

Access to Musculoskeletal Imaging Studies in Argentina: Are Orthopaedic Surgeons Mere Bystanders?

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ABSTRACT

Introduction: Access to imaging study results has undergone substantial changes in recent years, affecting the practice of orthopaedic surgeons. **Objective:** To evaluate the perceptions of orthopaedic surgeons in Argentina regarding access to imaging studies, image quality, and the impact of these factors on clinical practice. **Materials and Methods:** A total of 323 members of the Argentine Association of Orthopaedics and Traumatology participated in the survey. Data were analyzed according to years in practice, geographic region, workplace, and subspecialty. **Results:** A significant change in access to imaging studies was observed, with 62% of respondents reporting a substantial impact. Nearly 50% reported being dissatisfied with current access methods, and 47% indicated that access difficulties frequently or very frequently had a negative impact on their clinical practice. According to 29% of respondents, attempts to access imaging studies took up as much as 40–50% of the consultation time. Ninety-two percent had received no formal training in the use of the new digital platforms. Perceptions of image quality varied, with 24% considering it worse than in their previous experience. **Conclusions:** Orthopaedic surgeons in Argentina report high levels of dissatisfaction and frequent difficulties accessing imaging studies. A lack of training and insufficient consideration of physicians as primary users contribute to this perception. This study highlights the need to involve healthcare professionals as key stakeholders in the design and implementation of imaging access systems.

Keywords: Digital imaging; orthopaedics and traumatology; outpatient imaging; diagnostic imaging; surveys; questionnaires.

Level of Evidence: IV

Acceso a estudios por imágenes musculoesqueléticas en la Argentina: ¿somos los ortopedistas convidados de piedra?

RESUMEN

Introducción: El acceso a los resultados de estudios por imágenes ha experimentado cambios sustanciales en los últimos años que influyen en la práctica del especialista en ortopedia y traumatología. **Objetivo:** Evaluar la percepción de los especialistas en ortopedia y traumatología de la Argentina sobre el acceso a estudios por imágenes, su calidad y el efecto en la práctica clínica. **Materiales y Métodos:** Participaron de la encuesta 323 miembros de la Asociación Argentina de Ortopedia y Traumatología. Los datos se analizaron según los años de ejercicio, la región geográfica, el lugar de trabajo y la subespecialidad. **Resultados:** Se observó un cambio significativo en el acceso a estudios por imágenes, el 62% reportó un impacto importante. Casi el 50% informó estar insatisfecho con los métodos actuales de acceso y el 47%, un impacto negativo frecuente o muy frecuente en su práctica clínica. Según el 29%, los intentos de acceso consumieron hasta el 40-50% del tiempo de consulta. El 92% no recibió capacitación formal en las nuevas plataformas digitales. La percepción de la calidad de las imágenes fue variable: el 24% las consideró peores que en experiencias previas. **Conclusiones:** Los especialistas argentinos en ortopedia y traumatología reportan altos niveles de insatisfacción y dificultades frecuentes en el acceso a estudios por imágenes. La falta de capacitación y la escasa consideración de los médicos como usuarios primarios contribuyen a esta percepción. Este estudio resalta la necesidad de involucrar a los profesionales como actores clave en el diseño e implementación de sistemas de acceso a imágenes.

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Palabras clave: Imágenes digitales; ortopedia y traumatología; imágenes ambulatorias; diagnóstico por imágenes; encuestas; cuestionarios.

Nivel de Evidencia: IV

INTRODUCTION

Imaging studies play a fundamental role in the diagnosis, staging, therapeutic decision-making, preoperative planning, and monitoring of musculoskeletal conditions.^{1,2}

Difficulties and limitations in accessing the information provided by diagnostic imaging studies can have a significant negative impact on orthopedic and trauma practice.³

In recent years, in our practice as orthopedic and trauma specialists, we have observed substantial and rapid changes in the ways imaging results are accessed.^{4,5} Traditional radiographic films have progressively given way to formats including laser-printed images, compact discs, institutional Picture Archiving and Communication Systems (PACS), and digital platforms accessible from computers and mobile devices. Although these tools were designed to facilitate and streamline access to imaging studies, their implementation has not always met initial expectations.^{5,6} In practice, the traditional, straightforward availability of printed studies has been replaced by difficulties associated with digital access, such as connectivity issues, technological incompatibilities, and the proliferation of online platforms. Furthermore, even when the images can be accessed, they are often accompanied by warnings stating that they are not suitable for diagnostic purposes (Figure 1), despite obviously having been requested for that purpose.

