



RAD Assistant: An Amazon Alexa Skill as Point of Care Clinical Decision Support Tool for Diagnostic Radiology

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Background/Problem Being Solved

Multiple evidence and expert consensus-based algorithms guide clinical follow-up for commonly encountered lesions in diagnostic radiology. Frequently cited recommendations include the Fleischner Society for pulmonary nodules and Society of Radiologist in Ultrasound (SRU) for ovarian cysts. Due to the complexity of these algorithms, radiologists frequently reference guidelines throughout the workday and although readily accessible via web application, radiologists must divert visual attention from imaging examinations for reference.

Interventions

The aim was to develop and validate an Amazon Alexa skill to provide easy audible reference for two commonly used diagnostic radiology algorithms.

Barriers/Challenges

- Ensure consistently appropriate recommendations from complex guideline algorithms
- HIPPA compliance
- Format readily accessible and feasible across multiple devices

Outcome

RAD Assistant, an Amazon Alexa skill, was developed and made available for free download. This Alexa Skill consists of a voice user interface (VUI; defined as a JSON schematic) that listens for pre-defined user “utterances” in order to determine user “intents.” Audio queues are supplemented by visual menus and re-prompts. The VUI then supplies these intents to the AWS lambda function (a Node.js application programmed in Javascript), where calculations are performed. The VUI reads back the users inputted information at the end to reaffirm what the recommendation is based on. One of the principle concerns for use of these devices in healthcare is privacy. This application is not HIPAA compliant and thus careful development was necessary to avoid requesting protected health information.

Two native English speakers with American and British accents invoked intents to receive recommendations for both ovarian cyst and pulmonary nodules across 3 devices: Echo Spot, Samsung phone and iphone). 143 of 154 intents (92.9%) were successfully completed. All completed intents (143, 100%) provided correct SRU and Fleischner recommendations. The ovarian cyst subgroup had 73/77 (94.8%) successful intents, with an average total invocation time to recommendation of 38.5 seconds. For pulmonary nodule, 70/77 (90.9%) successful intents had an average invocation time to recommendation of 49.5 seconds. Overall, 956 of 1013 (94.4%) of all utterances were successful.

Discussion:

We report development of “RAD Assistant”. This free, voice-enabled assistant is capable of relieving radiologists from constant reference of guidelines via web-browser on PACS work stations with expensive screen real-estate. We demonstrate the Alexa service is capable of understanding the medical lexicon with accurate recommendations based on pre-programmed user intents. Several commercially available voice assistants use machine learning algorithms to understand human speech. Of these assistants, Amazon Alexa has the highest market penetration, allows use via both iPhone and Android applications and Echo devices. The Alexa Skill was carefully developed to avoid requesting protected health information since the Alexa platform is not HIPPA compliant. Further validation with a variety of accent, dialects and languages are necessary. Expansion into other published algorithms such as TI-RADS and LI-RADS are also possible

Conclusion/Statement of Impact

"RAD Assistant", an Amazon Alexa skill is capable of providing quick and easy follow-up guidelines for pulmonary nodules and ovarian cysts.

Keywords

Fleischner, pulmonary nodules, ovarian cyst, amazon alexa skill