AACPDM 75th ANNUAL MEETING

hipscreen.org

Mini-Symposium MS07

HipScreen Tutorial

Vedant A. Kulkarni, MD

Shriners Hospitals for Children®— Northern California

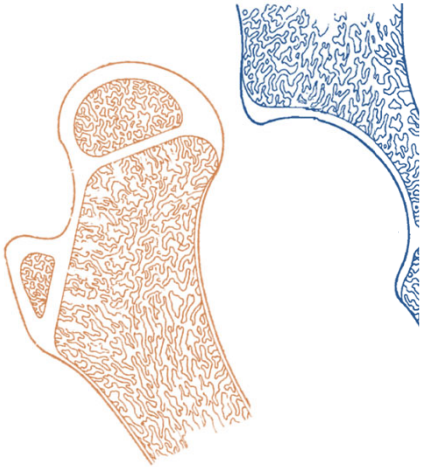
UCDAVIS HEALTH | SCHOOL OF MEDICINE

HipScreen

On y va!-Let's go!

Part 1

Introduction of Hip Surveillance

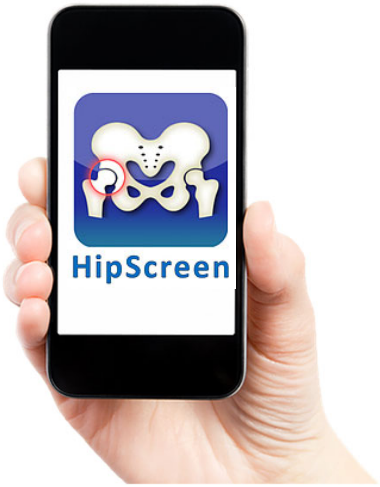


Part 2

Perspectives in Hip Surveillance Implementation

Part 3

HipScreen:
Hip Surveillance at Your Fingertips!



AACPDM 75th ANNUAL MEETING

FINANCIAL DISCLOSURE
AACPDM 75th Annual Meeting
October 6-9, 2021

Speaker Name: Vedant Kulkarni, MD

1. Disclosure of Relevant Financial Relationships
I have no financial relationships to disclose.

2. Disclosure of Off-Label and/or investigative uses:
I will not discuss off label use and/or investigational use in my presentation.

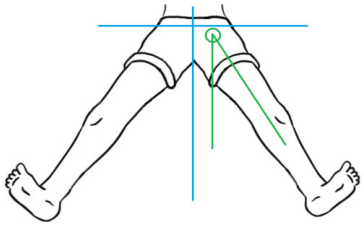
Shriners Hospitals for Children®— Northern California

hipscreen.org

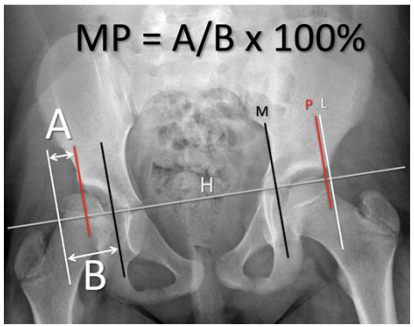
The Hip Surveillance Visit:
Assess Whole Child

Function

Physical Exam



Radiographs



Shriners Hospitals for Children®— Northern California

hipscreen.org

Barriers to Implementation

The Provider Perspective

"The guidelines are too complex"

"Don't know how to read an x-ray"

"Measuring an X-ray takes too much time"

"My radiologists don't measure the Migration Percentage"

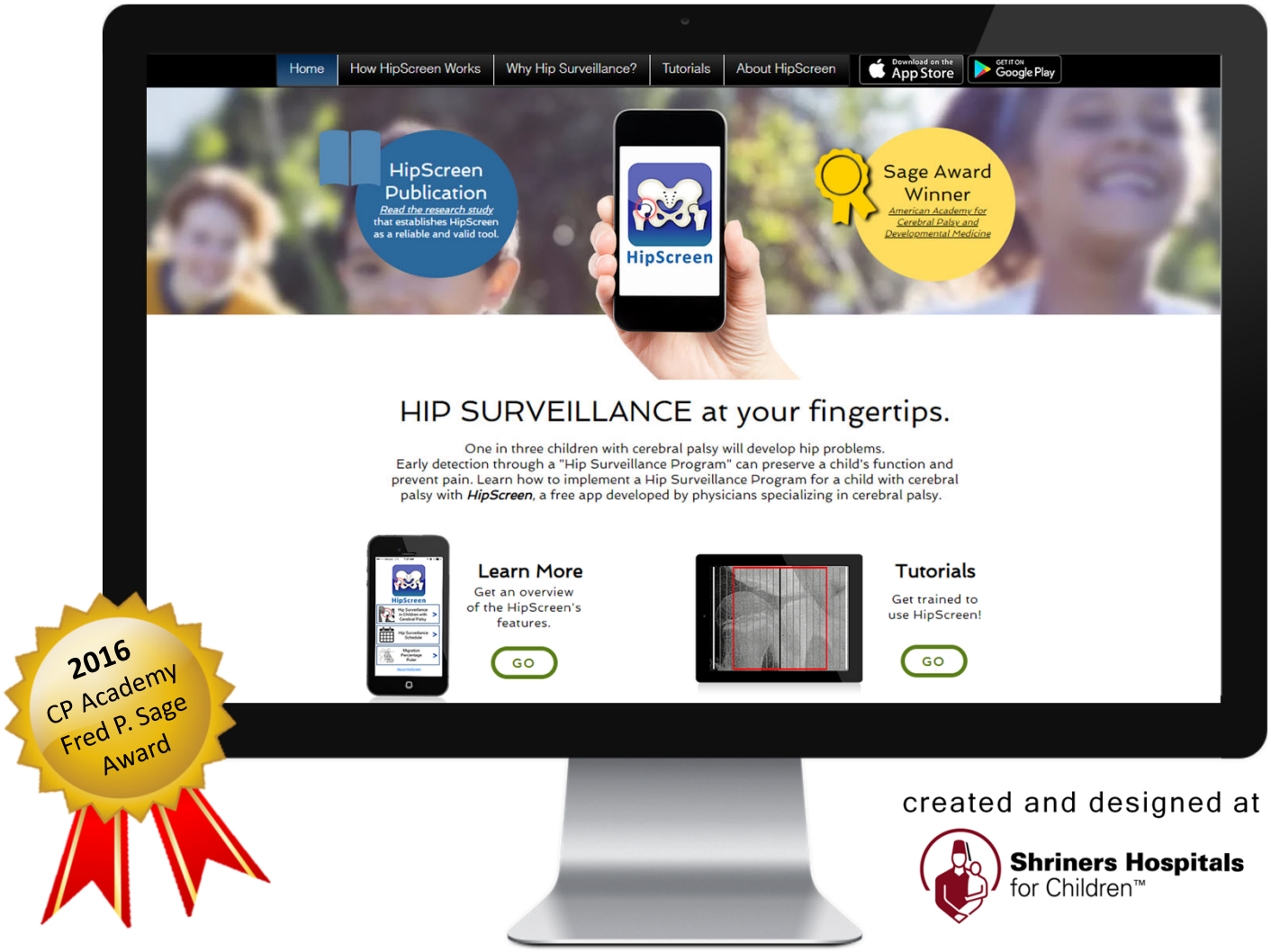
Use 21st Century Technology!