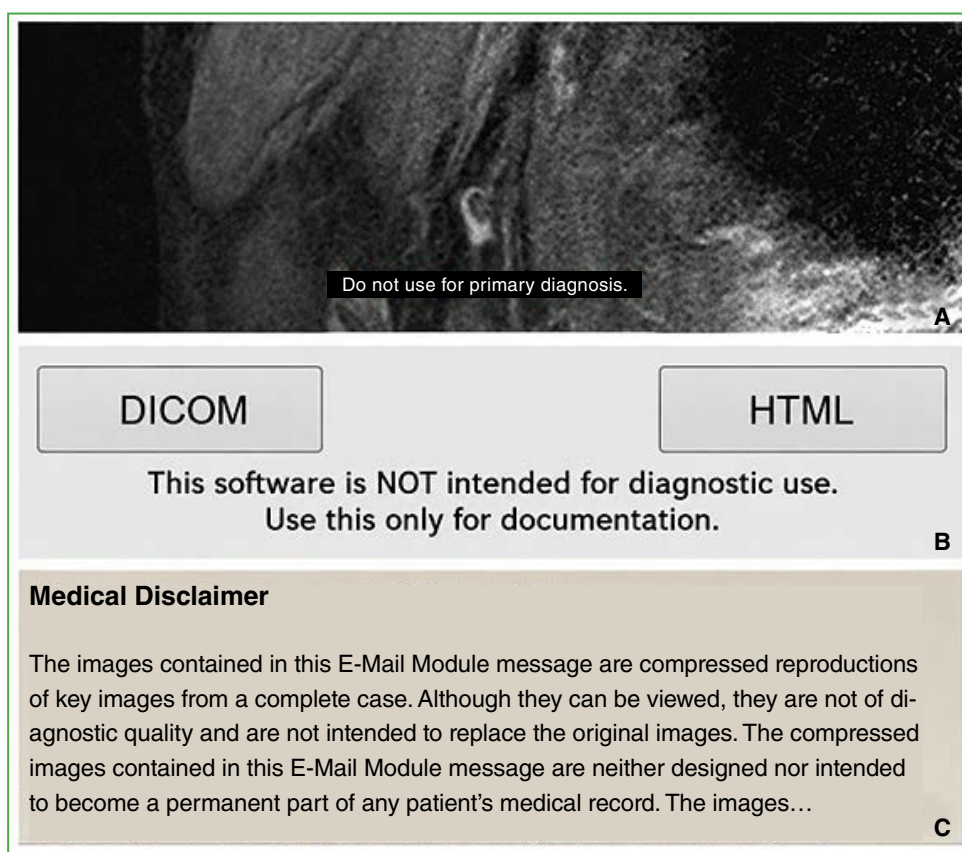


Figure 1. Examples of warning messages accompanying imaging studies requested for diagnostic purposes. **A.** Magnetic resonance imaging (MRI) study with a warning stating that it “should not be used for primary diagnosis.” **B.** Another common disclaimer displayed when opening a compact disc containing diagnostic imaging studies states that it should not be used for diagnosis, but only for “documentation.” **C.** Imaging studies accompanied by a warning stating that the images are not of “diagnostic quality.”

It should be noted that orthopedic and trauma specialists have had limited, if any, involvement in the implementation of these changes and have been forced to adapt to them in their daily practice, regardless of whether they agreed with them. In most cases, these changes have been implemented without prior consultation and presented as a fait accompli.

The objective of this study was to evaluate the perceptions of orthopedic and trauma specialists in Argentina regarding the current process of accessing requested diagnostic images and the quality of those images.

MATERIALS AND METHODS

A semistructured survey was designed based on previous studies⁷⁻⁹ and adapted to the local practice setting. Two of the authors developed the questions independently. Subsequently, two other authors conducted a pilot test to optimize the instrument. Consensus-based modifications were then made, resulting in the final version of the survey.

The final questionnaire included 15 questions divided into three sections (Table 1).

Table 1. Questions included in the survey

Demographic Data	1. How many years of experience do you have in orthopedics and traumatology?
	2. What is your main area of practice within the specialty?
	3. What type of institution do you work at?
	4. In which region of the country do you primarily work?
Assessment of Access to Imaging Study Results	5. Have you noticed a change in the process for accessing imaging study results since the pandemic (over the past 5 years)?
	6. Are you satisfied with the current system?
	7. Has your professional practice been affected by the lack of printed diagnostic images over the past two years?
	8. Have you had difficulty accessing your patients' imaging studies?
	9. What has been the main difficulty?
	10. Is access to the diagnostic imaging platforms you regularly use user-friendly?
	11. Do you feel that the new system negatively affects your workflow?
	12. Do you feel that the new system may affect your diagnostic ability?
	13. What percentage of your consultation time might be spent trying to access imaging studies?
	14. Do you consider the image quality in the studies you request to be, compared to usual, (much better/better/the same/worse/much worse)?
Training	15. Did you receive any notification of the changes or training on the new system from the imaging service providers?

