



## **Bridging the Gap: Effects of an Imaging Network in Appalachia**

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## **West Virginia University Hospitals**

- 531-bed tertiary referral teaching hospital complex
- Morgantown, West Virginia
- Component facilities
  - Level 1 trauma center (only such facility in WV)
  - Ruby Memorial Hospital
  - WVU Children's Hospital
  - WVU Stroke Center

## West Virginia University Hospitals

WVUH serves West Virginia and portions of Maryland, Ohio, and Pennsylvania as the largest healthcare system in its rural Appalachian region. Other hospitals are smaller and distant.



<http://www.greenwichmeantime.com/time-zone/usa/west-virginia/map/>

## Recurring Situation

- Patients with complicated medical, surgical, or traumatic problems are transferred to WVUH from smaller hospitals where initial diagnostic imaging is performed.
- Images and reports often are not sent with the patient.

## Recurring Situation

- Images sometimes are sent on compact discs
  - Subject to misplacement
  - Not available for all treating physicians
- Many patients require repeat imaging, with
  - Unnecessary additional radiation exposure
  - Added costs
  - Delay in treatment (most important)

## Recurring Situation: Solution needed

- Central repository for imaging
  - Improve the efficiency of patient care
  - Increase availability of images
  - Allow review and comparison for follow up

## Evolution of ImageGrid™ use at WVUH

- ImageGrid™ Radiology Web Viewer by Candelis
  - Web-based, multimodality image archive
  - Allows the upload of images to a single repository
- WVUH installed this software as a backup to PACS for system “downtimes.”

## Alternate Purpose: An idea hatches

- Our Orthopedic Surgeons first began using ImageGrid™ in clinic to upload preoperative MRIs from outside facilities to avoid expensive repeat imaging.
- This idea quickly spread to other surgical specialties, and soon Radiologists were consulted to view the uploaded images.

## A Possible Solution

- WVUH Radiologists and IT support specialists realize that ImageGrid™ could remedy the issue of repeat imaging in critically ill patients transferred from smaller hospitals in the region...

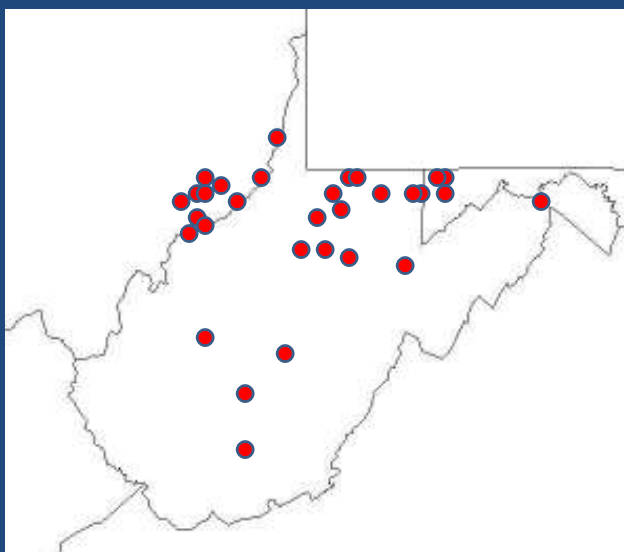
## Popularity at WVUH Grows

- In early 2011, ImageGrid™ software was installed on clinical computers at WVUH.
- Over the next few months, physicians in multiple departments within WVUH requested access to the software.
- Personnel were trained to upload images from CDs.

## Growth of a Network

- Next, outside facilities began joining the network for secure direct internet image transfer.
- Network use is simple and cost-free, requiring only
  - Internet connection
  - Virtual Private Network (VPN) connection

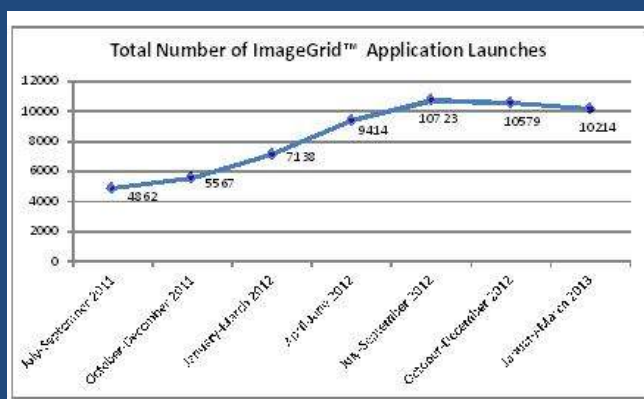
31 facilities linked up with the WVUH ImageGrid™ system in first 18 months



