User Experience - Usability and Integration

Next Steps:

1. Bronte: PRISMA Flow diagram and study characteristics
2. Cailin & Benjamin: extract data from the studies
3. Codebooks

## PRISMA

First we need to collect all possible studies that we will use for analysis.

1. Design search queries (research question)
2. Identify databases to search
3. Run search queries in the databases and collect results.

Second we screen them to identify which are relevant for our analysis.

1. Define inclusion/exclusion criteria.
2. Exclude based on title.
3. Exclude based on abstract.
4. Exclude based on full text and if it contains the data we need.

The databases searched in August/September 2022 were Google Scholar, PubMed, and ProQuest. The search was limited to published articles from scholarly journals and three search queries were defined. The queries were designed to capture any user experience studies undertaken of the commercial AI product qXR by using the keywords user experience, user acceptance, usability, and workflow integration. A total of 28 articles were identified and 17 remained after duplicates were removed. The titles and abstracts of the articles were screened and 16 articles were excluded. The criteria for inclusion was that the article referred to user experience of qXR in a standard clinical setting. The remaining article was excluded after a full-text read through of the article because it contained information about the use of qXR, however, did not contain a study on user experience.

Inclusion criteria

* Topic: diagnosis of tuberculosis using the artificial intelligence product qXR
* Setting: standard clinical setting
* Study type: user experience

PRISMA Flow Chart

1. 27 articles identified from running the 3 search queries in the 3 databases.
2. 17 articles remain after duplicates were removed.
3. 1 article remained after screening titles and abstracts.
4. No articles remained after full-text reading.

## Research Question and Search queries

1. User experience studies relating to qXR (Bronte)

* “qXR” AND (“user experience” OR “user acceptance”) study
* “qXR” “artificial intelligence” “usability” study
* (“qXR” AND "artificial intelligence") AND (workflow integration study)

1. User experience studies relating to qXR’s competitors (Benjamin, Cailin)

* “Artificial intelligence” AND tuberculosis AND (user AND (experience OR acceptance))
* “Artificial intelligence” tuberculosis usability
* “Artificial intelligence” AND tuberculosis AND (workflow AND (integration OR impact))

