3-D virtual reality volumetric imaging review in cancer patients’ understanding and education of their disease and treatment

*Presented by Douglas E. Holt, MD, Eastern Idaho Regional Medical Center*

Impact of Pediatric Radiation Oncology with Movie Induced Sedation Effect (PROMISE) on patient movement and general anesthesia use in pediatric radiation therapy

*Presented by Jeffrey T. Chapman, BS, University of Texas Southwestern Medical Center*

Development and impact of a virtual PSA monitoring clinic for follow-up of prostate cancer patients

*Presented by Richard Boyajian, MSN, RN, NP, Dana-Farber/Brigham and Women's Cancer Center*

Site-specific education using digital media to improve patients’ understanding of the radiotherapy trajectory: An interventional study

*Presented by Hussain Almerdhemah, B.App.Sc-RT, King Faisal Specialist Hospital and Research Centre*

**Moderator:** Laura A. Dawson, MD, FASTRO, Princess Margaret Cancer Center; Chair, ASTRO Board of Directors
3-D Virtual Reality Imaging Review in Cancer Patients’ Understanding and Education of Their Disease and Treatment

Douglas E. Holt, MD

Idaho Cancer Center
Disclosure

- Disclosure: I have no conflicts of interest to disclose.
- This study was supported by funding from the Colorado Cancer Coalition and the University of Colorado

Author list:

- D. E. Holt¹, A. L. Carr², S. Roberts², S. A. Milgrom¹, E. Kolva³, B. D. Kavanagh¹, G. E. Switzer⁴, C. Eitel⁵, J. Nelson⁵, B. W. Miller¹, J. C. Shiao¹, A. Mueller⁶, S. D. Karam¹, W. Dzingle¹, and T. Clapp⁵; ¹Department of Radiation Oncology, University of Colorado, Aurora, CO, ²Department of Psychology, University of Colorado, Denver, CO, ³Department of Medical Oncology, University of Colorado, Aurora, CO, ⁴Department of Medicine, University of Pittsburgh, Pittsburgh, PA, ⁵Department of Biomedical Sciences, Colorado State University, Fort Collins, CO, ⁶Department of Radiation Oncology, Thomas Jefferson University, Philadelphia, PA
Background

• A cancer diagnosis is a traumatic event that impacts patients along with information processing and retention.

• One of the big struggles for people diagnosed with cancer is just trying to understand what is happening to them (i.e. information is complex/abstract).
  • Up to 80% of the information presented to patients is forgotten nearly immediately
  • Up to 50% of the information retained is inaccurate

• Poor understanding is associated with worse clinical outcomes and patient experiences.

• How can clinics/providers help patients understand their disease and treatment more fully?
Evolution of Patient Education

- Nothing
- Verbal Description
- Illustrations, Videos, Medical Imaging
- 3D Printed Models
- Augmented/Virtual Reality

*Least effective method when used alone
Virtual Reality for Patient Education

• Information is personalized to the patient

• Presenting anatomical information in 3D vs. 2D reduces cognitive load and enables learning

• Supported by several learning theories

• Existing studies show high satisfaction, increased engagement and strong preference for VR
Patient Impact

- Improve understanding of disease (despite multiple prior consultations)
- Strongly preferred in imaging review
- Top ranked tool over other methods
- High majority (97%) of patients agreed VR should be standard of care
Patient Impact

• Improved understanding in treatment rationale, radiation treatment, and related toxicity

• Less anxiety, greater engagement, and higher satisfaction

• Routinely positive experience “amazing”, “phenomenal”, “fantastic” “awesome”, “too short”
Patient Impact

• “It [VR] seems like one of the things you have as soon as you get diagnosed with cancer.”

• “[VR] was more helpful than my doctors just trying to explain it, or not even explaining it to me...[VR] was really helpful.”

• “This visual moment leveled the playing field...for me. It just let me in on my own healthcare.”

• “I had a certain amount of fear what was going on to my body. But now it feels like it's less.”

• “This helped me make sense of why the radiation could be really helpful.”

• “[VR] changed everything...I would prefer seeing the VR and everything. Like every single piece of the puzzle- it just fills in the blanks.”