## Rapid Continued Growth

- Number of facilities using ImageGrid™ continues to rise
- Frequency of its use is increasing
- Number of uploaded images continues to increase

## Continued Growth Data



- ImageGrid™ was launched 4,862 times from July through September 2011
- ImageGrid™ was launched 10,214 times from January to March 2013

## Benefits of an Imaging Network

- Coordinates actions among multiple healthcare institutions
- Eliminates repeat imaging
- Reduces unnecessary radiation
- Lessens financial costs
- Saves lives

## The Story of G.W.

- G.W. is a 50 year old male pedestrian who is hit by an automobile at 50 mph in Elkins, WV.
- He is taken to a small, local hospital with multiple, severe injuries but is hemodynamically stable.
- Initial CT imaging shows transection of the aorta with a large, but contained, hematoma.



## The Story of G.W.

- WVUH is consulted for patient transfer.
- In seconds, images are uploaded to ImageGrid™.
- Trauma and Vascular Surgery teams are activated.
- The patient begins travelling 70 miles north to Morgantown, WV via helicopter.

## The Story of G.W.

- Meanwhile, at WVUH, the Operating Room and trauma surgical teams are prepared.
- Images are reviewed, and pre-operative plans are made.
- Ten minutes prior to landing, the patient becomes profoundly hypotensive.
- Helicopter lands on rooftop, and G.W. is taken directly to the OR, bypassing Emergency Department.

## The Story of G.W.

- Intraoperative angiogram demonstrates that the aorta has freely ruptured.
- Endovascular aortic graft is deployed, and bleeding stops.
- G.W. is discharged home after a long hospital stay and rehabilitation.
- Almost two years later, he continues to do well.

## The Story of G.W.

- G.W. is just one example of a patient whose life was saved by the timely, coordinated efforts of multiple healthcare providers in our region.
- Without an established imaging network, such timely actions would not be possible.

## Future Direction

- Since 2011, our imaging network has continued to grow.
- The idea of an imaging network is still relatively new to our region.
- Some issues remain that require clarification.

## Questions to Clarify

- What kind of report, if any, should be generated when a second Radiologist views images from another facility?
- Should these images be merged into our PACS system?
- What is the role of Radiology residents in interpreting these images?

## Emergency Medical Treatment and Active Labor Act (EMTALA)

- Referring hospitals must provide results (preliminary or final) of diagnostic tests upon transfer of patients to a new facility<sup>1</sup>
- Yet as many as 16% to 34% of outside studies arrive without radiology reports<sup>2</sup>

## The Radiologist's Dilemma

- The in-house Radiologist is often asked to re-interpret the exam, which poses a dilemma
- Considerations for the Radiologist:
  - Duty to provide patient care
  - Maintaining collegial relationships with other hospital physicians
  - Incurring medicolegal responsibility for the exam
  - Lack of financial compensation

## Implications of a Verbal Consult

- Radiologists often give an informal, verbal second opinion.
  - Clinician may misinterpret the findings and incorrectly document it in the record
  - Treatment plans could be based on the misinterpreted findings
- If possible, consultations should be documented by the Radiologist.

## Role of the Radiology Resident

- The role of the Radiology Resident is unclear.
  - Residents are asked to “over-read” studies already interpreted by a board-certified Radiologist.
- Recent survey of 64 program directors<sup>3</sup>:
  - At 45% of programs, residents review outside imaging after hours with no attending involvement.
  - 45% of PDs reported the transfer of outside studies is an issue that “definitely” needs addressed at their program.
- Further research is needed in this area to develop better guidelines.

## Conclusions

- Rural settings with large distances between hospitals benefit from imaging networks.
- Imaging networks can reduce cost, delay, and radiation exposure from repeat imaging.
- Coordinated imaging networks between hospitals can save lives.
- Network implementation raises questions, and further research is needed to clarify gray areas.

## Bibliography

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## West Virginia University Hospitals