1. User experience studies relating to commercial medical AI products which diagnose lung-related diseases.

## Databases To Search

1. Google Scholar
2. PubMed
3. ProQuest

Articles Identified for qXR

| Title | Database | Link | Status |
| --- | --- | --- | --- |
| Tuberculosis detection from chest x-rays for triaging in a high tuberculosis-burden setting: an evaluation of five artificial intelligence algorithms | Google Scholar | <https://www.sciencedirect.com/science/article/pii/S2589750021001163> | Excluded: study type is DTA |
| Early Evaluation of an Ultra-Portable X-ray System for Tuberculosis Active Case Finding | Google Scholar | <https://www.mdpi.com/2414-6366/6/3/163> | Excluded: setting is portable/remote |
| Digital Health and Rheumatology: The Indian Context | Google Scholar | <https://www.researchgate.net/profile/Vinod-Ravindran/publication/354299421_Digital_health_and_rheumatology_The_Indian_context/links/613ffb5e5d9d0e131b4281eb/Digital-health-and-rheumatology-The-Indian-context.pdf> | Excluded: topic is rheumatology |
| Development of convolutional neural networks for recognition of tenogenic differentiation based on cellular morphology | Google Scholar | <https://www.sciencedirect.com/science/article/pii/S0169260721003539> | Excluded: topic is development of CNNs |
| Early Evaluation of an Ultra-Portable X-ray System for Tuberculosis Active Case Finding | ProQuest | <http://ezproxy.library.usyd.edu.au/login?url=https://www.proquest.com/scholarly-journals/early-evaluation-ultra-portable-x-ray-system/docview/2576502802/se-2> | 5 |
| Independent evaluation of 12 artificial intelligence solutions for the detection of tuberculosis | Google Scholar | <https://www.nature.com/articles/s41598-021-03265-0> | Excluded: topic is DTA |
| Early Evaluation of an Ultra-Portable X-ray System for Tuberculosis Active Case Finding | Google Scholar | <https://www.mdpi.com/2414-6366/6/3/163> | 7 |
| Artificial intelligence and radiology: Combating the COVID-19 conundrum | Google Scholar | <https://www.thieme-connect.com/products/ejournals/html/10.4103/ijri.IJRI_618_20> | Excluded: topic is covid-19 |
| The Applications of Artificial Intelligence in Chest Imaging of COVID-19 Patients: A Literature Review | Google Scholar | <https://www.mdpi.com/2075-4418/11/8/1317> | Excluded: topic is covid-19 |
| Independent evaluation of 12 artificial intelligence solutions for the detection of tuberculosis | ProQuest | <http://ezproxy.library.usyd.edu.au/login?url=https://www.proquest.com/scholarly-journals/independent-evaluation-12-artificial-intelligence/docview/2609525298/se-2> | 10 |
| The Applications of Artificial Intelligence in Chest Imaging of COVID-19 Patients: A Literature Review | ProQuest | <http://ezproxy.library.usyd.edu.au/login?url=https://www.proquest.com/scholarly-journals/applications-artificial-intelligence-chest/docview/2565118756/se-2> | 11 |
| Early Evaluation of an Ultra-Portable X-ray System for Tuberculosis Active Case Finding | ProQuest | <http://ezproxy.library.usyd.edu.au/login?url=https://www.proquest.com/scholarly-journals/early-evaluation-ultra-portable-x-ray-system/docview/2576502802/se-2> | 12 |
| Artificial Intelligence Solutions for Analysis of X-ray Images | Google Scholar | <https://journals.sagepub.com/doi/full/10.1177/0846537120941671> | Excluded: topic is broad discussion of AI for x-rays |
| A new resource on artificial intelligence powered computer automated detection software products for tuberculosis programmes and implementers | Google Scholar | <https://www.sciencedirect.com/science/article/pii/S147297922030216X> | Included. Excluded in full-text reading because it is not a study of user experience. |
| The Application of Artificial Intelligence in the Diagnosis and Drug Resistance Prediction of Pulmonary Tuberculosis | Google Scholar | <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9366014/> | Excluded: technical study |
| Deep learning, computer-aided radiography reading for tuberculosis: a diagnostic accuracy study from a tertiary hospital in India | Google Scholar | <https://www.nature.com/articles/s41598-019-56589-3> | Excluded: DTA study |
| Artificial intelligence applications in medical imaging: A review of the medical physics research in Italy | Google Scholar | <https://www.sciencedirect.com/science/article/pii/S1120179721001678> | Excluded: topic is applications of AI |
| The Applications of Artificial Intelligence in Chest Imaging of COVID-19 Patients: A Literature Review | Google Scholar | <https://www.mdpi.com/2075-4418/11/8/1317> | 18 |
| Performance of Qure.ai automatic classifiers against a large annotated database of patients with diverse forms of tuberculosis | Google Scholar | <https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0224445> | Excluded: technical study |
| Evolution of Machine Learning in Tuberculosis Diagnosis: A Review of Deep Learning-Based Medical Applications | Google Scholar | <https://www.mdpi.com/2079-9292/11/17/2634> | Excluded: topic is a broad description of AI tools for tuberculosis |
| Comprehensive literature review on the radiographic findings, imaging modalities, and the role of radiology in the COVID-19 pandemic | Google Scholar | <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8473437/> | Excluded: topic is covid-19 and utilisation of AI |
| The COVID-19 opportunity for Qure.ai | Google Scholar | <https://journals.sagepub.com/doi/full/10.1177/14657503211063913> | Excluded: topic is use of qXR for detecting covid-19 |
| Early Evaluation of an Ultra-Portable X-ray System for Tuberculosis Active Case Finding | Google Scholar | <https://www.mdpi.com/2414-6366/6/3/163> | 23 |
| Viscosity Prediction in a Physiologically Controlled Ventricular Assist Device | Google Scholar | <https://ieeexplore.ieee.org/abstract/document/8268082> | Excluded: topic is ventricular assist device |
| The Applications of Artificial Intelligence in Chest Imaging of COVID-19 Patients: A Literature Review | ProQuest | <http://ezproxy.library.usyd.edu.au/login?url=https://www.proquest.com/scholarly-journals/applications-artificial-intelligence-chest/docview/2565118756/se-2> | 25 |
| Early Evaluation of an Ultra-Portable X-ray System for Tuberculosis Active Case Finding | ProQuest | <http://ezproxy.library.usyd.edu.au/login?url=https://www.proquest.com/scholarly-journals/early-evaluation-ultra-portable-x-ray-system/docview/2576502802/se-2> | 26 |
| Performance of Qure.ai automatic classifiers against a large annotated database of patients with diverse forms of tuberculosis | ProQuest | <http://ezproxy.library.usyd.edu.au/login?url=https://www.proquest.com/scholarly-journals/performance-qure-ai-automatic-classifiers-against/docview/2344551058/se-2> | 27 |