Shriners Hospitals for Children™—Northern California

Download on the App Store

hipscreen.org

GET IT ON Google Play



2016 CP Academy Fred P. Sage Award

created and designed at

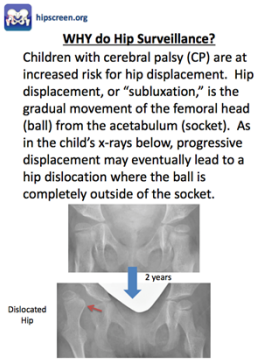
Shriners Hospitals for Children™

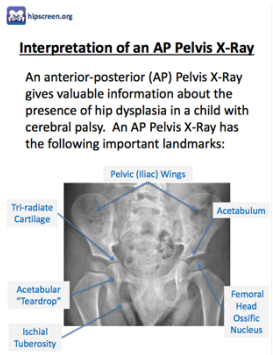
Shriners Hospitals for Children®— Northern California

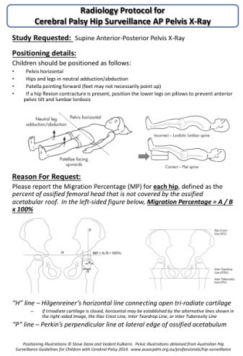
Download on the App Store | GET IT ON Google Play

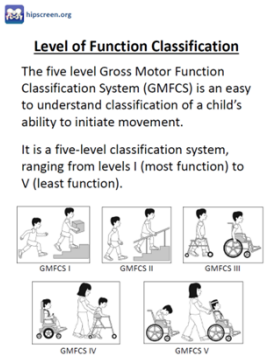
hipscreen.org

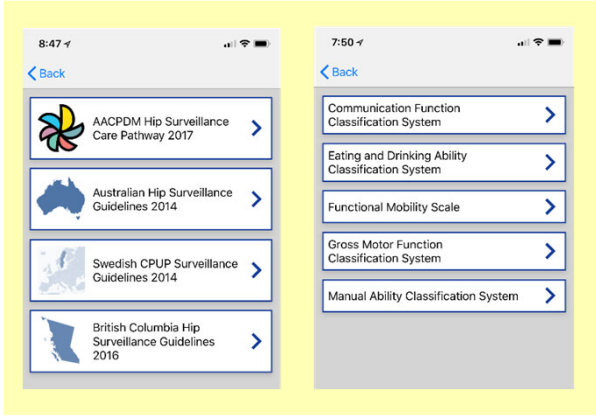
Educational Material











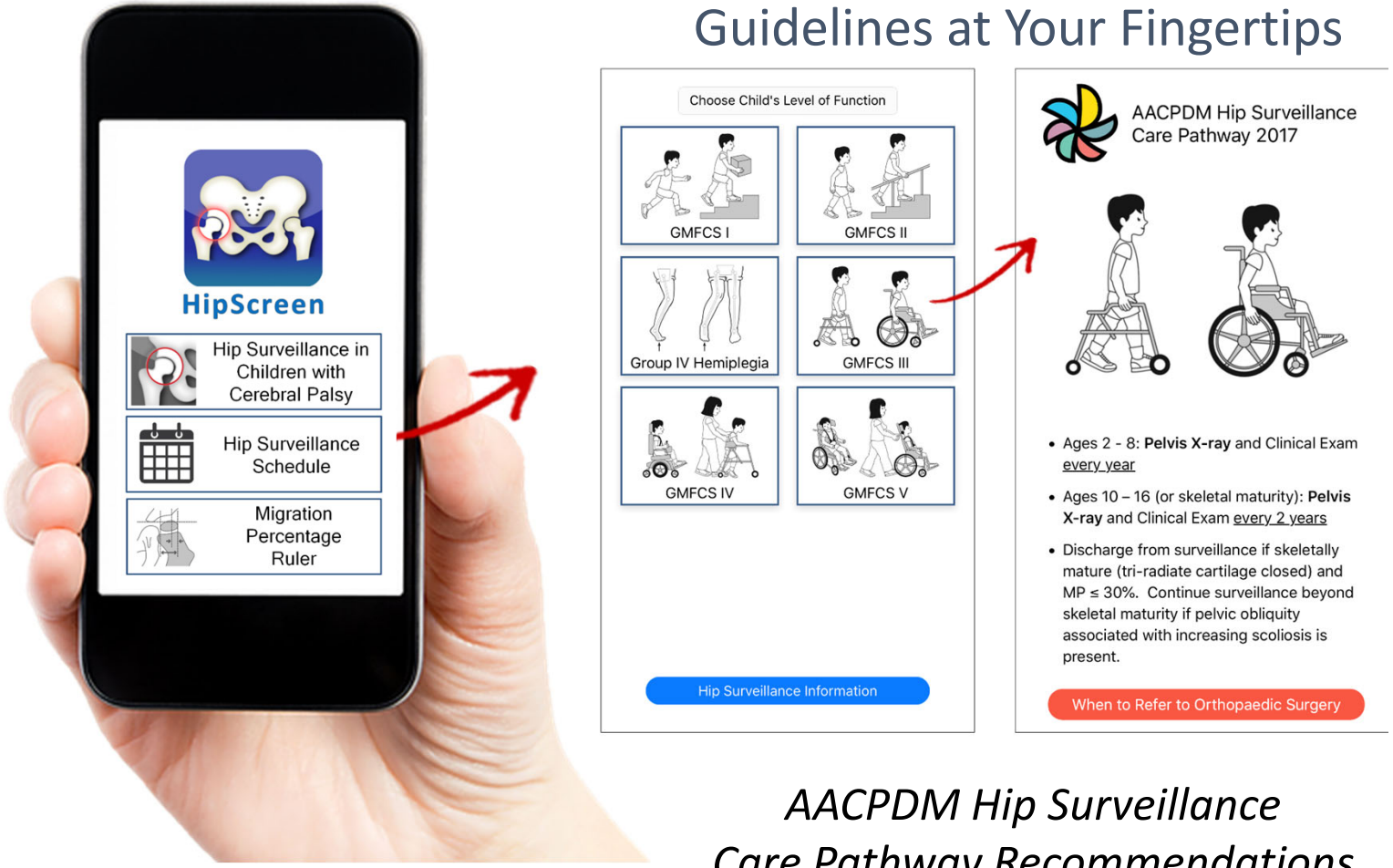
Full Text Surveillance Guidelines and CP Classification Systems

Shriners Hospitals for Children®— Northern California

Download on the App Store | GET IT ON Google Play

hipscreen.org

Guidelines at Your Fingertips



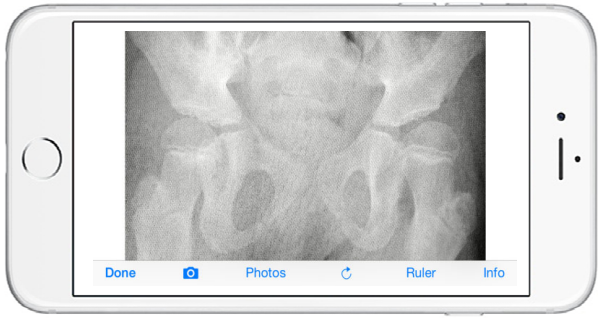
AACPDM Hip Surveillance Care Pathway Recommendations

