



Emerging Technology in the Clinic and OR

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No disclosures

Outline

- Clinic Innovations
- Implant technology
- Robotics
- OR technology/efficiency
- Future directions

Clinic Innovations

AI Scribes

Clinic Innovations

- **Ambient EHR-integrated scribes**

- Listen passively during visits, auto-generate notes directly into EMR

- **Mobile-app based/AI only scribes**

- Smart phone or tablet records → appears in EMR within minutes
- Voice assistant features, parallel patient communications

- **Hybrid AI + human scribes***

- AI generates draft, then remote medical documentation assistant reviews for accuracy



Image: <https://medicalfuturist.com/medical-ai-scribes-in-2025-the-top-3-practical-benefits/>

Decision Aids

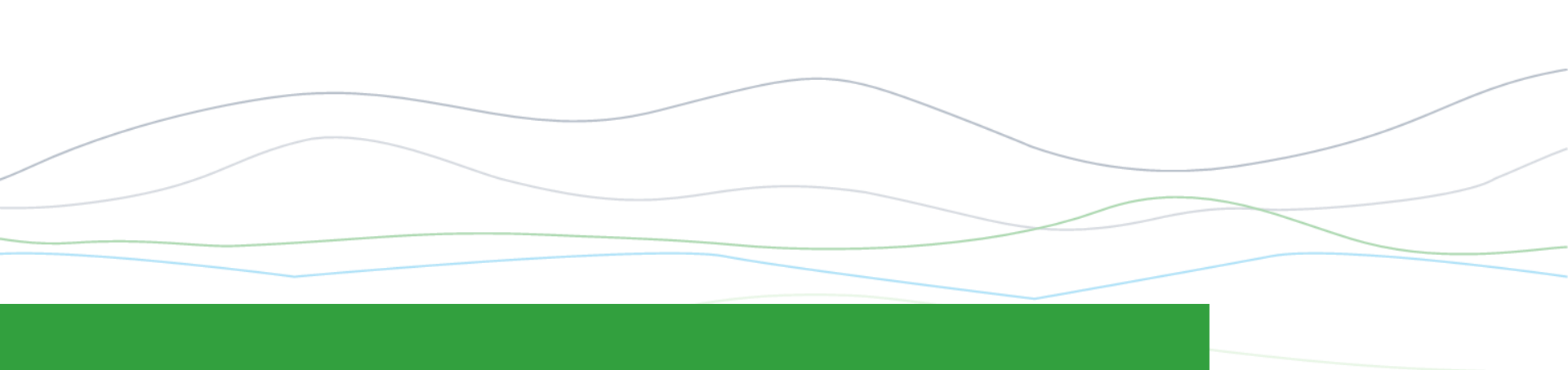
Clinic Innovations

- **Educational video modules**
 - Explain surgery, risk, rehab, etc.
- **Interactive web tools**
 - Quizzes, checklists, “what to expect” pathways
- **EHR-integrated portals**
 - Preop tasks, reminders, recovery tracking
- **Institution-specific apps**
 - Customized education + PROMs collections

The Impact Of Decision Aids On Adults Considering Hip Or Knee Surgery

[Vanessa B. Hurley](#), [Hector P. Rodriguez](#), [Stephen Kearing](#), [Yue Wang](#), [Ming D. Leung](#), and [Stephen M. Shortell](#)

- “Compared to matched patients not exposed to the decision aids, those exposed had two-and-a-half times the odds of undergoing hip replacement surgery and nearly twice the odds of undergoing knee replacement surgery within six months of the consultation.”

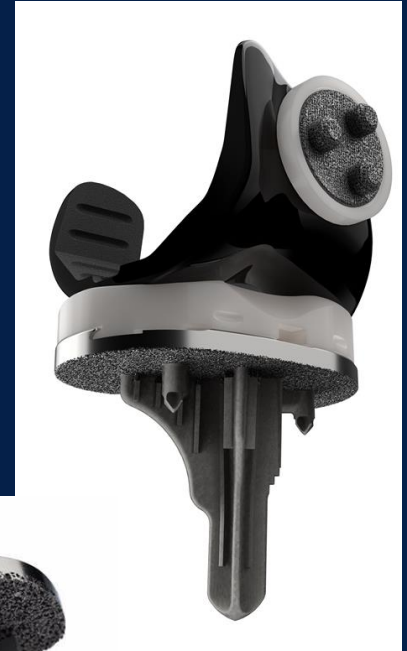


Implant Technology

Cementless Knee Designs

Implant Technology

- Porous surfaces
 - Ti or CoCr with 3D printed lattice for ingrowth
- Hydroxyapatite coatings