The first section, consisting of four questions, was designed to collect participants' demographic data. Participants were asked to indicate their primary practice setting (public institution, private institution, or private practice). If they worked in more than one setting, they were instructed to select only the setting on which they would base their responses.

The second section included 10 questions designed to assess participants' perceptions of the new methods of accessing images and their impact on clinical practice.

Finally, participants were asked whether they had received any type of training from imaging service providers or from the institutions where they reported working.

The questions were uploaded to the SurveyMonkey® platform. The survey received prior approval from the Executive Committee of the Argentine Association of Orthopedics and Traumatology and was announced to its members via email and social media (Figure 2).



Figure 2. Promotion of the survey on social media.
(“Survey: Access to ancillary test results in our professional practice. YOUR OPINION IS VERY IMPORTANT!”).

The researchers adhered to best practices for the responsible use of data (European General Data Protection Regulation). Responses were anonymous, and no personal data were collected from any participant. Only the principal investigator had access to the platform. Data from the responses were to be used solely for publication purposes. Once submitted, responses could not be edited. Each respondent could complete the survey only once, and all questions had to be answered for the response to be considered valid and included in the final analysis.

Where appropriate, ordinal data were analyzed using values ranging from 1 to 5. Open-ended responses were coded independently by two researchers, and consensus was reached for the qualitative analysis.

Statistical Analysis

The results for all questions were evaluated using Cronbach's alpha coefficient, which measures the internal consistency reliability of a scale or test by assessing the degree to which its items are correlated with one another. The internal consistency of the instrument was considered excellent (>0.9), with a Cronbach's alpha coefficient of 0.9689, indicating that the items were strongly correlated and measured the same construct; therefore, the questionnaire was considered reliable (Table 2).

Table 2. Internal consistency of the questionnaire

Item	Comments	Sign	Item correlation	Correlation with remaining items	Average inter-item covariance	Alpha
Question 5	323	+	0.7434	0.7038	0.8918	0.9699
Question 6	323	+	0.9477	0.9370	0.8341	0.9637
Question 7	323	-	0.9551	0.9425	0.7845	0.9628
Question 8	323	-	0.9445	0.9324	0.8253	0.9635
Question 9	323	+	0.8929	0.8585	0.7726	0.9673
Question 10	323	-	0.8785	0.8537	0.8422	0.9658
Question 11	323	-	0.9534	0.9410	0.7936	0.9628
Question 12	323	-	0.9477	0.9342	0.7986	0.9631
Question 13	323	+	0.9470	0.9310	0.7738	0.9635
Question 14	323	+	0.9364	0.9224	0.8241	0.9637
Question 15	322	+	0.4541	0.4327	0.9880	0.9763
Scale test					0.8299	0.9689

RESULTS

Demographic Data

A total of 323 physicians who were members of the Argentine Association of Orthopedics and Traumatology participated in the survey. The largest proportion reported practicing general orthopedics and traumatology (25%), while the remainder were distributed across 10 subspecialties (Table 3). Overall, 78.3% of respondents had more than 10 years of professional experience in the specialty.

Table 3. Distribution of participants by their area of practice in the field of orthopedics and traumatology.

Area of practice	
General orthopedics and traumatology	81 (25.08%)
Shoulder and elbow	64 (19.81%)
Hip and Knee	53 (16.41%)
Ankle and foot surgery	26 (8.05%)
Hand surgery	26 (8.05%)
Sports Traumatology	25 (7.74%)
Spine	22 (6.81%)
Pediatric Orthopedics	17 (5.26%)
Trauma	8 (2.48%)
Pediatric Oncology	1 (0.31%)
Neuroorthopedics	0
Total	323 (100%)

General orthopedics and traumatology showed a bimodal distribution according to years of practice, with the highest proportions among physicians with less than 5 years of practice (51.6%) and those with more than 30 years (30.43%). More recently developed subspecialties, such as shoulder and elbow surgery, peaked among physicians with 6-10 years of practice (35.9%), whereas more traditional subspecialties, such as hip and knee surgery, were more heavily represented among those with more than 30 years of practice (26.5%).

Regarding the primary practice setting, 67.8% reported working at a private institution, 16.4% at a public institution, and 15.8% in private practice. In addition, the proportion of physicians working in private practice increased with years of professional experience.

Regarding geographic distribution (Figure 3), physicians from all regions of the country participated, with a predominance of respondents from the Buenos Aires Metropolitan Area (AMBA) (52.6%), defined as the area comprising the Autonomous City of Buenos Aires and 40 surrounding municipalities in Buenos Aires Province.