Shriners Hospitals for Children®— Northern California

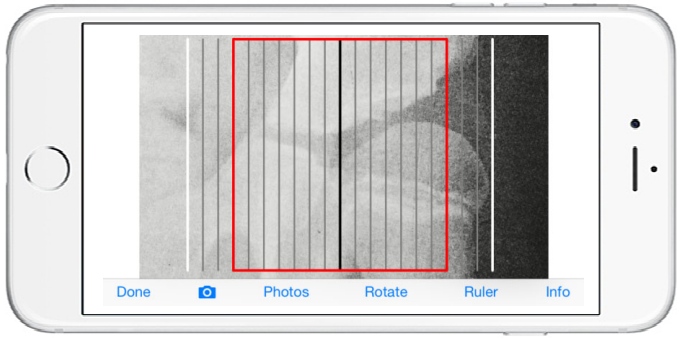
Download on the App Store | GET IT ON Google Play

hipscreen.org

Easily Measure Hip X-Rays



Rotate, Zoom, and Pan

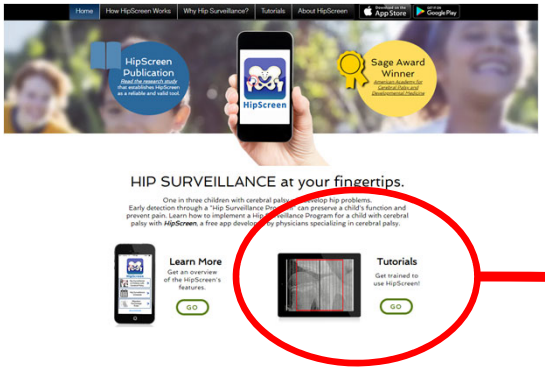


Shriners Hospitals for Children®—Northern California

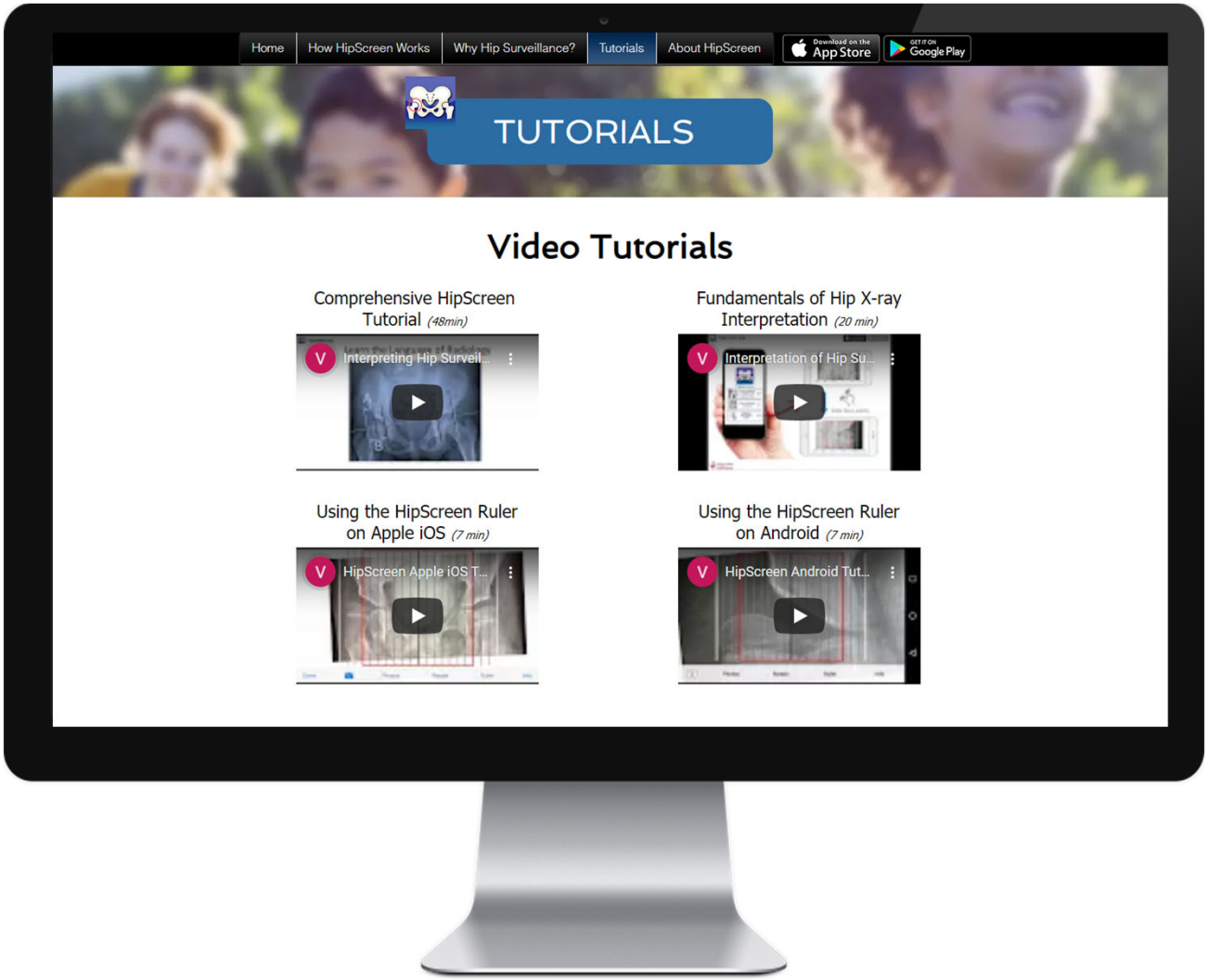
Download on the App Store

hipscreen.org

GET IT ON Google Play



Watch it again!