• “I think people should understand because they need to be their own best advocate for what's going on with their body, and the only way you can do that is if you have knowledge of all that.”
Impact of Pediatric Radiation Oncology with Movie Induced Sedation Effect (PROMISE) on Patient Movement and General Anesthesia Use in Pediatric Radiation Therapy

Jeffery T. Chapman, MS

University of Texas Southwestern Medical Center
Disclosure

• I have nothing to disclose

• Thank you to Wipe Out Kids Cancer for funding our upcoming phase II clinical trial

• Author list:
  Jeffrey Chapman BS, Tsuicheng Chiu PhD, David Parsons PhD, Eric Chambers MBA, Yang K. Park PhD, Xuejun Gu PhD, Tu D Dan MD, Steve Jiang PhD, Kiran A Kumar MD MBA
Radiation Therapy for Children with Cancer

- Pediatric radiation therapy (RT) often requires daily anesthesia to ensure precise immobilization for safe and accurate treatment
  - Potential harm to the patient’s health and quality of life
  - Significant logistical and financial burden

Is there a better way to help children stay still during their treatments?
PROMISE: Pediatric Radiation Oncology with Movie Induced Sedation Effect

• Interactive, incentive-based system
• Wireless video streaming to a screen directly in front of the patient
• Real-time video monitoring of patient motion
• Automatically stops the radiation beam and video if the patient moves outside of defined parameters
The Impact of PROMISE

• Estimated ~30% absolute reduction in need for daily general anesthesia in children 3-7 years old with PROMISE

• Anecdotally, significant improvement in patient & family quality of life

• Upcoming phase II clinical trial to safely reduce anesthesia use in children 3-11 through PROMISE
Special Thanks

Dr. Kumar

Dr. Jiang

Dr. Chiu
Development and Impact of a Virtual PSA Monitoring Clinic for Follow-up of Prostate Cancer Patients

Richard Boyajian, APRN, NP & Ashleigh Kowtoniuk PA-C

Dana-Farber/Brigham and Women's Cancer Center
Disclosure

• Employer: Brigham and Women’s Hospital
• Funding: Brigham Care Redesign Incubator & Startup Program (BCRISP) grant
• Financial benefit: Potential royalties from VPCC DHP commercialization

• Author List:
  R. Boyajian\textsuperscript{1,2}, W. J. Gordon\textsuperscript{3}, A. M. Kowtoniuk\textsuperscript{1,2}, K. R. Boyajian\textsuperscript{2}, M. Mackin\textsuperscript{3}, N. E. Martin\textsuperscript{4}, P. F. Orio III\textsuperscript{5}, G. P. Walsh\textsuperscript{6}, and P. L. Nguyen\textsuperscript{7}; \textsuperscript{1}Dana Farber/Brigham and Women’s Cancer Center, Boston, MA, \textsuperscript{2}Brigham and Women’s Department of Radiation Oncology, Boston, MA, \textsuperscript{3}Brigham and Women’s Hospital, Boston, MA, \textsuperscript{4}Department of Radiation Oncology, Brigham and Women’s Hospital, Dana Farber Cancer Institute and Harvard Medical School, Boston, MA, \textsuperscript{5}Department of Radiation Oncology, Brigham and Women’s Hospital and Dana-Farber Cancer Institute, Boston, MA, \textsuperscript{6}Brigham and Women’s Physician Organization, Boston, MD, \textsuperscript{7}Brigham and Women’s Hospital/Dana-Farber Cancer Institute, Boston, MA
Background

2021 estimated 248,530 will be diagnosed

High Incidence + High Survival rate + Late Relapse = Long term PSA surveillance

15 yr relative Survival rate is 95%

2021 estimated > 3,100,000 living with

1. American Cancer Society, Cancer Facts & Figures 2021
Background

Anxiety
New Diagnosis
Fears

Treatment

PSA Surveillance
Travel
Missed work
Expense

Time
Virtual Prostate Cancer Clinic (VPCC)

VPCC Digital Health Platform was designed based on evidence-based standards of care.
Hello, Mr. 

Our records show that you are due for a repeat PSA in October 2021. After receiving treatment for prostate cancer, your PSA needs to be monitored on a regular basis. This is done to ensure that your prostate cancer has not returned.

Step 1 - Visit a lab for your PSA blood work
The lab you had chosen during enrollment is: BWH/MGH Health Care Center at Foxborough
20 Patriot Place Foxborough, MA 02035

An electronic lab order has been entered for you. Lab results from this facility are automatically linked to our medical record system. Our VPCC team will have access to the lab results when they are ready.