# User experience studies relating to qXR’s competitors (Benjamin, Cailin)

## Research Question and Search Queries

* “Artificial intelligence” AND tuberculosis AND (user AND (experience OR acceptance))
* “Artificial intelligence” tuberculosis usability
* “Artificial intelligence” AND tuberculosis AND (workflow AND (integration OR impact))

## Databases To Search

1. Google Scholar - Cailin
2. PubMed - Ben
3. ProQuest - Ben

PRISMA Flow Diagram

1. Articles identified from database search: . Articles provided by client: 5.
2. Articles remaining after screening title and abstract
3. Articles remaining after reading full-text

Inclusion Criteria

* Topic: AI in radiology
* Setting: standard clinical setting
* Study type: user experience (actual and perceived factors affecting acceptance)

Articles provided by the client

| Title | Status |
| --- | --- |
| Exploring stakeholder attitudes towards  AI in clinical practice | Included |
| An international survey on AI in radiology in 1,041 radiologists  and radiology residents part 1: fear of replacement, knowledge,  and attitude | Included |
| An international survey on AI in radiology in 1041 radiologists  and radiology residents part 2: expectations, hurdles  to implementation, and education | Included |
| Implementation of artificial intelligence (AI) applications  in radiology: hindering and facilitating factors | Included |
| The integration of artificial intelligence in medical imaging practice:  Perspectives of African radiographers | Included |