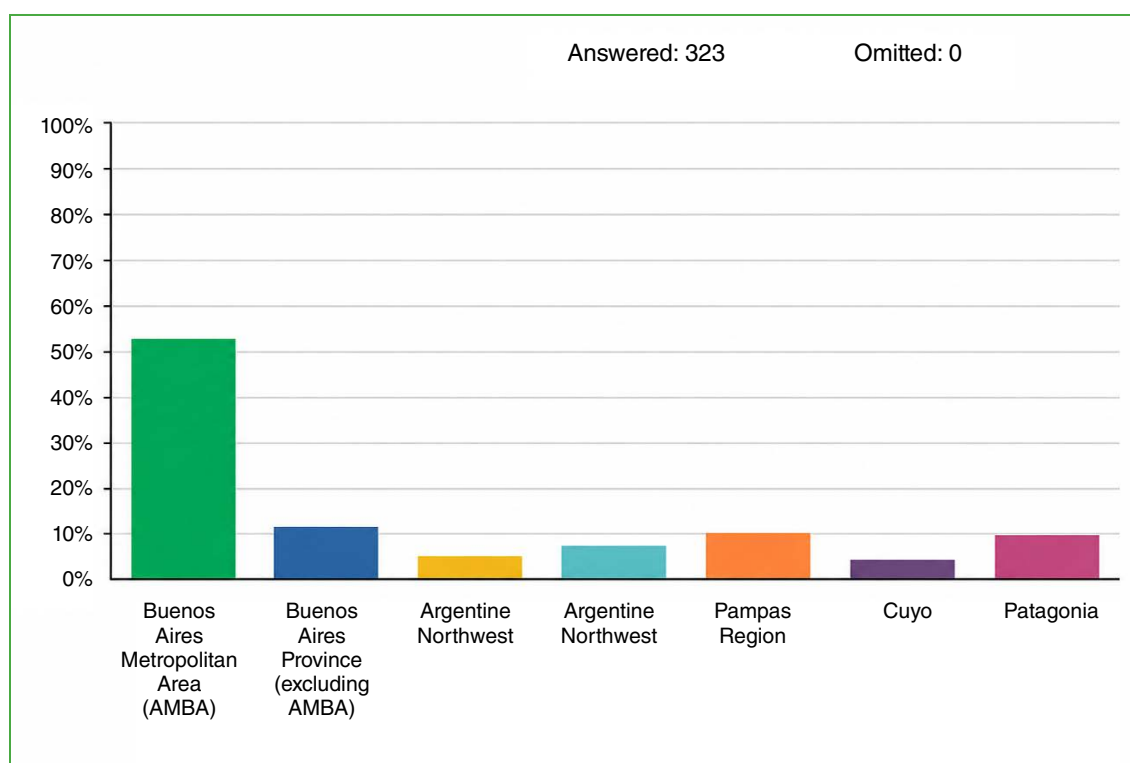


Figure 3. Geographic distribution of respondents' practice locations.

Perception of Change

Sixty-two percent of respondents reported having perceived a very significant change in the methods used to access imaging study results since the beginning of the pandemic (over the past 5 years), whereas only 0.62% reported no change. The perception of change was directly related to years of professional practice. It was considered very significant by 42% of physicians with up to 5 years of practice, compared with 72% of those with more than 30 years of experience.

Geographically, the greatest impact of these changes was observed in regions with larger urban centers, such as the AMBA, the Pampas Region, and northwestern Argentina.

The impact was most pronounced among physicians in private practice, 78% of whom rated the change as very significant, compared with 58.5% and 58.9% of those working in public and private institutions, respectively.

Finally, the subspecialties in which physicians reported the greatest impact were orthopedic oncology, spine surgery, and hip and knee surgery.

Level of Satisfaction

Fifty percent of respondents who perceived changes reported being slightly or not at all satisfied. Within this group, the highest proportion of respondents who were “not at all satisfied” was observed among physicians with more than 30 years of practice (28.26% of that subgroup).

Regarding geographic distribution, the highest level of dissatisfaction was recorded in the AMBA, where 69.42% reported being slightly or not at all satisfied. In contrast, the Cuyo region had the lowest level of dissatisfaction, with 20% of respondents falling into the same category.

Regarding practice setting, 53% of respondents who based their answers on their private practice reported dissatisfaction, compared with 49.3% of those working in private institutions and 49% of those working in public institutions.

Finally, the subspecialties reporting the highest levels of dissatisfaction were orthopedic oncology, spine surgery, and hip and knee surgery.