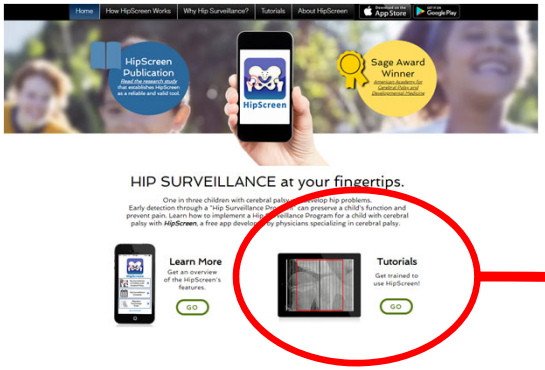


Shriners Hospitals for Children®—Northern California

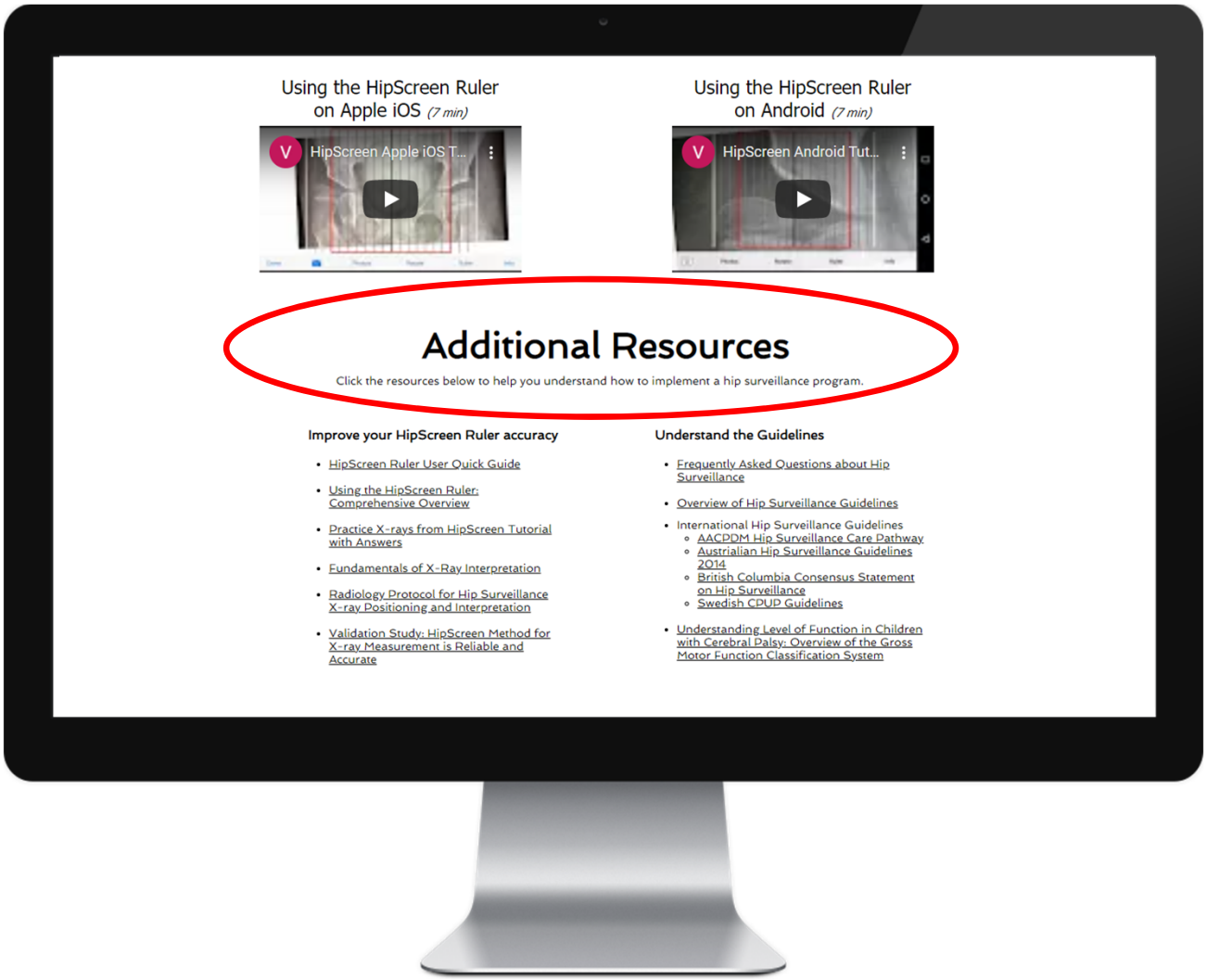
Download on the App Store

hipscreen.org

GET IT ON Google Play



More Resources!

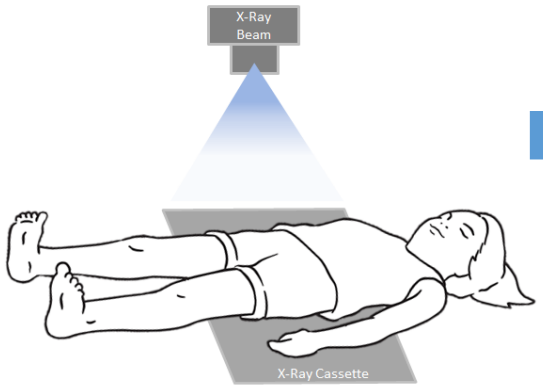


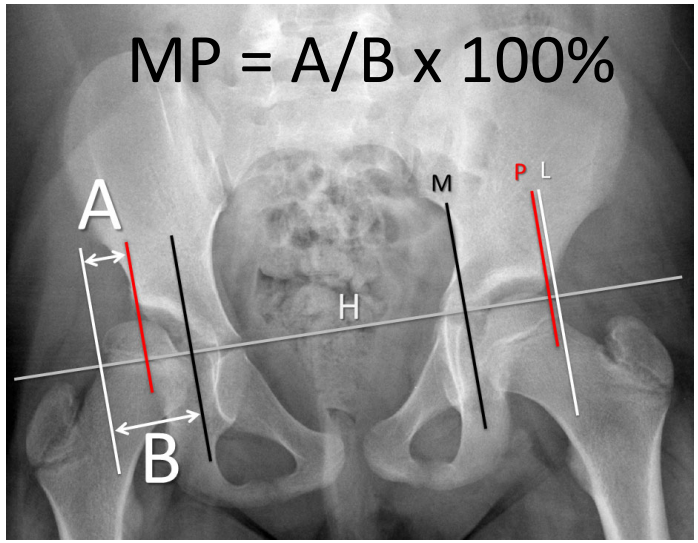
Shriners Hospitals for Children®— Northern California

hipscreen.org

Migration Percentage (MP)

Cornerstone to Early Identification





MP is the "Percentage of the Ball Outside of the Edge of Socket"

MP greater than 30% = Increased Risk of Progressive Displacement

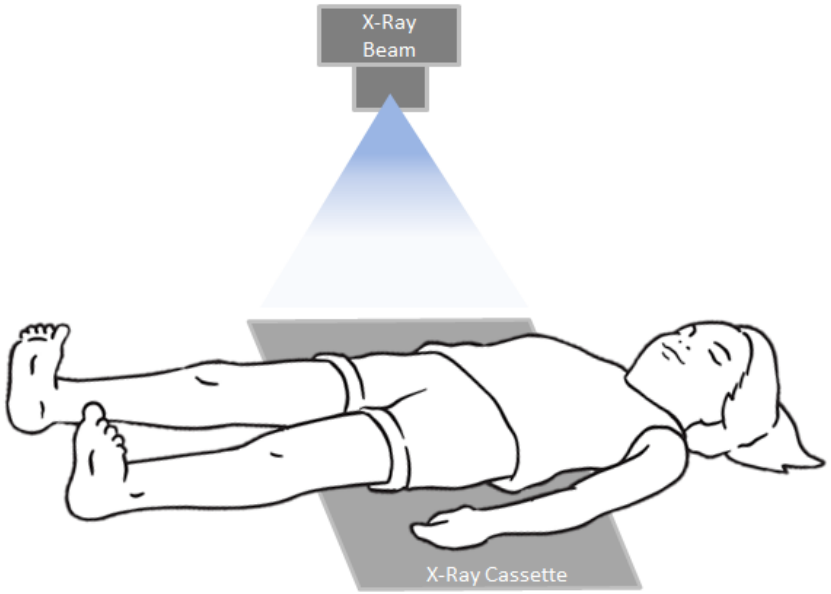
Soo B et al. JBJS Am 2006.

Shriners Hospitals for Children®— Northern California

hipscreen.org

Supine AP Pelvis X-Ray

Establishes MP for Both Hips



Radiation Exposure = 60 mrem

- Average annual radiation = 300 mrem
  - Higher if you live at above sea level
- Air travel = 0.5 mrem per hour

Shriners Hospitals for Children®—Northern California

hipscreen.org

Critical Migration Percentage:

Refer to a Specialty Center for Treatment

30%

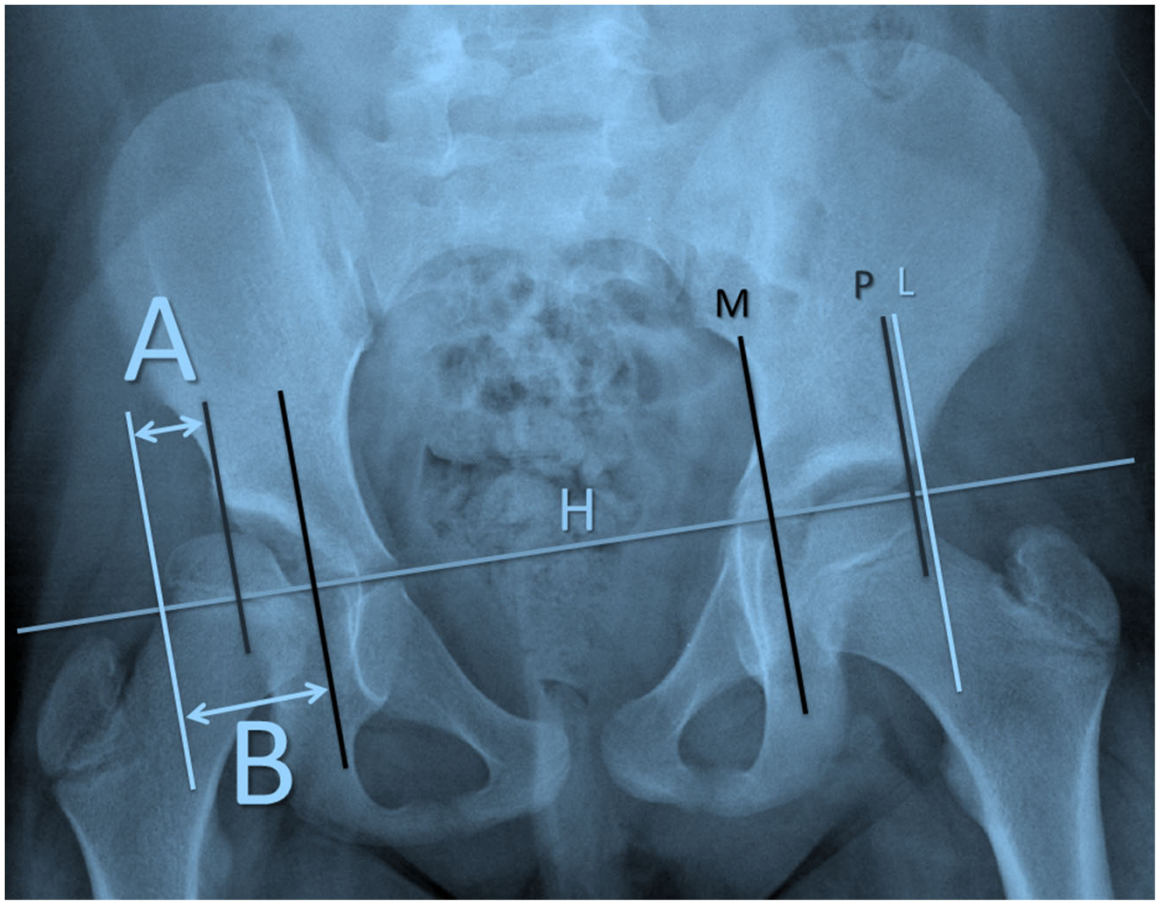
Migration Percentage at which risk of progressive hip displacement increases dramatically

Soo B et al. *JBJS [Am]* 2006;88:121-129.

