

Evaluation of Mobile Digital C-arm Features on Productivity

A side-by-side comparison of workflow using the OEC Brivo™ and a comparable competitive mobile C-arm



ABSTRACT

A side-by-side comparison was performed with the OEC Brivo C-arm* imaging system from GE Healthcare and a competitive C-arm system. Six clinical imaging specialists (CIS) from GE OEC performed a set of orthopedic procedure tasks on each system, including acquisition of images from a phantom. The impact on productivity was evaluated in terms of intra-operative time savings, workflow efficiency, and efficiency in surgical guidance (the number of image adjustments and retakes needed to acquire a suitable image). The study measured productivity advantages with the OEC Brivo system.

BACKGROUND AND PROJECT SCOPE

Efficient workflow and high-quality imaging are important to hospitals and surgical centers seeking to deliver positive patient outcomes and positive economic performance in operating rooms (B. Hartmann, 2010). Characteristics of C-arm imaging systems can substantially affect both quality and productivity in image-guided procedures. In January 2015, GE Healthcare conducted a study to evaluate the productivity of the OEC Brivo digital C-arm system against a comparable competitive digital C-arm system. The study measured the impact of specific features on the OEC Brivo system on workflow optimization and the ability to perform orthopedic procedure tasks quickly and in a few steps – factors that can contribute to clinical efficiency and economic performance. The features evaluated included:

- **Auto Trak**, which automatically locates regions of interest and adjusts image brightness and contrast. The intent is to reduce the retakes required to secure a suitable clinical image.
- **Smart Metal**, which adjusts the image automatically to compensate for metal (such as prostheses) in the field of view.
- **Manual noise filtering**, designed to remove errors in the image acquisition process and enable acquisition of clear images in less time.
- **Angle Measurement Software,**** which helps users make accurate measurements, such as during hip procedures for correctly positioning bones or inserting screws.



Methodology

The focus was on four automated and manual features of the OEC Brivo system: Auto Trak, Smart Metal, manual noise filtering, and Angle Measurement Software. The objective was to quantify their effect on surgery imaging efficiency, as measured by the number of fluoro shots, the number of image adjustments and the time required to secure suitable-quality images.

A physician responsible for quality and medical affairs for GE Healthcare participated in the tests to provide objective input on the study and the image quality. Six GE clinical imaging specialists (CIS) were instructed to perform lumbar spine and hip procedures with both the OEC Brivo C-arm and the competitive system to test the benefits of the automated features as a way to assess their impact on clinical efficiency and economic performance. A phantom was used in the study, and actual images were generated. All six participants were introduced to the features of the systems by way of a video and a demonstration by a moderator. The imaging procedures focused on AP and lateral lumbar spine, hip, and hip with prosthesis.

Findings

The two systems produced images of similarly high quality. The difference was in the number of steps, the number of image adjustments, and number of retakes required to achieve image quality deemed acceptable by the medical doctor. In the side-by-side comparison of the two C-arm systems in four imaging procedures:

- The OEC Brivo system on average required 34 percent fewer fluoroscopy shots (11 versus 17) than the competitive system to acquire a comparable, clinically usable image. Assuming equal kV and mA and other factors between the two systems, this can help reduce dose exposure to the operator and patient. Fewer images also can shorten procedures.
- The OEC Brivo system required 60 percent fewer adjustments (10 versus 25) than the competitive system to acquire comparable images, because of the automatic image adjustment features including Auto Trak and Smart Metal. The automatic features allowed the participants to make image adjustments in a just few button pushes. For instance, the Auto Trak features allowed brightness and contrast adjustments with only one push, while the competitive system required at least four pushes.
- This feature, absent in the competitive system, enabled verification within a few seconds that measurements are accurate. This can help improve procedural accuracy.
- Printing of images was quicker and required fewer steps with the competitive system.
- The participants liked the colour coding of brakes, handles and scales of the competitive system, which can be helpful for the staff during a procedure.

CONCLUSION

Image quality was similar for the two comparable mobile digital C-arms compared and evaluated, as reported by the physician. The side-by-side comparison found productivity advantages when using the OEC Brivo C-arm that could translate to economic advantages. The comparison documented workflow advantages from the automated features of the OEC Brivo system. The CIS highlighted the utility and the importance of automated features and intuitive interface during surgery procedures.

ABOUT OEC BRIVO

The OEC Brivo digital mobile C-arm systems from GE Healthcare are used for everyday use in general surgical applications and musculoskeletal procedures. Designed as affordable and compact imaging solutions well suited for basic imaging, Brivo offers low-dose features, user friendly workflow and wireless connectivity. Automated features including point-and-shoot capability are designed to enhance productivity, and various smart options are intended to enable users to improve technique in challenging situations. The user interface is similar to that of other OEC C-arm systems.

REFERENCES

B. Hartmann, L. N. (2010). Workflow Efficiency Comparison of a New CR System with Traditional CR and DR Systems in an Orthopedic Setting. *Journal of Digital Imaging*, pp 666Y673.

* The OEC Brivo 865 Plus was used to conduct the study

** Angle measurement software is not available on the OEC Brivo 715 Prime

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™ The OEC Brivo 865 Plus is also commercially marketed as OEC Brivo Plus.

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