Impact of the Lack of Printed Imaging Studies

Forty percent of respondents reported being frequently or very frequently affected by the lack of printed imaging studies. Once again, years of professional practice influenced this perception: the proportion reporting a negative impact was highest among physicians with more than 30 years of practice, 57.6% of whom reported being frequently or very frequently affected.

Physicians in the AMBA were the most affected (54%), whereas those in the Cuyo region reported the lowest impact (7%).

Physicians working in public institutions reported the greatest impact (53%), followed by those in private practice (47%). In contrast, the impact was lower among physicians working in private institutions (35%).

Difficulty Accessing Imaging Studies

A total of 49.9% of respondents reported experiencing difficulties accessing imaging studies frequently or very frequently, whereas only 0.93% reported never having encountered any difficulties. Among physicians in the AMBA, 68% reported frequent difficulties, whereas orthopedic surgeons in the Cuyo region reported the lowest level of difficulty (13%).

Physicians working in public institutions reported frequent or very frequent difficulties in 55% of cases, followed by those in private practice (53%); this percentage was slightly lower among those working in private institutions (48%).

Regarding subspecialties, spine surgeons reported the greatest impact (68%), whereas sports orthopedics specialists were the least affected (20%).

Main Difficulties

For this question, participants were offered five response options:

- The patient forgets to bring the printed imaging studies.
- The imaging provider’s platform cannot be accessed.
- The imaging studies are difficult to view on the patient’s mobile phone.
- The studies were not uploaded correctly.
- All of the above.

The most frequent response was “all of the above” (49.9%), followed by inability to access the imaging platform (35%). Physicians with more than 30 years of practice (28.5%) and spine subspecialists (64%) were the groups that most frequently reported encountering all of the aforementioned problems.

Accessibility of Digital Platforms

A total of 56% of respondents considered the platforms difficult to use. Once again, spine specialists reported the most negative assessment, whereas sports orthopedics specialists reported the most favorable perception.

Impact of the Changes on Clinical Practice

Only 28.5% of respondents reported that the changes in access to imaging studies had little or no negative impact on their clinical practice. A total of 24.5% indicated that the negative impact occurred occasionally, whereas 47% reported that it occurred frequently or very frequently.

The lowest negative impact was observed among physicians with less than 5 years of practice (35.5%), whereas the highest was reported by those with more than 30 years of practice (63%). Geographically, the worst results were recorded in the AMBA, where 65% of responses were “frequent” or “very frequent.” In the Cuyo region, the impact was lower, with only 13% reporting “frequent” and none reporting “very frequent.”

Regarding practice setting, physicians working in public institutions (53%) and private practice (51%) were the most affected, compared with those working in private institutions (45%). Regarding subspecialties, spine surgeons reported the greatest negative impact (63%), whereas sports orthopedics specialists were the least affected (16%).

Diagnostic Ability

Twenty-seven percent of respondents considered that the new system could frequently (18%) or very frequently (9%) affect their diagnostic ability. Consistent with previous findings, this perception was more common among physicians with more than 30 years of practice (37%) and less common among those with less than 5 years of experience (16%). Geographically, the greatest impact was observed in the AMBA (35% reporting “frequent” or “very frequent”), whereas no responses in these categories were recorded in the Cuyo region.

Regarding practice setting, private practice was the most affected (35% reporting “frequent” or “very frequent”), whereas the impact was lower in private institutions (24%).

Regarding subspecialties, spine surgeons reported the greatest impact (36% reporting “frequent” or “very frequent”), whereas sports orthopedics specialists reported a lower impact (12% “frequent” and 0% “very frequent”).

Time Consumption

A total of 29.5% of respondents estimated that attempts to access images could take up as much as 40–50% of the consultation time. No significant differences were observed according to years of practice, although geographic differences were evident. Once again, physicians in the AMBA were the most affected: 45% of respondents spent more than 40% of the consultation time attempting to access images, whereas physicians in the Cuyo region were the least affected (7%).

No significant differences were found according to practice setting. Regarding subspecialties, spine specialists reported the greatest impact (54%), whereas sports orthopedics specialists were the least affected (8%).

Image Quality

Twenty-four percent of respondents considered image quality to be inferior to what they had previously experienced; 27.5% rated it as equivalent, 38.5% as better, and 10% as much better. Physicians with more than 30 years of practice had the most negative perception, with 40% considering image quality to be worse or much worse, compared with only 13% among those with less than 5 years of practice.

The perceived decline in quality was most pronounced in the AMBA (32%) and least pronounced in the Patagonia region (3%).

Regarding practice setting, the worst results were reported by physicians in private practice (35%), followed by those working in public institutions (26.5%) and, to a lesser extent, private institutions (20.5%).

