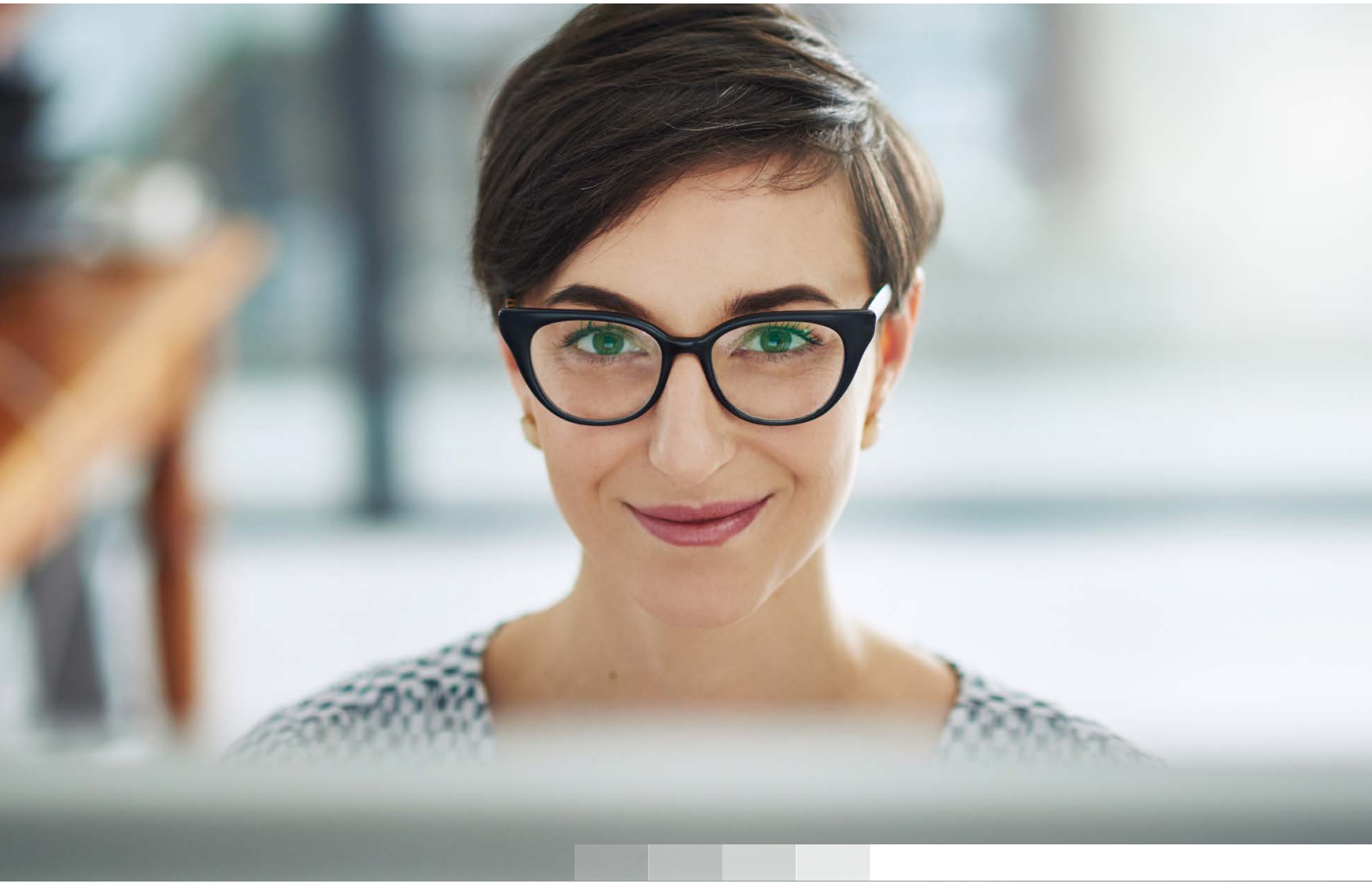
Home reading for radiologists:

Do you have what it takes?



Working from home is becoming increasingly popular. The benefits range from spending less time on commuting to a better work-life balance and improved productivity. For radiologists, home working is the perfect way to deal with a growing workload and the strain of being on call. But do they have what it takes to read and report from home? This ebook touches upon the challenges related to home working, which type of displays are up to the job, and how you can ensure quality and medical compliance.

BARCO

1. The benefits of home working

Being able to work from home means radiologists can avoid unnecessary commutes and frequent interruptions to their busy reading sessions. In addition, homeworking allows radiologists to perform on-call and late-evening duties in a more flexible way.

Also, the ability to reach out to peers at their home for a second or expert opinion is in some cases a clinical necessity. At the same time, in some countries, radiologists are a scarce resource. Being able to rely on a geographically dispersed network of (home-based) radiologists is, for some hospitals, the only way to support 24/7 availability.