Advances in Hip Stems

Implant Technology

- Triple-taper takeover

R. G. Ricotti,
D. A. Flevas,
R. Sokrab,
J. M. Vigdorchik,
D. J. Mayman,
S. A. Jerabek,
T. P. Sculco,
P. K. Sculco

- THE INTERNATIONAL HIP SOCIETY

Changing practice to a new-generation triple-taper collared femoral component reduces periprosthetic fracture rates after primary total hip arthroplasty

A CONSECUTIVE SERIES OF 1,888 CASES

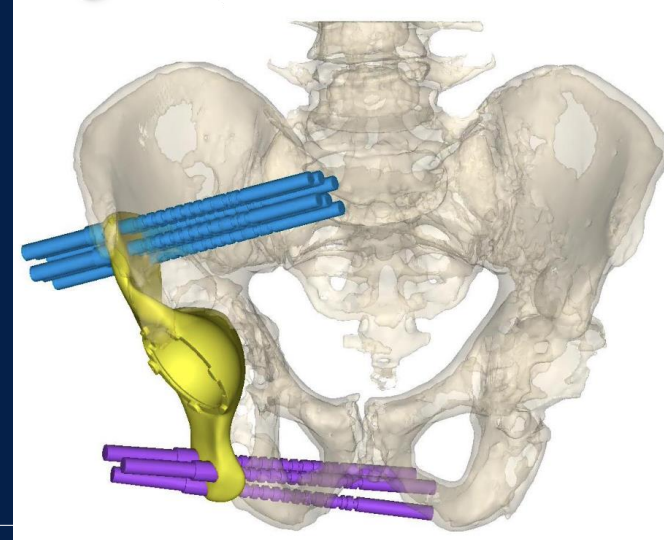
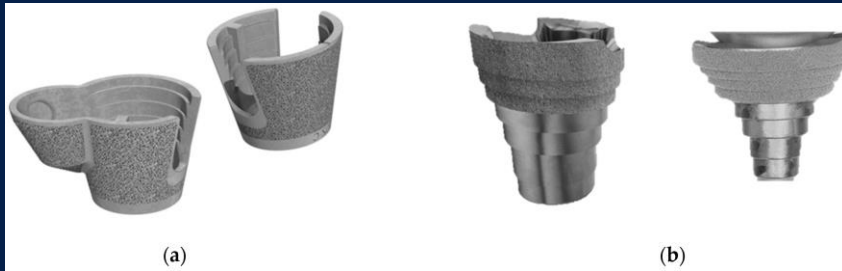
1.42% vs 0.13% ($p=0.002$)



Acetabular & Revision Implants

Implant Technology

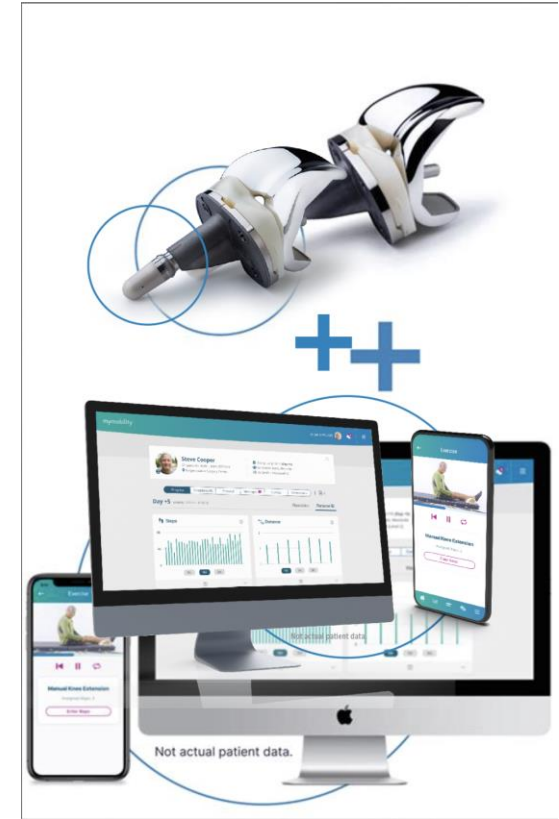
- 3D printed custom components
- Trabecular metal/porous metal augments and cones