If the lab listed above is no longer your preferred lab, you're welcome to visit any Mass General Brigham lab, and the electronic lab order will still work. If you need to visit a lab outside the Mass General Brigham network, let us know, so we can send you a new lab order.

Step 2 - Update us about your symptoms
Tell us about your symptoms by filling out the survey here: Symptom Survey

Please complete the survey to help us better understand any symptoms you may be experiencing.

Step 3 - Review your results
When we have the results of your PSA and symptom survey, we will contact you to review the information.

Please contact our office directly with any questions or concerns.

Thank you,
Virtual Prostate Cancer Clinic (VPCC)

Phone: 617-525-8431
Fax: 617-394-2692
Email: VPSAM@partners.org

October 26, 2021

Hello,

We hope you are well. It has been 36 months since you completed your radiation therapy.

Your most recent PSA continues to show no sign of cancer. If your PSA stays below 2.0, we would not be concerned about any cancer recurrence.

PSA RESULT in the EHR IS PULLED INTO MESSAGE

If you would like to speak with a clinician about your PSA or radiation-related symptoms (particularly any blood in your stool or urine), please call our office or schedule an appointment online using patient gateway.

To schedule your appointment online, log in to your Patient Gateway account here and select 'Schedule an Appointment' under the main button. Simply follow the prompts to find a date and time that is convenient for you. If you have not had an appointment with Richard Boyajian, NP and Ashleigh Keytomnik, PA-C in the past, you will not be able to self-schedule this appointment. If this is the case, please call our office to schedule.

After completing treatment, we must continue to regularly check your PSA levels. (Prostate-Specific Antigen). We do this to ensure your prostate cancer has not returned. It is also important to monitor for any radiation-related symptoms. Your current symptom survey indicates that you are not experiencing any significant symptoms.

Your next check-in is due in April 2022. We have placed an order in the system so you can go to your MGB lab. We will send you a reminder email for your next check-in prompting you to get your next PSA.

If you have any questions or concerns please call our office at 617-525-8431.

Thank you,

Richard N. Boyajian, NP
Virtual Prostate Cancer Clinic
Brigham & Women’s Hospital
Department of Radiation Oncology
Office: 617-525-8431
Fax: 617-394-2692
Virtual Care Misconceptions

• Too many in healthcare fall victim to maintaining a **one : one** relationship between in person & virtual visits.
• Transfer 1 in person visit to 1 virtual visit.
• Not a long-term solution to the healthcare provider shortage

• Healthcare needs to understand the benefit of the **One : Many** relationship
• Score patients on **urgency of need**
• **Higher needs** require a provider visit
• **Lower needs** first contact is electronic to report their “normal” results.
• This approach allows a small number of provider to manage a larger patient population, while still ensuring the entire population receives the care they need
Patient Impact  

1,505 surveys completed by 636 unique pts, ~45% response rate.

• **Access**: Compared to Pre-VPCC (FY15)...
  - By FY2019, consults had more than doubled, 109.74% because the doctors had more time
  - By FY2019, we have treated 79.3% more pts with prostate cancer

• **Convenience**: 92% of patients saved time overall

![Pie chart showing the amount of time saved by patients]

- Less than 2 hours: 24%
- 2-3 hours: 23%
- More than 3 hours: 53%

Amount of Time Saved  
N=1,408
Patient Impact: 1,505 surveys completed by 636 unique pts, ~45% response rate.

- **Satisfaction**: 94% of patients were comfortable with this form of monitoring
- **Stay Connected**: 95.1% reported, it was important to have **DF/BWCC team** monitoring as opposed to outside providers
- **Financial savings**: 87.3% reported reduced out-of-pocket expenses
- >90% reported that VPCC made their health care
  - easier and more flexible & convenient
  - met their medical needs
  - reduced travel-related stress
  - receive PSA results in a timely manner, and
  - pts were comfortable with this form of monitoring
Patient Impact  1,505 surveys completed by 636 unique pts, ~45% response rate.

