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# Artificial Intelligence (AI) Application Implementation In Radiology: Impediments And Enablers

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**Abstract:**

The aim of this study was to determine the obstacles and enablers related to the adoption of artificial intelligence (AI) in clinical radiology within the Netherlands.

Materials and techniques: An exploratory, qualitative research design was used with an embedded multiple case study. 24 semi-structured interviews from seven Dutch hospitals made up the data collection process. The Non-adoption, Abandonment, Scale-up, Spread, and Sustainability (NASSS) framework for new medical technologies in healthcare organizations was recently published, and it served as a guide for the analysis of barriers and facilitators. Implementation processes must be carried out in an organized way in order to provide evidence of the clinical added value of AI applications and help improve the quality and effectiveness of clinical radiology.

**Keywords:** Artificial Intelligence, Computer Systems, Diagosis, Radiology.

**Introduction**

More and more people are realizing the value of artificial intelligence (AI) in clinical radiology. Algorithms developed recently in machine learning enable the automated and precise identification and diagnosis of medical images. Policymakers, healthcare professionals, and radiologists all have high expectations as a result of the significant

technological advancements. They promise significant improvements in healthcare quality and efficiency, such as enabling more accurate diagnosis and automating labor-intensive duties that radiologists currently (Obermeyer , 2016). Radiologists will need to acquire complementary skills as AI is predicted to significantly alter clinical work practices . The story that "AI is replacing radiologists" has gained traction as a result of the intense debate surrounding this issue at major conferences and in academic journals . Not surprisingly, there have been strong reactions to the replacement narrative in the radiology community ( European , 2019). Strict legal and regulatory requirements, a wide range of stakeholders, organizational processes, and strong routines and professional identities are all involved in the deployment of technology in hospital settings. It is too soon to assess the use of AI applications in radiology because they are still in their infancy. However, it can be assumed that implementation barriers for AI applications will exist given the unsuccessful widespread diffusion of previous CAD systems. We investigated the organizational, social, and technological elements that both help and impede the successful deployment of AI applications in radiology departments ( Liew, 2018 ).

**Materials and methods:**

Strict legal and regulatory requirements, a wide range of stakeholders, organizational processes, and strong routines and professional identities are all involved in the deployment of technology in hospital settings. It is too soon to assess the use of AI applications in radiology because they are still in their infancy. However, it can be assumed that implementation barriers for AI applications will exist given the unsuccessful widespread diffusion of previous CAD systems. We investigated the organizational, social, and technological elements that both help and impede the successful deployment of AI applications in radiology departments ( Sogani , 2019).

We looked into seven Dutch hospitals using an embedded multiple case study approach. An overview of our interviewees and the cases that is, the hospitals—they are involved in is given in Appendix A. Given the intense pressure to reduce costs in the health care sector— a factor that AI in radiology is predicted to play a major role in—we decided to concentrate on The Netherlands (Baxter , 2019).

**Implementation of artificial intelligence (AI) applications in radiology:**

This study adds to the body of empirical data already available

regarding the difficulties in implementing AI-based medical technologies. One of the main reasons for non-adoption and abandonment, and consequently a hindrance to the effective application of AI applications in radiology, is a lack of acceptance, as we have determined. The factors influencing radiologists' acceptance of AI applications discovered in this study are consistent with data from radiologists' surveys (Topol, 2016). and radiology residents, as well as past research on the factors that influence physicians' adoption of computerized decision support systems (CDSS): a lack of knowledge, trus, a shift in the clinician's sense of self, and professional autonomy. We discovered that local champions are essential in bridging the gap in the acceptance of tech users. The significance of having a local champion had previously appeared in research on the adoption of telehealth systems, as well as on the implementation of CDSS . Notably, local champions were also recognized as a key implementation facilitator in a recent study on the use of CDSS in US radiology departments. The facilitating role that local champions played in initiating and advancing the CDSS implementation processes is mentioned in both studies (Chockley , 2016).

**AI applications in radiology :**

Applications of AI in radiology are expected to challenge the roles of highly educated people by supporting and possibly automating some medical decision-making processes. The process of adopting and implementing health digitization is made more complex by the aspect of job displacement brought about by automation. Despite the fact that many recent radiology publications have discussed the possibility of AI replacing radiologists and thereby endangering their professional identity, none of the research participants felt that this threat was real (Mazurowski , 2019). This is consistent with recent surveys of radiologists' opinions. Radiologists already have the most digitally advanced workplace in the medical industry. and they see themselves as the logical leaders in incorporating digital support tools into their regular work. Radiologists must become AI literate through supplementary training in order to assume a leading role in the hospital's adoption of AI applications ( Dreyer , 2017).

**Recommendations:**

To improve the results' generalizability, more research should look into applications that are more complex technically than BoneXpert and account for a greater portion

of radiologists' diagnostic work. Furthermore, it's critical to comprehend how the political and social environments of each nation influence the implementation procedures. Future research can pinpoint particular technical obstacles to the deployment of AI applications, such as datasets and related specifications (such as size, algorithms, and heterogeneity of data). Subsequent studies ought to concentrate on the effects of AI application implementation on radiologists' knowledge development.

**Conclusion:**

Given the significant attention that artificial intelligence (AI) applications are receiving in radiology and other medical fields, such as pathology, it is critical to comprehend the obstacles and enablers surrounding the application of AI. The existence of a "local champion," or someone with a keen personal interest in AI applications who frequently starts and actively promotes AI implementation in the company, is one of the key enabling factors. The ambiguous added value for clinical practice is one of the main obstacles, which lowers adopters' acceptance of AI applications and makes it more difficult to raise money to purchase AI applications. Additionally, it was discovered that a significant impediment to the implementation of AI applications was the omission of all pertinent stakeholders from the planning, execution, and monitoring phases of the process. More proof of the additional value of adopters' AI applications in the clinical setting is required in order to boost adoption rates. It is imperative that all relevant stakeholders, particularly radiologists and referring clinicians, are involved in the decision- making process when it comes to AI application design and implementation.

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