Lastly, remote working can help to attract and retain young radiologists. For this new generation, who are familiar with new technologies such as videoconferencing and online consultations, 'work-life integration' is extremely important. *"They are much more focused on getting the work done rather than on exactly where or when it gets done. Radiology practices may need to reconsider their staffing models, offering more than just part-time or full-time positions. To retain Millennial talent, groups may need to consider staggered shifts, remote reading, job sharing, and other non-traditional options."*[1]

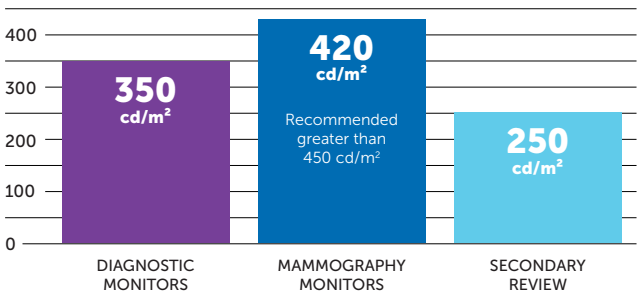
2. Guidelines for home reading displays

The American College of Radiology (ACR) recommends a 'single high professional standard of quality for both teleradiology providers and on-site radiologists'.[2] It's why the latest guidelines stipulate clear standards for enterprise-wide medical imaging to ensure consistency of care while also facilitating collaboration. These guidelines set rules for every medical display, whether on- or off-site, and include standards for display luminance, pixel pitch as well as calibration to the DICOM standard.

Luminance

According to the ACR-AAPM-SIIM Technical Standard for Electronic Practice of Medical Imaging, a display used for medical imaging should have a luminance of at least 350 cd/m^2 (450 recommended in the case of mammography). This provides radiologists with more visible shades of gray so they can detect subtle details faster. More importantly, the luminance should remain stable over time, meaning luminance output should be measured and controlled, even in a home environment.

LUMINANCE (minimum) for different types of displays



Pixel pitch and display size

Pixel pitch is related to display resolution and diagonal size. A larger display with a high resolution will present more data, providing radiologists with the best image for analysis. This reduces the need for panning and zooming and makes reading more efficient. Though some consumer displays feature similar specs compared to medical displays, they are not fit for home reading.

RECOMMENDED DISPLAY SPECIFICATIONS

Typical viewing distance	Appropriate diagonal size	Recommended pixel pitch
23 - 25 inch (60 - 65 cm)	21 - 33 inch (53 - 82 cm)	200 - 210 µm per pixel

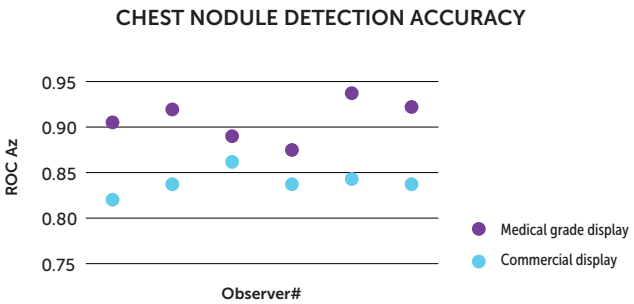
DICOM calibration and quality control

Every display that is used for viewing of medical images must comply with the DICOM Part 14 grayscale standard display function (GSDF), even the ones that are used at home. The ACR recommends that *"teleradiology services should be incorporated into the local operations related to safety and quality within the radiology practice, hospital, or imaging center".*[2]

Only when 24/7 compliance is guaranteed can radiologists have complete peace of mind about their reading performance. However, manual calibration to the DICOM standard is extremely inefficient, especially in a home-working environment.

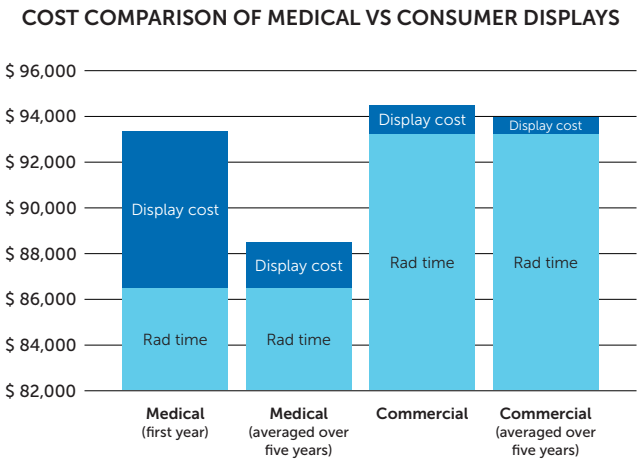
3. Diagnostic displays are a better fit

Diagnostic displays comply with all the required medical standards and guidelines. What's more, they are engineered for optimal viewing of medical images. A number of well-controlled studies have demonstrated that diagnostic displays improve radiologist performance [Bacher[3], Krupinski[4]]. Another study [Krupinski[5]] compared detection of pulmonary nodules by radiologists using a Barco diagnostic display system vs. a commercial display. As the graph below shows, every radiologist observer found that the diagnostic display gave more accurate results than a consumer display – confirming that radiologists perform better with diagnostic displays.