“Smart” Implants

Implant Technology

- **Sensor-enabled components**
 - Measure load, pressure, alignment in real time
- **Data-transmitting**
 - Wireless communication with external devices
- **Integrated wearables/implant ecosystems**
 - Combine implant data + patient-reported outcomes

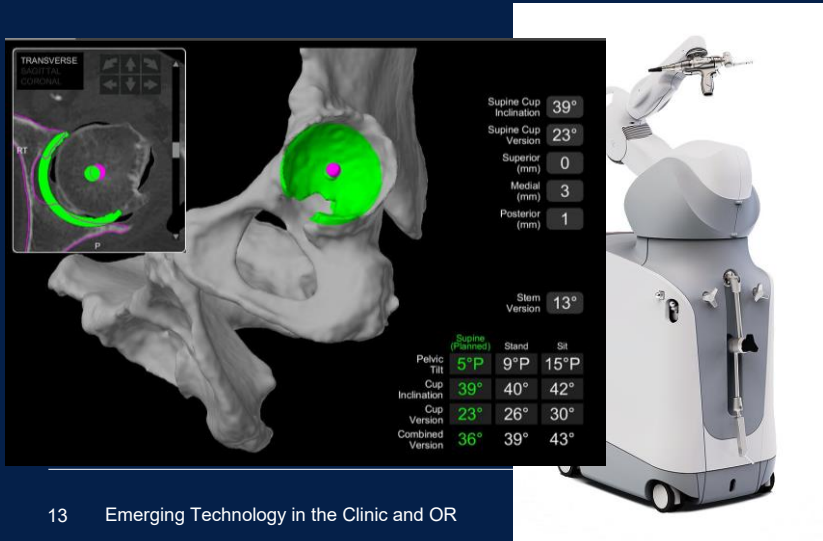


Robotics

Robotics in Complex & Revision Cases

Robotics

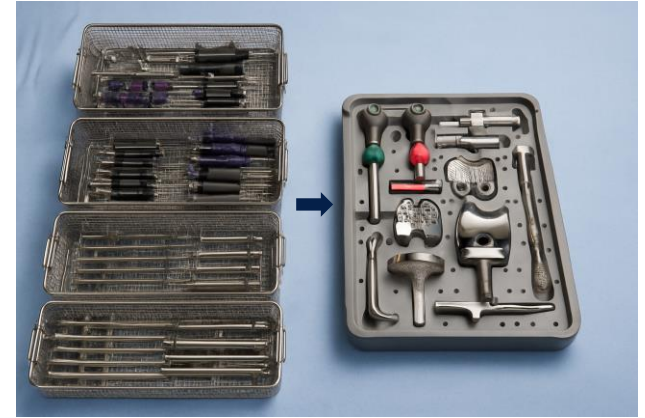
- Considerations
 - Image based/imageless, haptics, portability, revision applications, compatibility with multiple systems
- Systems and indications for revisions are expanding