Shriners Hospitals for Children®— Northern California

hipscreen.org

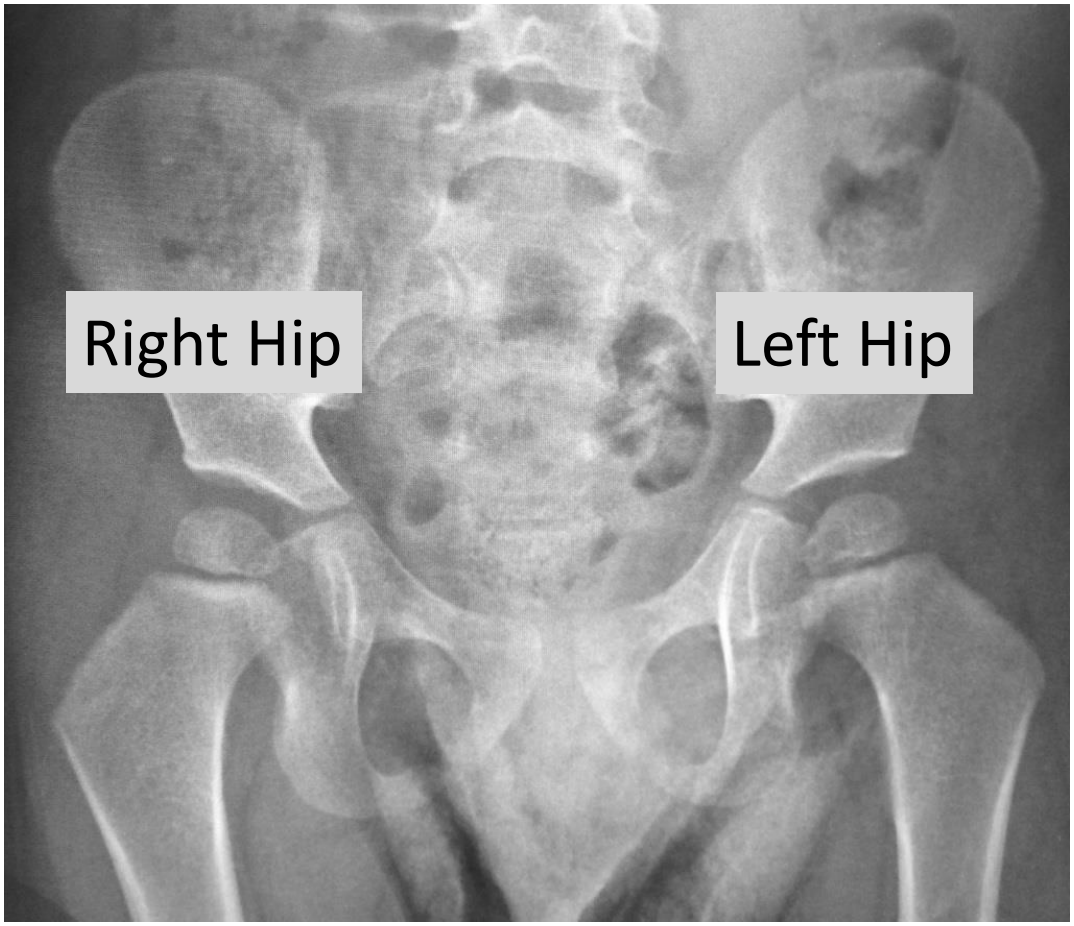
Learn the Language of Radiology

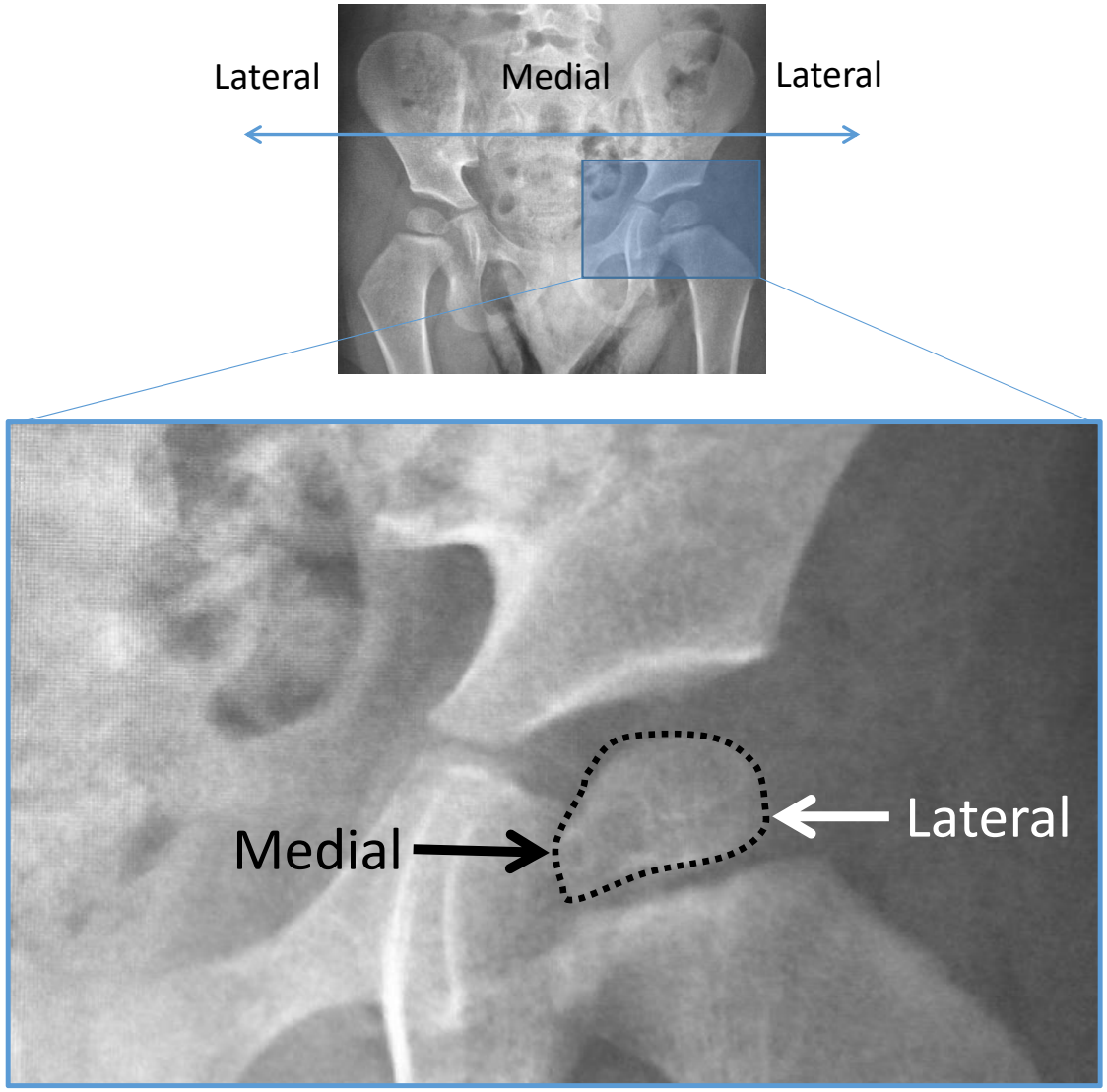


Shriners Hospitals for Children®— Northern California

hipscreen.org

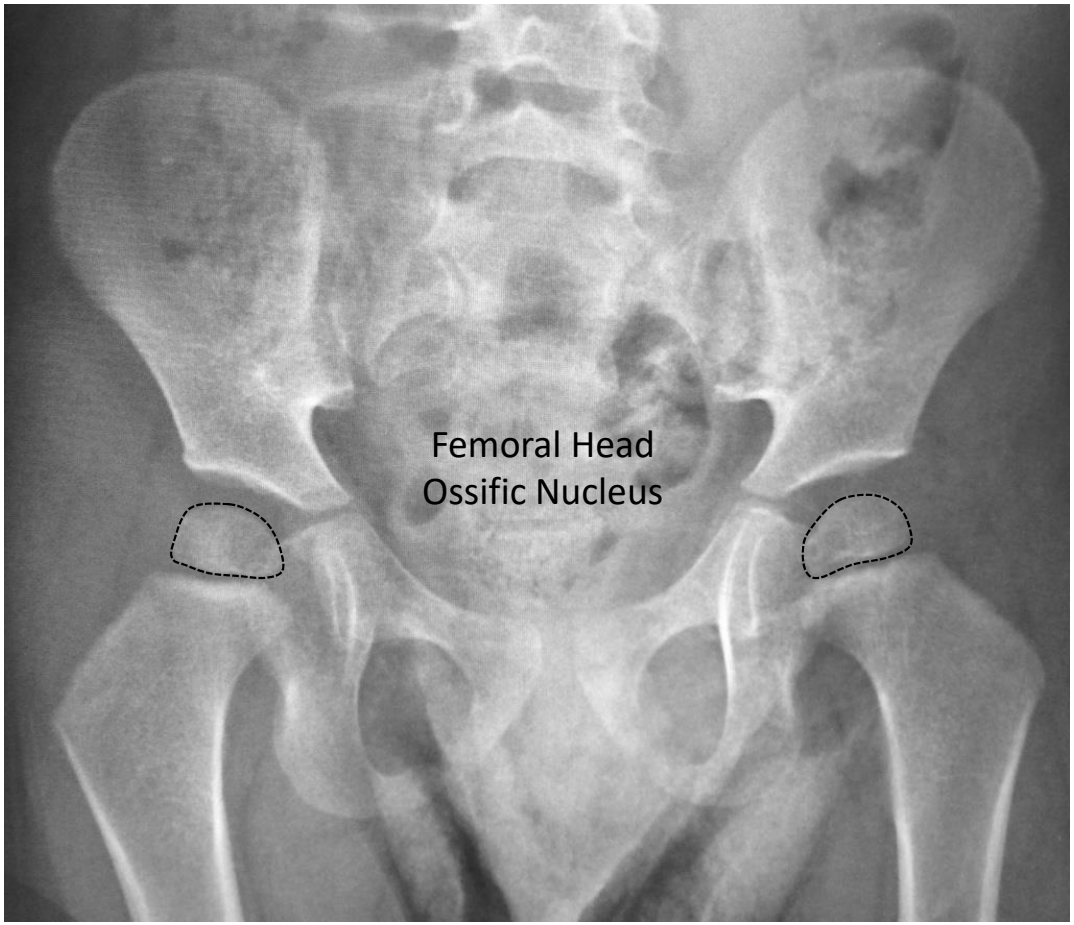
The child is facing you!