Regarding subspecialties, physicians specializing in spine surgery (23%) and hip and knee surgery (40%) reported the worst results, whereas the negative perception was much less frequent among sports orthopedics (8%) and orthopedic oncology specialists (0%).

Training

A total of 92.24% of respondents reported that they had not received any training on accessing and navigating digital platforms. All participants from the Cuyo region ($n = 15$) reported having received no training, whereas physicians from northwestern Argentina had the highest rate of training (26%). No significant differences were observed according to practice setting, although the lowest training rate was reported in private practice (5.8%) and the highest in public institutions (9.6%).

DISCUSSION

The survey findings reveal a marked change in access to imaging study results in the field of orthopedics and traumatology over the past five years, particularly since the COVID-19 pandemic. A significant level of dissatisfaction with current methods of accessing imaging studies was observed. The most affected were physicians with more years of professional experience, those working in private practice, and those located in the AMBA. Conversely, the least affected were specialists with less than 5 years of practice, those working in private institutions, and those in the Cuyo region.

Regarding subspecialties, spine surgeons reported the highest levels of dissatisfaction, whereas sports orthopedics specialists reported the lowest. It should be noted that the sample size and practice settings of both groups were comparable; therefore, these differences were not influenced by these variables.

Most respondents had not received any training from imaging service providers or the institutions where they worked; the changes were implemented without formal training. Nearly 50% expressed dissatisfaction with the new methods, a similar proportion reported frequent difficulties accessing information, and 47% reported a frequent or very frequent negative impact on their clinical practice. Furthermore, 27% considered that the changes could affect their diagnostic ability. It also became evident that accessing imaging studies can consume a considerable proportion of consultation time: nearly 30% of respondents indicated that attempts to access images could take up as much as 40-50% of the consultation time. As reported in other studies,¹⁰ the worst conditions were observed in the AMBA.

In contrast, experiences in other settings have shown more favorable results following changes in methods of accessing images. Kruger et al.¹ reported that 94.5% of surgeons considered that the transition from physical to digital images improved access to imaging studies. Wojciech et al.¹¹ evaluated the introduction of the DICOM system and found that, in 90% of cases, digital images were successfully accessed on the first attempt. Lindsay et al.¹² reported that the implementation of PACS improved report turnaround time (70%) and medical staff workflow (57%). Jorwekar et al.¹³ reported a 94% satisfaction rate among respondents following implementation of the same system. Chan et al.¹⁴ found that referring physicians almost unanimously preferred PACS to printed films, and 91% reported improved productivity.

Why, then, is the perception in our setting so different? The medical literature suggests that users will adopt new technologies only if they perceive that they make their work easier;¹⁵ however, the results of our survey show that this is not the case for many surgeons in our setting.

It has been proposed that the performance of a radiology center should be assessed according to six variables: productivity, report turnaround time, ease of access, finances, and physician and patient satisfaction.¹² In practice, healthcare intermediaries prioritize patient/client satisfaction, considering indicators such as complaints, satisfaction, and waiting times.^{15,16} However, referring physicians, particularly those in private practice, are the true primary clients,¹⁶ as they generate the demand for imaging studies and must use their results. Despite this, their opinions are rarely taken into account when changes are implemented or platforms are selected. This reflects a failure to recognize specialists as “clients” in the provision of imaging services.

Physicians frequently receive poor-quality studies, images deemed unsuitable for diagnosis by the imaging provider itself (Figure 1), inaccurate reports (Figure 4), inadequate images (Figure 5), inaccessible platforms (Figure 6), and data upload errors (Figures 7 and 8). Faced with these situations, the orthopedic surgeon must choose between making decisions based on inadequate studies or referring the patient back to have the examinations repeated, resulting in further difficulties and delays.

Clearly, the failure of imaging providers to identify the primary user hinders the implementation of improvements aimed at increasing physician satisfaction.