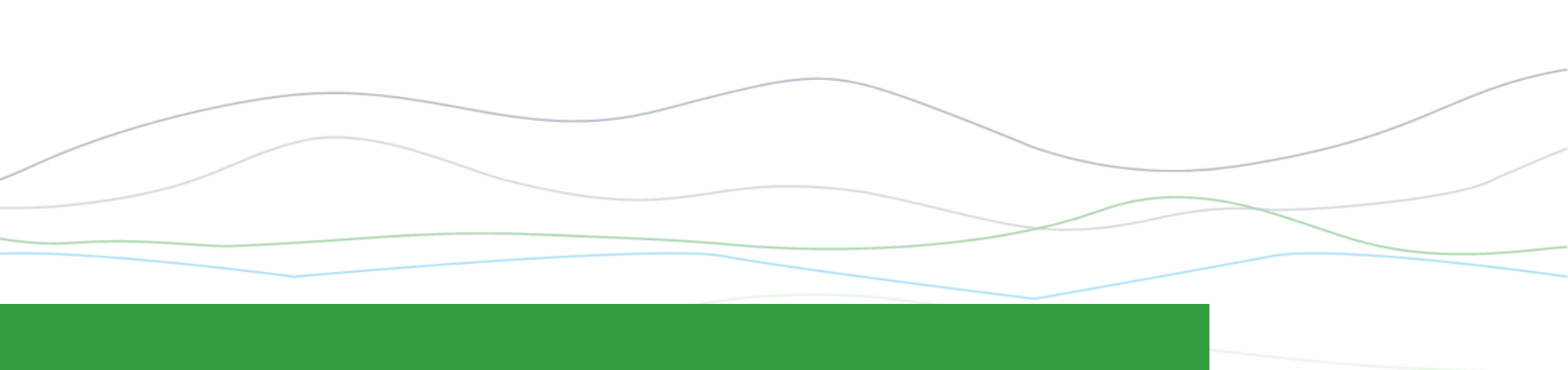


OR Technology/Efficiency

OR Technology/Efficiency

- Consolidated or single-tray systems
 - Leverage robotic planning
- Augmented reality





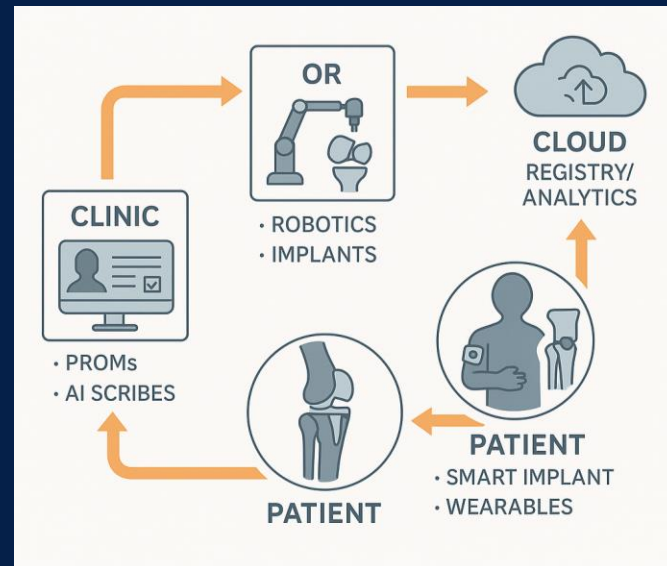
Future Directions

Personalized Arthroplasty

Future Directions

■ **Convergence of Innovations:**

- Clinic (AI scribes + PROMs)
- OR (Robotics + Implants)
- Patient-centered (Smart Implants +/- Wearables)
- Cloud (Registries + Analytics)



■ **Impact:**

- Personalized arthroplasty tailored to bone quality, activity, demographics, and anatomy
- Predictive analytics for early complication detection



UCSF



References

1. Hurley VB, Rodriguez HP, Kearing S, Wang Y, Leung MD, Shortell SM. The Impact Of Decision Aids On Adults Considering Hip Or Knee Surgery: This study examines if there is an impact on surgical utilization among patients exposed to decision aids and who consult collaboratively with their clinicians. *Health Affairs*. 2020 Jan 1;39(1):100-7.
2. Ricotti RG, Flevas DA, Sokrab R, Vigdorchik JM, Mayman DJ, Jerabek SA, Sculco TP, Sculco PK. Changing practice to a new-generation triple-taper collared femoral component reduces periprosthetic fracture rates after primary total hip arthroplasty: a consecutive series of 1,888 cases. *The bone & joint journal*. 2024 Mar 1;106(3 Supple A):115-20.

PROMs Integrations

Clinic Innovations

- **Short-form joint scores** → HOOS JR, KOOS JR, Oxford Hip/Knee Score.
- **Computer adaptive testing** → PROMIS CAT modules (physical function, pain interference).
- **EHR-integrated dashboards** → EMR questionnaires, registry additions
- **Research/registry platforms** → REDCap, AJRR (American Joint Replacement Registry)