Lateral
Medial
Lateral
Medial
Lateral

Shriners Hospitals for Children®— Northern California

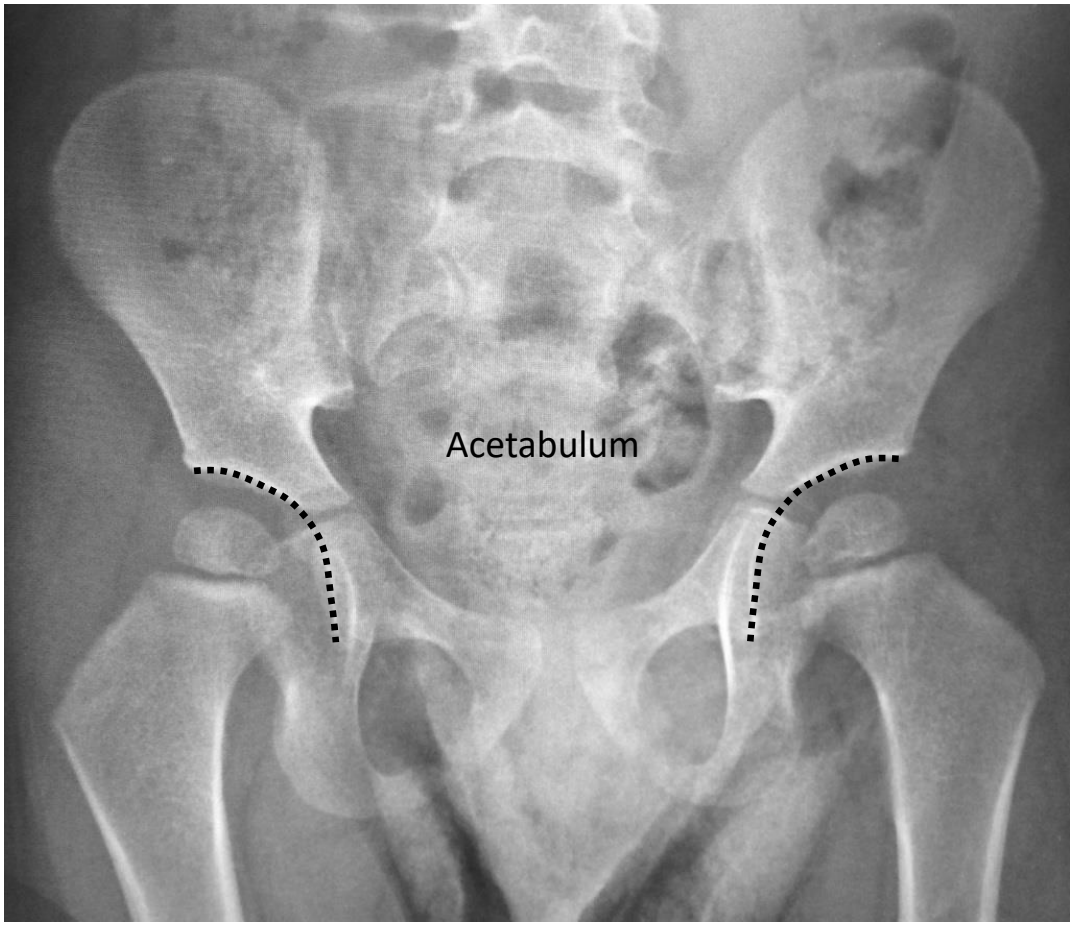
The hip joint



hipscreen.org

Shriners Hospitals for Children®— Northern California

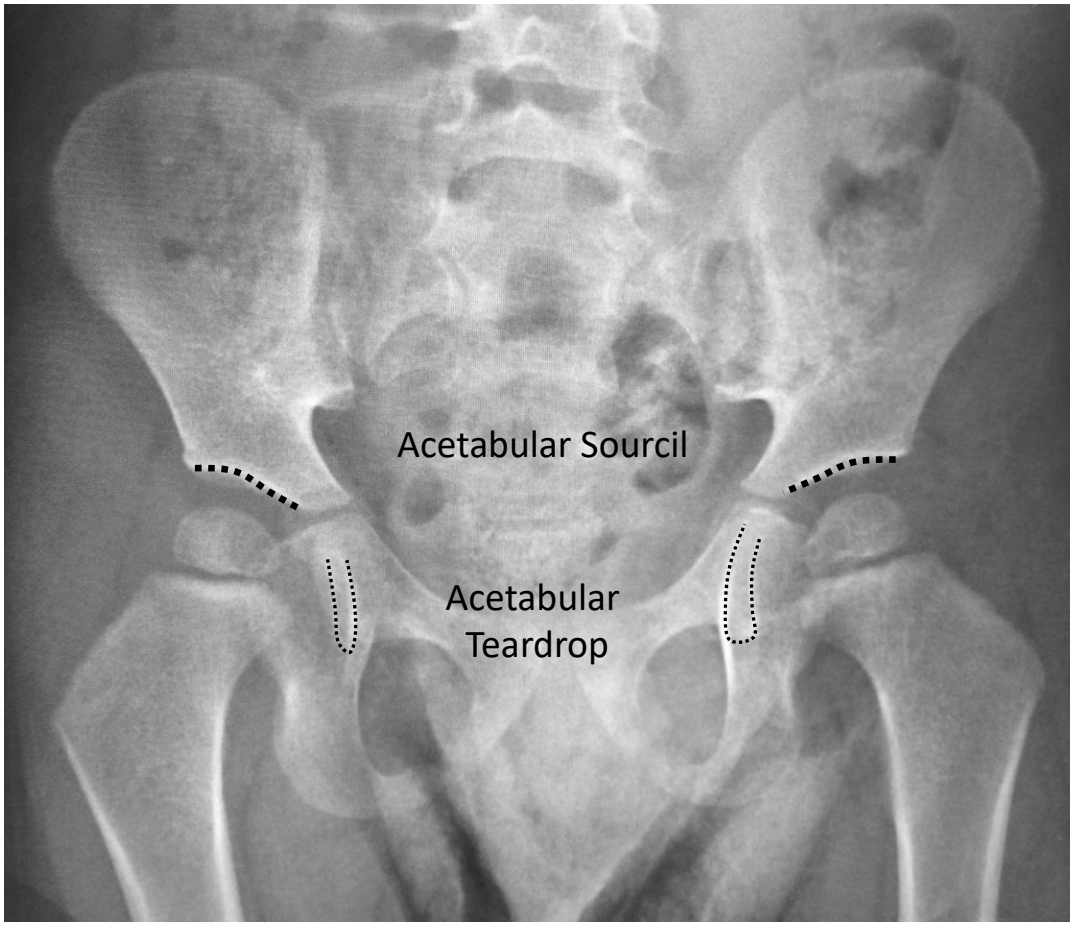
The hip joint



hipscreen.org

Shriners Hospitals for Children®— Northern California

The hip joint

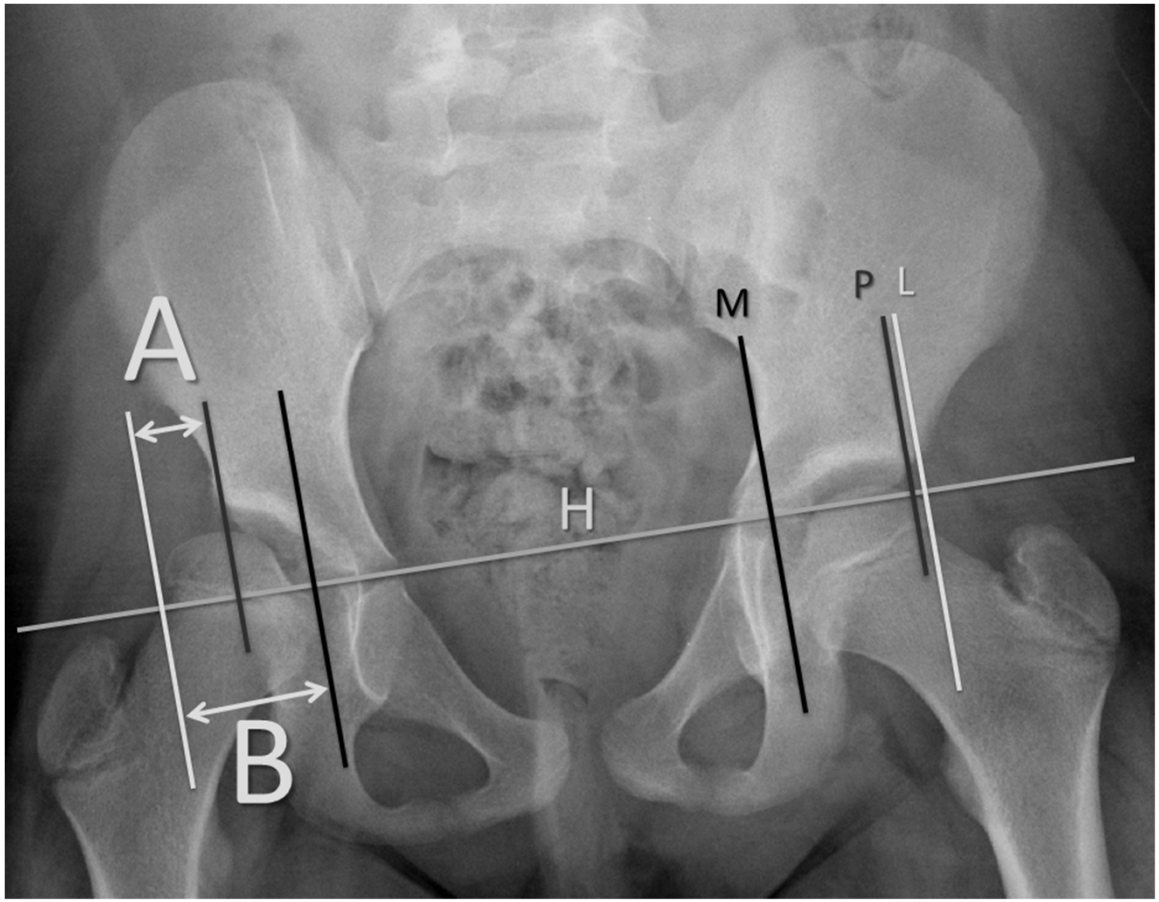


hipscreen.org

Shriners Hospitals for Children®— Northern California

hipscreen.org

Calculating Migration Percentage (MP)