| Title | Database | Link | Status |
| --- | --- | --- | --- |
| Artificial intelligence and the future of global health | Google Scholar - Searching ‘artificial intelligence and tuberculosis usability’ | <https://www.sciencedirect.com/science/article/pii/S0140673620302269> | Cut from list - No mention of usability |
| Independent evaluation of 12 artificial intelligence solutions for the detection of tuberculosis | Google Scholar - Searching ‘artificial intelligence and tuberculosis usability | <https://www.nature.com/articles/s41598-021-03265-0> | Cut from list - No mention of usability (only says how further studies should be done on usability) |
| Using Artificial Intelligence to Reduce the Risk of Nonadherence in Patients on Anticoagulation Therapy | Google Scholar - Searching ‘artificial intelligence and tuberculosis usability | <https://www.ahajournals.org/doi/full/10.1161/STROKEAHA.116.016281> | Cut from list - Doesn’t address TB |
| Computer-aided detection in chest radiography based on artificial intelligence: a survey | Google Scholar - Searching ‘artificial intelligence and tuberculosis usability | <https://biomedical-engineering-online.biomedcentral.com/articles/10.1186/s12938-018-0544-y> | Cut from list - No mention of usability |
| Evolving Applications of Artificial Intelligence and Machine Learning in Infectious Diseases Testing | Google Scholar - Searching ‘artificial intelligence and tuberculosis UX’ | ​​<https://academic.oup.com/clinchem/article/68/1/125/6490223?login=true> | Keep for now - has one sentence about user experience |
| Proposal for the development of a mobile virtual assistant  for treatment of tuberculosis | Google Scholar - Searching ‘artificial intelligence and detecting tuberculosis UX’ | <https://www.researchgate.net/profile/Domingos-Alves-3/publication/331399302_Proposal_for_the_development_of_a_mobile_virtual_assistant_for_treatment_of_tuberculosis/links/5c77adc4299bf1268d2b7e2d/Proposal-for-the-development-of-a-mobile-virtual-assistant-for-treatment-of-tuberculosis.pdf> | Keep for now - talks about how they are going to test user experience with this TB AI |
| Artificial intelligence in overcoming rifampicin resistant-screening challenges in Indonesia: a qualitative study on the user experience of CUHAS-ROBUST | Google Scholar - Searching ‘artificial intelligence and detecting tuberculosis UX’ | <https://www.emerald.com/insight/content/doi/10.1108/JHR-11-2020-0535/full/html> | YES KEEPING THIS |
| Is Artificial Intelligence the New Friend for Radiologists? A Review Article | Google Scholar - Searching ‘artificial intelligence and detecting tuberculosis UX’ | <https://www.cureus.com/articles/43506-is-artificial-intelligence-the-new-friend-for-radiologists-a-review-article> | Remove - nothing on TB nor UX |
| Acoustic surveillance of cough for detecting respiratory disease using artificial intelligence | Google Scholar - Searching ‘artificial intelligence and detecting tuberculosis UX’ | <https://openres.ersjournals.com/content/8/2/00053-2022.abstract> | Remove - nothing on TB |
| The perception of health providers about an artificial intelligence applied to Tuberculosis video-based treatment in Brazil: a protocol proposal | Google Scholar - Searching ‘AI detecting tuberculosis TAM model’ | <https://www.sciencedirect.com/science/article/pii/S1877050919322720> | Keep |
| **Satisfaction evaluation of health professionals in the usability of software for monitoring the tuberculosis treatment** |  | <https://www.sciencedirect.com/science/article/pii/S1877050917323177> | Keep |
| Towards a Clinical Trial Protocol to Evaluate Health Information Systems: Evaluation of a Computerized System for Monitoring Tuberculosis from a Patient Perspective in Brazil |  | <https://link.springer.com/article/10.1007/s10916-018-0968-8> | Keep |
| An adoption model describing clinician’s acceptance of automated diagnostic system for tuberculosis |  | <https://link.springer.com/article/10.1007/s12553-016-0136-4> | Keep |
| Reimagining the status quo: How close are we to rapid sputum-free tuberculosis diagnostics for all? | Google Scholar - Searching ‘AI detecting tuberculosis TAM model’ | <https://www.sciencedirect.com/science/article/pii/S2352396422001232> | Remove - no mention of UX |
| Acceptance of the Use of Artificial Intelligence in Medicine Among Japan’s Doctors and the Public: A Questionnaire Survey | Google Scholar - Searching ‘AI detecting tuberculosis UTAUT model’ | <https://humanfactors.jmir.org/2022/1/e24680/> | Remove - no mention of TB |
| ADOPTION BARRIERS OF AI: A CONTEXT-SPECIFIC  ACCEPTANCE MODEL FOR INDUSTRIAL MAINTENANCE | Google Scholar - Searching ‘AI detecting tuberculosis UTAUT model’ | <https://www.researchgate.net/profile/Kai-Heinrich-3/publication/351302853_Adoption_Barriers_of_AI_A_context-specific_acceptance_model_for_industrial_maintenance/links/6090fc23a6fdccaebd078209/Adoption-Barriers-of-AI-A-context-specific-acceptance-model-for-industrial-maintenance.pdf> | Remove - no mention of TB |
| Exploring healthcare professionals’ understanding and experiences of artificial intelligence technology use in the delivery of healthcare: An integrative review | Google Scholar - Searching ‘AI detecting tuberculosis UTAUT model’ | <https://www.sciencedirect.com/science/article/pii/S0378720621000987> | Remove - no mention of TB |
| USER-BASED BARRIERS TO THE ADOPTION OF ARTIFICIAL INTELLIGENCE IN HEALTHCARE | Google Scholar - Searching ‘AI detecting tuberculosis UTAUT model’ | <https://www.proquest.com/docview/2282534102?pq-origsite=gscholar&fromopenview=true> | Remove - no mention of TB |
|  |  |  |  |
| Artificial intelligence in overcoming rifampicin resistant-screening challenges in Indonesia: a qualitative study on the user experience of CUHAS-ROBUST | Emerlad insight | <https://www.emerald.com/insight/content/doi/10.1108/JHR-11-2020-0535/full/html#abstract> | DUPLICATE |
| Tuberculosis detection from chest x-rays for triaging in a high tuberculosis-burden setting: an evaluation of five artificial intelligence algorithms | The Lancet Digital Health | <https://www.thelancet.com/journals/landig/article/PIIS2589-7500(21)00116-3/fulltext#seccestitle140> | Remove - no mention of User experience. (Could be used for the tech team.) |
| User Experience Evaluation in Intelligent Environments: A Comprehensive Framework | MDPI journal | <https://www.mdpi.com/2227-7080/9/2/41/html> | Remove - no mention of TB |
| Meta-Analysis of the Unified Theory of Acceptance and Use of Technology (UTAUT): Challenging its Validity and Charting a Research Agenda in the Red Ocean | SSRN library | <https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3834872> | Keep - Eventhough did not mention TB, there are correlation we could look at. |
| Artificial Intelligence in Healthcare | Google Search Engine | <http://www.diva-portal.se/smash/get/diva2:1433298/FULLTEXT01.pdf> | Keep |
| Determinants of Intention to Use Artificial Intelligence-Based Diagnosis Support System Among Prospective Physicians | Frontiers | <https://www.frontiersin.org/articles/10.3389/fpubh.2021.755644/full> | Keep |
| Acceptance of the Use of Artificial Intelligence in Medicine Among Japan’s Doctors and the Public: A Questionnaire Survey | PubMed | <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8968553/> | Keep |
| From Precision Education to Precision Medicine | Jstor | <https://www.jstor.org/stable/26977862> | Remove - Not related to TB |
| User Satisfaction with an AI System for Chest X-Ray Analysis Implemented in a Hospital's Emergency Setting | Pubmed | <https://pubmed.ncbi.nlm.nih.gov/35612006/> | Keep |
| Assessment of MRI technologists in acceptance and willingness to integrate artificial intelligence into practice | Pubmed | <https://pubmed.ncbi.nlm.nih.gov/34364784/> | Keep - Even it is about MRI not chest CT |
| The Artificial Intelligence in Digital Radiology: *Part 2*: Towards an Investigation of *acceptance* and *consensus* on the Insiders | Proquest | <https://www.proquest.com/docview/2621305676/1AA4441E907F40B4PQ/2> | Remove - not so relatent |
| A review on advances in 18F-FDG PET/CT radiomics standardisation and application in lung disease management | Proquest | <https://www.proquest.com/docview/2625646780/1AA4441E907F40B4PQ/6> | Remove – not relevant to user experience |
| Physicians’ preferences and willingness to pay for artificial intelligence-based assistance tools: a discrete choice experiment among german radiologists | Proquest | <https://www.proquest.com/docview/2652042019/123594AA29B04919PQ/35> | Keep |
| Legal and Regulatory Framework for AI Solutions in Healthcare in EU, US, China, and Russia: New Scenarios after a Pandemic | Proquest | <https://www.proquest.com/docview/2656387851/123594AA29B04919PQ/56> | Keep |
| A survey on brain tumor detection techniques for MR images | Proquest | <https://www.proquest.com/docview/2432687432/123594AA29B04919PQ/85> | Remove - not relevant to TB |