4. Faster reading at home saves time and money

A diagnostic display system delivers return on investment even after only one year of use. Studies show that radiologists come to the correct interpretation more quickly with diagnostic displays [Bacher[6], Krupinski[7]]. Furthermore, these two studies indicate that there is more certainty with diagnostic displays – as evidenced by the lower number of false positives and the shorter viewing time.



5. Quality Assurance of home reading workstations

According to a study performed by The MarkeTech Group in 2017, almost 7 out of 10 hospital QA administrators say that managing the quality of home reading workstations is challenging[8]. First of all, there's the variety of displays to consider, ranging from consumer to high-end diagnostic monitors, and anything in between. Secondly, regulatory requirements are becoming stricter, with differences between regions and countries.

Regardless of where a radiologist is physically located when viewing and reporting cases, medical quality standards (e.g. ACR-AAPM-SIIM-DIN-JESRA) still apply to ensure the accuracy of the diagnoses. Needless to say, controlling the quality and managing compliance of a home-installed workstation with the technical standards that are in place is no easy feat.

Full control of all display assets, whether on-site or remote, can only be achieved with an enterprise-wide QA management solution, such as Barco's QAWeb. It automates (regional) compliance, DICOM calibration and performance as well as reporting, maintenance, follow-up, and incident handling. All this can be done from any location and without interrupting radiologists in their reading sessions.

6. Home reading: what does it take?

There are different types of home reading in radiology. There's the radiologist who performs occasional reading and reporting of exams, in case of an emergency or request for a second opinion, for example.

However, when processing a high volume of diagnostic exams (one/twice a week or full-time) at home, a diagnostic display that ticks all the boxes (i.e. a high luminance over time, the right pixel pitch and automated, interruption-free DICOM calibration) is required. This can only be achieved with displays that use special sensors and photometers so they can be quality controlled.

These displays have stable luminance and uniform images; they feature self-healing; and they enable real-time DICOM calibration and quality checks. In combination with an advanced QA solution, policies can be configured and assigned to every display installed in a home environment from a central and remote location. It's the only way to ensure full compliance with medical standards so radiologists can make reliable decisions at home.

About Barco Healthcare

Improving the quality and value of care are the leading priorities for healthcare professionals today. At a time when the amount of data is growing rapidly and there is more demand for mobility, healthcare systems struggle to work more efficiently, and to provide personalized care to a growing number of patients in an affordable way.

Focused on transforming the delivery of care, Barco connects healthcare professionals at every patient touch point, from the imaging room, to radiology, through specialist consultations and in the surgical suite. We offer a network of medical imaging solutions that deliver the complete picture to support more informed decisions, when and where it matters most.

It's why we are considered the gold standard for medical visualization and how we are there at every stage of the patients' journey. So healthcare professionals can focus on patients' needs and, in the end, achieve the best clinical outcome.

Barco, enabling bright outcomes

Footnotes

[1] Ana P. Lourenco, John J. Cronan, Teaching and Working With Millennial Trainees: Impact on Radiological Education and Work Performance

[2] Ezequiel Silva III et al, ACR White Paper on Teleradiology Practice: A Report From the Task Force on Teleradiology Practice, 2013

[3] Image quality performance of liquid crystal display systems: Influence of display resolution, magnification and window settings on contrast-detail detection. European Journal of Radiology, 2003, Volume 58, Issue 3, Pages 471-479 K. Bacher, P. Smeets, A. De Hauwere, T. Voet, P. Duyck, K. Verstraete, H. Thierens

[4] Krupinski EA, Siddiqui K, Siegel E, Shrestha R, Grant E, Roehrig H, Fan J. (2007). Influence of 8-bit vs 11-bit digital displays on observer performance and visual search: a multi-center evaluation. Proc SPIE Med Imag, 6515, 65150L-1.

[5] Krupinski EA. Medical Grade vs Off-The-Shelf Color Displays: Influence on Observer Performance and Visual Search. Submitted for review, 2008

[6] Image quality performance of liquid crystal display systems: Influence of display resolution, magnification and window settings on contrast-detail detection. European Journal of Radiology, 2003, Volume 58, Issue 3, Pages 471-479 K. Bacher, P. Smeets, A. De Hauwere, T. Voet, P. Duyck, K. Verstraete, H. Thierens

[7] Krupinski EA. Medical Grade vs Off-The-Shelf Color Displays: Influence on Observer Performance and Visual Search. Submitted for review, 2008

[8] The MarkeTech Group, wants and woes of healthcare IT managers, 2017

M00775-R00-0518-EB May 2018

Barco nv | www.barco.com/healthcare
Beneluxpark 21 | 8500 Kortrijk | Belgium
T +32 56 36 80 47 | F +32 56 36 83 86