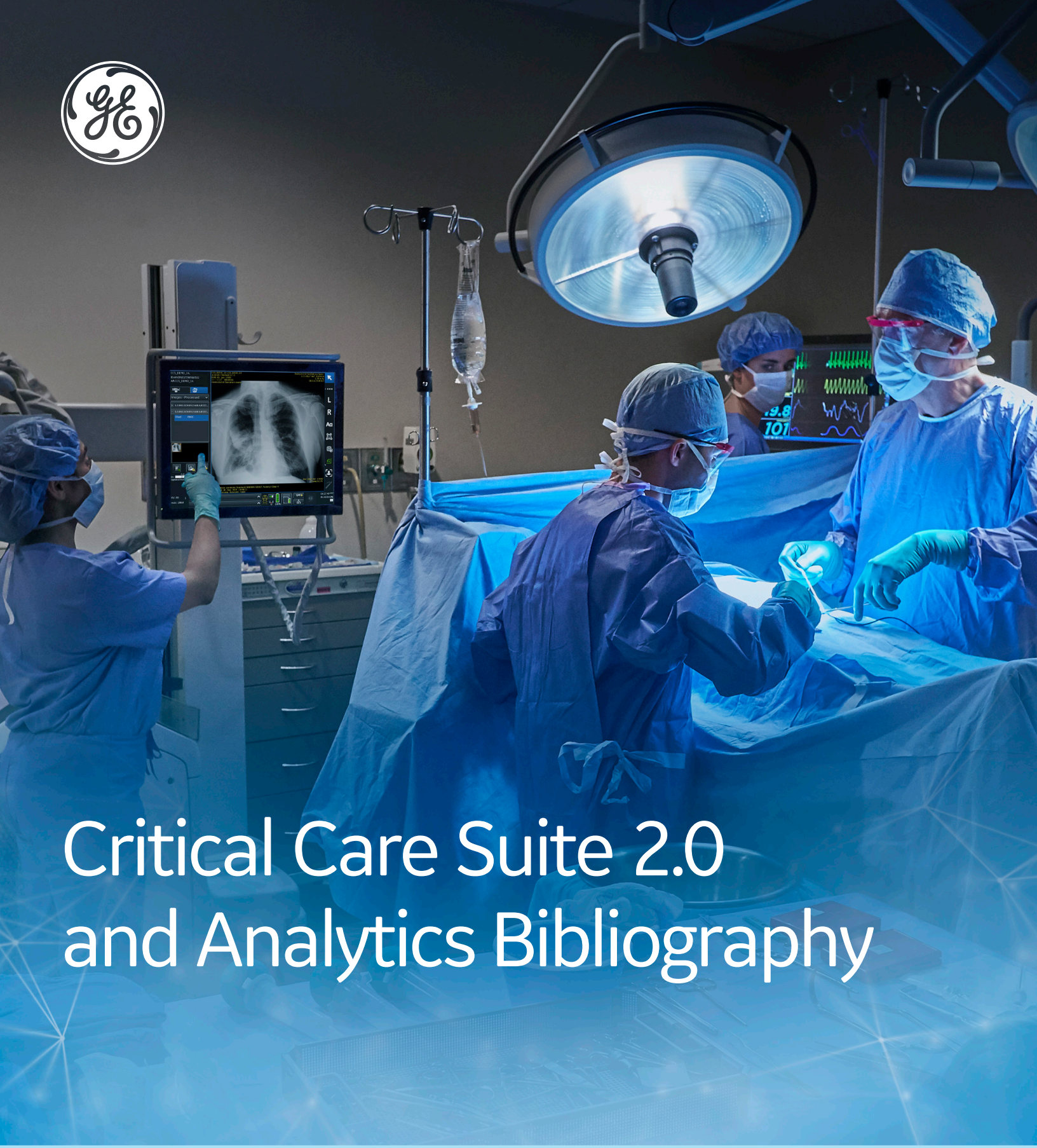

Critical Care Suite 2.0 and Analytics Bibliography

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PUBLISHED PAPERS

Automated detection of moderate and large pneumothorax on frontal chest X-rays using deep convolutional neural networks: A retrospective study
Taylor, A. G., Mielke, C., & Mongan, J.
(2018) PLoS medicine, 15(11), e1002697.
Conclusion: We trained automated classifiers to detect moderate and large pneumothorax in frontal chest X-rays at high levels of performance on held-out test data. These models may provide a high specificity screening solution to detect moderate or large pneumothorax on images collected when human review might be delayed, such as overnight.
https://journals.plos.org/plosmedicine/article?id=10.1371/journal.pmed.1002697

NOTE: This was an early prototype of the GE Healthcare 510k K183182 for Critical Care Suite, the algorithm performance in this publication does not match the product.