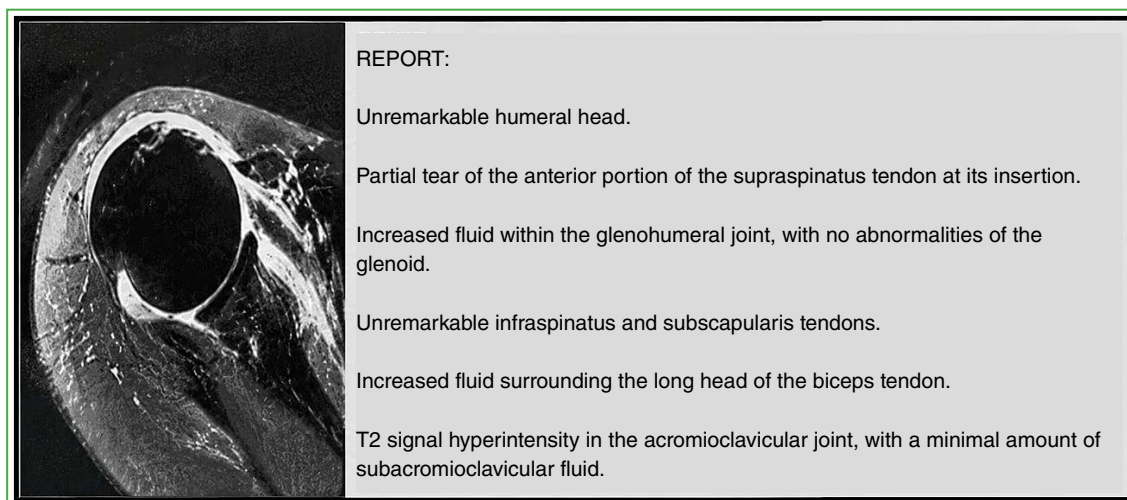


Figure 4. MRI study in which the report states that the subscapularis muscle shows no abnormalities, despite the presence of a full-thickness tear of its distal insertional tendon.



Figure 5. Examples of poor-quality diagnostic images. **A.** An anteroposterior shoulder image is inserted between two views of the cervical spine. The shoulder image is cropped, and large areas cannot be visualized because of technical errors. **B.** Anteroposterior and oblique images of the rib cage printed on a radiographic film the size of a pen.

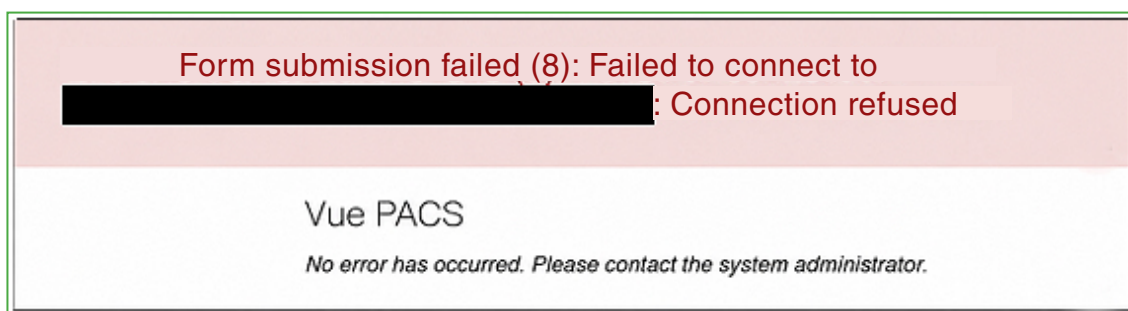


Figure 6. Examples of situations in which images stored in PACS cannot be accessed.

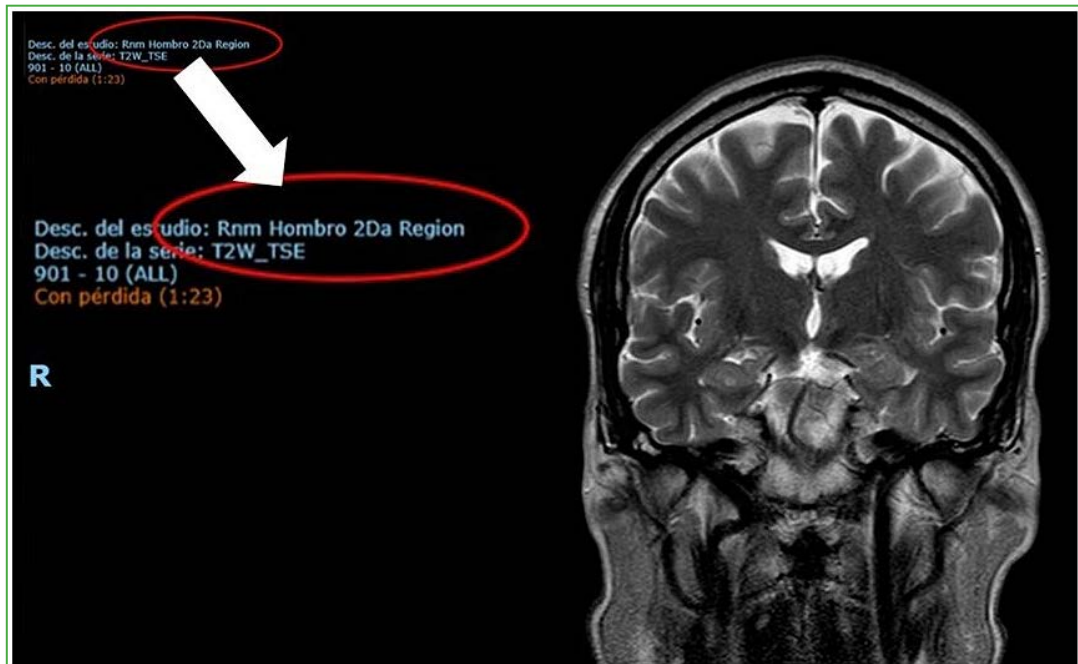


Figure 7. Example of an incorrect image upload. The patient had been referred for an MRI of the shoulder. The study is correctly labeled, but brain images from another patient were uploaded instead.