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| --- | --- | --- | --- |
| **King-2006-metaAnalysisTAM.** | Simon | <https://drive.google.com/file/d/1gVAdPe8yQHN4CfhqCDguBK3E_sCWyVWY/view?usp=sharing> | We can keep this one but is not relevant to TB. (TBD) |
| META-ANALYSIS OF THE UNIFIED THEORY OF ACCEPTANCE AND USE OF TECHNOLOGY (UTAUT): CHALLENGING ITS VALIDITY AND CHARTING A RESEARCH AGENDA IN THE RED OCEAN | Simon | <https://drive.google.com/file/d/1GwtYaSCR3XJ6oi8GblAXNoiYT35kUJ4M/view?usp=sharing>  <https://aisel.aisnet.org/jais/vol23/iss1/10/> | DUPLICATE |
| Technology acceptance:  a meta-analysis of the TAM:  Part 1 | Simon | <https://drive.google.com/file/d/1YowLilj0oX8IKV-dFF9GcgWoQwM7lTmg/view?usp=sharing> | Again evaluation on TAM not TB |
| Technology acceptance:  a meta-analysis of the TAM:  Part 2 | Simon | <https://drive.google.com/file/d/1Epp9h5YqonibjvXKORdC2rTffVInhihW/view?usp=sharing> | Again evaluation on TAM not TB |
| A meta-analysis of the Technology Acceptance Model | Simon | <https://www.researchgate.net/publication/222297603_A_meta-analysis_of_the_Technology_Acceptance_Model> | Again evaluation on TAM not TB |
| To buy or not to buy—evaluating commercial AI solutions in radiology (the ECLAIR guidelines) | Simon | <https://link.springer.com/article/10.1007/s00330-020-07684-x> | Guideline we could follow but nothing to do with TB |
| A systematic review of the diagnostic accuracy of artificial intelligence-based computer programs to analyze chest x-rays for pulmonary tuberculosis | Simon | <https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0221339> | Not relevant to user experience, but super helpful for the tech team. |