CONFERENCE ABSTRACTS & PRESENTATIONS

Leveraging Deep Learning for Orientation Detection and Correction of X-Ray Images
[1]K. Younis, Dalal, P. Vera, G., K., Nye, K., and Rao, G.
Society for Imaging Informatics in Medicine (SIIM), Conference on Machine Intelligence in Medical Imaging (C-MIMI), 2020, Oral Presentation.
Conclusion: We demonstrated the feasibility of a CNN in detecting the exact orientation in the full range [0, 255o] of different anatomy and view combinations with excellent accuracy and x-rays from a large international data set. We believe this is the first introduction of DL in detecting orientation of diverse radiographic images using one model and could be implemented to automatically apply a rotation for optimal review. This will optimize the workflow of the radiology department and saves technologists' time and effort and provide a mean for better review by the radiologist and can enhance subsequent AI models

Leveraging Deep Learning Artificial Intelligence in Detecting Mismatched Anatomy in Chest Images Acquired with Abdomen protocol: Prevalence Analysis and Performance Metrics
[1]K. Younis, K., Nye, K., Rao, G., and Fischer, T.
European Congress of Radiology, 2020, Oral Presentation.
Conclusion: A deep learning quality algorithm and workflow enhancement can be used to warn a radiographer if a chest image is acquired using a protocol for a different anatomy enabling correcting the DICOM Tags and reprocessing or reacquiring the exposure with the right protocol.

Improving Presentation Consistency of Radiographic Images Using Deep Learning

[1]Akram, N., Vera, G., Xue, P., Wanek, J., Zhang, F., Rao, G.; et al

Radiological Society of North America, 2020

Conclusion: The proposed approach demonstrates the feasibility of using deep learning technique to reduce inconsistency in initial display presentation and improve user workflow.

Chest X-ray View Classification Using Deep Convolutional Neural Networks

[1]Younis, K.; Nye, K.; Rao, G., B; Vera, G.; Dalal, P.

Radiological Society of North America, 2020

Conclusion: We demonstrated the feasibility of a VAE/CNN in identifying lateral and frontal CXRs from a large international data set. We believe this is the first introduction of DL in identifying CXRs from all anatomy/view combinations. This DL model could be implemented to flag protocol mismatch errors for a technologist and enable automatic corrections that saves time and improves workflow efficiency.

Evaluation of Deep Learning-Based Automatic Classification of Pneumothorax on Frontal Chest X-ray Images

[1]Yaeger, K., Fournier, R., Callcut, R., Zhang, T., Tegzes, P., Zhang, M., Herczeg, Z., Nye, K., Baenen, A., Sabol, J., Rao, G., Avinash, G.

Radiological Society of North America, 2019, Oral Presentation.

Conclusion: Deep learning-based algorithms can effectively detect PTX in frontal x-ray images with high accuracy.

NOTE: GE Healthcare 510k K183182 for Critical Care Suite uses an operating point threshold of 90.1 resulting in an algorithm performance that detects nearly all large PTXs (96%) and 3 out of 4 small PTXs (75%) with limited false alerts (94% specificity).

Leveraging Deep Learning Artificial Intelligence in Detecting the Orientation of Chest X-ray Images

[1]Younis, K., Soni, R., Zhang, M., Akram, N., Vera, Nye, K., G., Rao, G., Avinash, G., and John Sabol.

Society for Imaging Informatics in Medicine (SIIM), Conference on Machine Intelligence in Medical Imaging (C-MIMI), 2019, Oral Presentation.

Conclusion: This is the first introduction of deep neural network in detecting orientation in chest radiographic images. A deep learning algorithm that classifies the orientation on a CXR image could be implemented to automatically apply a rotation for a technologist to visually confirm.

https://cdn.ymaws.com/siim.org/resource/resmgr/mimi19/oral5/Leveraging_Deep_Learning_Kha.pdf

AI Assisted Radiology Image Quality Assessment

[1]Na, H.S., Zhang, M., Nye, K., Avinash, G., and John Sabol

Deep Learning in Healthcare Summit, 2019, Oral Presentation

Conclusion: Deep learning algorithms were developed to perform automatic QC checks on chest x-ray images to minimize the effort and improve the accuracy of QC programs, enabling the delivery of efficient and quality care to patients.

https://videos.re-work.co/videos/1475-ai-assisted-radiology-image-quality-assessment

Implementation of An Automated Real-Time Approach to X-Ray Reject Data Analysis and Presentation

Zamora, D., B. Walton, and Kalpana Kanal

American Association of Physicists in Medicine (AAPM), Annual Meeting, 2018, Oral Presentation, Med Phys (45):6.

Conclusion: Rapid and user-specific reject rates calculated using readily available standardized reports is achievable with the end goal of performing targeted training to improve the quality and speed with which medical images are produced.

https://w3.aapm.org/meetings/2018AM/programInfo/programAbs.php?sid=7531&aid=39187

Leveraging Deep Learning Artificial Intelligence to Conduct Quality Control On Chest X-Ray Images

[1]Zhang, M., Nye, K., Avinash, G., and John Sabol

American Association of Physicists in Medicine (AAPM), Annual Meeting, 2018, Poster.

Conclusion: This work demonstrates the feasibility of using AI to determine if incorrect anatomy or view were acquired and whether patient positioning was acceptable for CXR images. These results warrant further development to expand anatomy and view types, and additional image reject reasons.

About GE Healthcare

GE Healthcare provides transformational medical technologies and services to meet the demand for increased access, enhanced quality and more affordable healthcare around the world. GE (NYSE: GE) works on things that matter - great people and technologies taking on tough challenges. From medical imaging, software & IT, patient monitoring and diagnostics to drug discovery, biopharmaceutical manufacturing technologies and performance improvement solutions, GE Healthcare helps medical professionals deliver great healthcare to their patients.

GE Healthcare 3000 North Grandview Waukesha, WI 53188 U.S.A.

[1]Co-Authored by GE personnel

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