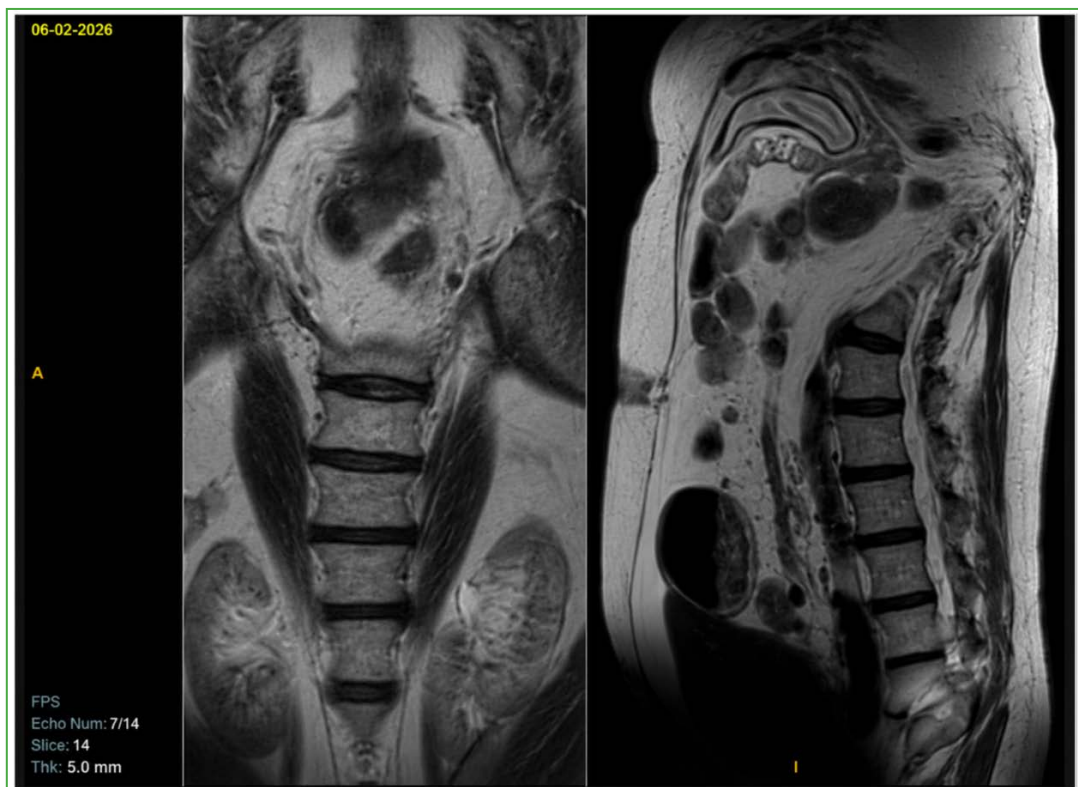


Figure 8. Another example of an incorrect image upload. The lumbar spine images were uploaded upside down. (The image was edited to include both views in a single figure.)

Limitations

This study has some limitations. First, the sample size is relatively small compared with the total population of orthopedic and trauma specialists in Argentina. The survey format, with predefined response options, may have limited the diversity of responses. In addition, the data were self-reported, which may have introduced response bias or resulted in incomplete information.

Strengths

This is the first study to assess the perceptions of orthopedic and trauma specialists regarding access to imaging study results in Argentina. Strategies were implemented to mitigate bias, including anonymous participation, and the study received institutional support.

CONCLUSIONS

To our knowledge, this survey is the first study to assess the perceptions of Argentine orthopedic and trauma specialists regarding access to imaging study results. Compared with international experiences, the level of dissatisfaction was high. The vast majority of physicians had received no training in the new methods of access.

The main contribution of this study is to provide an assessment of the current situation that may help ensure that orthopedic surgeons are recognized as relevant stakeholders and that their perspectives are considered when implementing technological changes in access to imaging studies.

Conflicts of interest: The authors declare no conflicts of interest.

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