate AI use in academic settings.

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