**Access:** The number of virtual follow up increased steadily each year, with a spike in FY2019 due to COVID-19

During the pandemic, the VPCC allowed for very rapid switching of patients from in-person follow-ups to virtual monitoring
Site-specific Education Using Digital Media to Improve Patients’ Understanding of the Radiotherapy Trajectory: An Interventional Study

Hussain Almerdhemah, B.App.Sc-RT
King Faisal Specialist Hospital and Research Centre
Disclosure

• Disclosure: I have no conflicts of interest to disclose.

Author list:

• H. Almerdhemah\textsuperscript{1}, Z. Mulla\textsuperscript{1}, H. M. Muamenah\textsuperscript{1}, A. Weber\textsuperscript{1}, T. Boubakra\textsuperscript{1}, H. Taha\textsuperscript{1}, H. Habibullah\textsuperscript{1}, B. Albeirouti\textsuperscript{1}, and A. M. Ahmed\textsuperscript{1,2}; \textsuperscript{1}King Faisal Specialist Hospital and Research Centre, Jeddah, Saudi Arabia, \textsuperscript{2}Department of Clinical Oncology, Sohag University Hospital, Sohag, Egypt
Background

• Access to radiation therapy in Saudi Arabia has grown extensively over the past decade

• Patients receive education at the time of diagnosis, but providers noticed that much of the information was not digested or retained

• Not many Arabic speaking centers use digital media for site-specific information on radiation therapy

• **How can providers increase patients’ and families’ knowledge about radiation treatments?**
The Patient’s Journey

Day One
RO CLINIC

CT-SIM
5 days - 3 weeks waiting

1st Treatment

Last Treatment
1 - 39 #

FU-RO

3 - 8 WEEKS

MIND THE GAP!
Impact of COVID-19

Role for Digital Media
Site-Specific Education on Radiation Therapy

- Digital platform with general and site-specific information on radiation therapy, delivered via animated cartoon videos and a patient-friendly website
One Generic Animated Video

(4 min. length)

Introduction to radiation therapy for cancer treatment

Steps involved in radiation therapy

Concise overview of patient’s trajectory from referral to end of RT and follow-up
تحقق الأبحاث الطبية قفزات كبيرة
Site-specific Digital Media

• 3-to-4-minute animated videos and infographic information
Site Specific Radiotherapy

- Breast
- Pelvis
- Head and Neck
- Brain
- Chest and Abdomen
- Bladder
- CNS
- Pediatric
- Advanced Treatment Techniques
- Palliative Radiotherapy
Bladder and Bowel Preparation

Thermoplastic Mask Formation

Mouth Care during Radiotherapy
الإسهال:
قد يشعر بعض المرضى بإسهال أو تقلصات أو ألم في البطن أو الفم، وذلك لأن غشاء المعدة والأمعاء حساس للعلاج الإشعاعي، مما قد يؤدي إلى الإسهال.

في حالة الإسهال تكون:
(أطعمة منخفضة الألياف والدهون):
1. البطاطس مسلوقة أو مشوية
2. الموز والجز
3. اللحم والدجاج والأسمك مشوية أو مخلوطة
4. الأرز والمحكية
5. الخبز الأبيض

الأعراض الجانبية المحتملة لنعوج الإشعاعي لمنطقة الحماة:
- تهيج في الجلد وحرق العالمي
- تهيج المعدة
- تهيج الأمعاء
- تشنجات البطن
- نوبات الإسهال
- متلازمة الغثيان والقيء
- الحمى
Patient Impact

• Of the 14 dimensions explored, 8 were observed to have remarkable improvement

• Increased understanding and confidence score UCS.

• Gains were especially pronounced for specific dimensions, such as:
  • What to expect with radiotherapy
  • The purpose of pre-treatment tattoo marks
  • Reasons for daily or weekly imaging
Example: Understanding the purpose of the tattoo

- Mean knowledge improved by ~0.5 out of 1 as an effect of the intervention.
By analyzing each dimension separately, we observed significant associations of reading ability across five dimensions.
Conclusions

• The use of digital educational material in radiation oncology meets an urgent need for concise and site-specific patient education, while sparing extra hospital visits to meet with education coordinators

• Further studies are needed to assess the clinical and long-term effectiveness of this educational material
Expert Perspective

Laura A. Dawson, MD, FASTRO
Princess Margaret Cancer Center
Chair, ASTRO Board of Directors
Question & Answer

Please submit your questions in the chat.
2021 ASTRO Annual Meeting Press Kit

press@astro.org

astro.org/annualmeetingpress

#ASTRO21