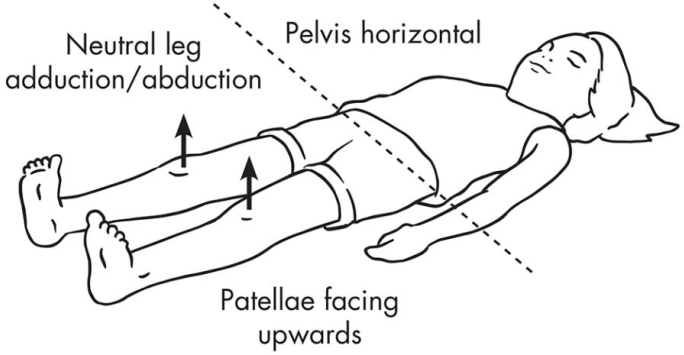


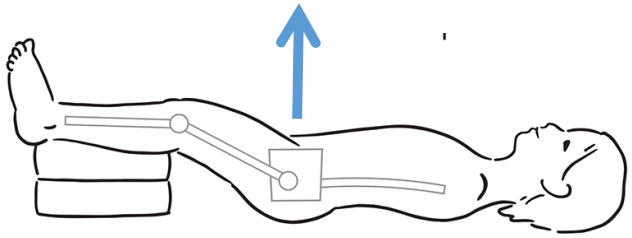
Shriners Hospitals for Children®— Northern California

hipscreen.org

Four Steps to Calculate Migration Percentage

STEP 1: Confirm that you have a properly positioned AP Pelvis X-ray.





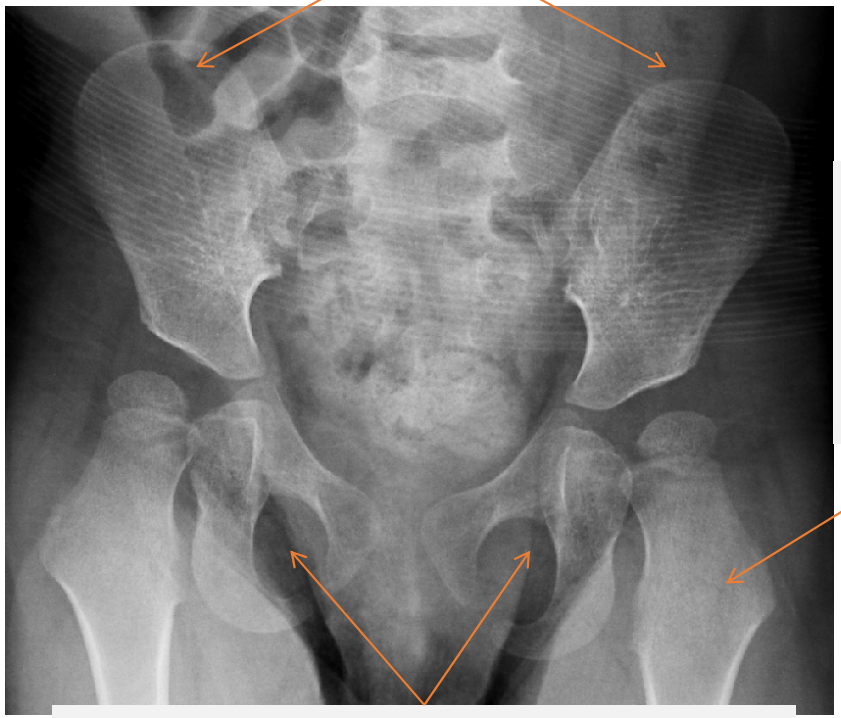
Correct – Flat spine

If a hip flexion contracture is present, use pillows to keep the pelvis facing forward

Shriners Hospitals for Children®— Northern California

hipscreen.org

Features of Appropriately Positioned AP Pelvis



Shriners Hospitals for Children®— Northern California

hipscreen.org

Features of Appropriately Positioned AP Pelvis

Symmetric Pelvic Wings

Symmetric and oval obturator foramina

Femur in neutral abduction/adduction

Asymmetric pelvic wings

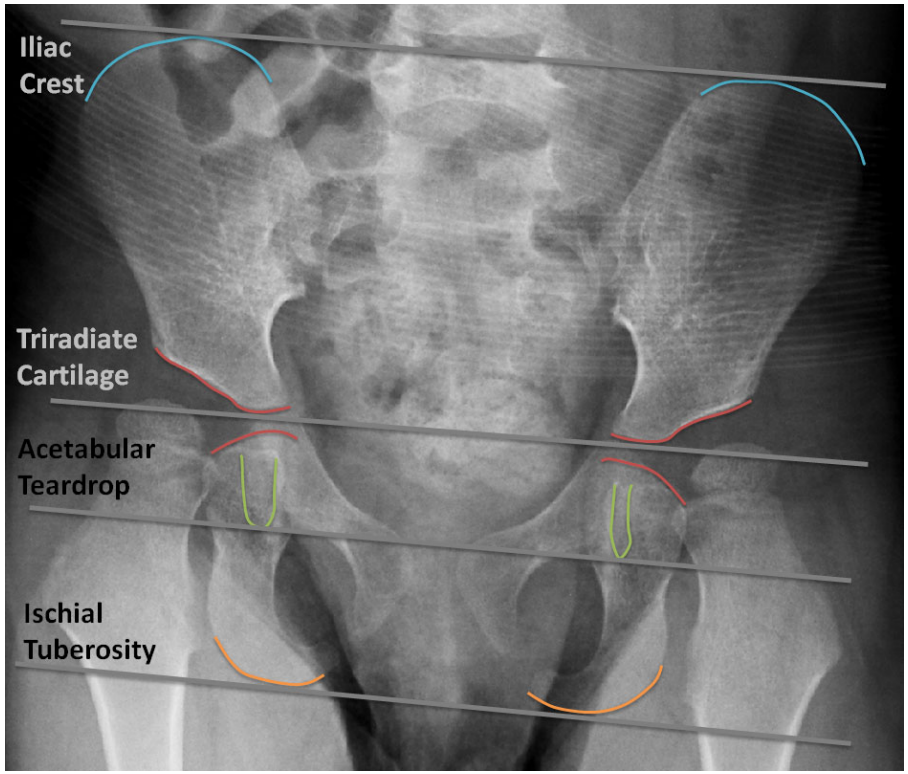
Asymmetric obturator foramina

Femur abducted

Obturator foramina not oval shaped and difficult to visualize

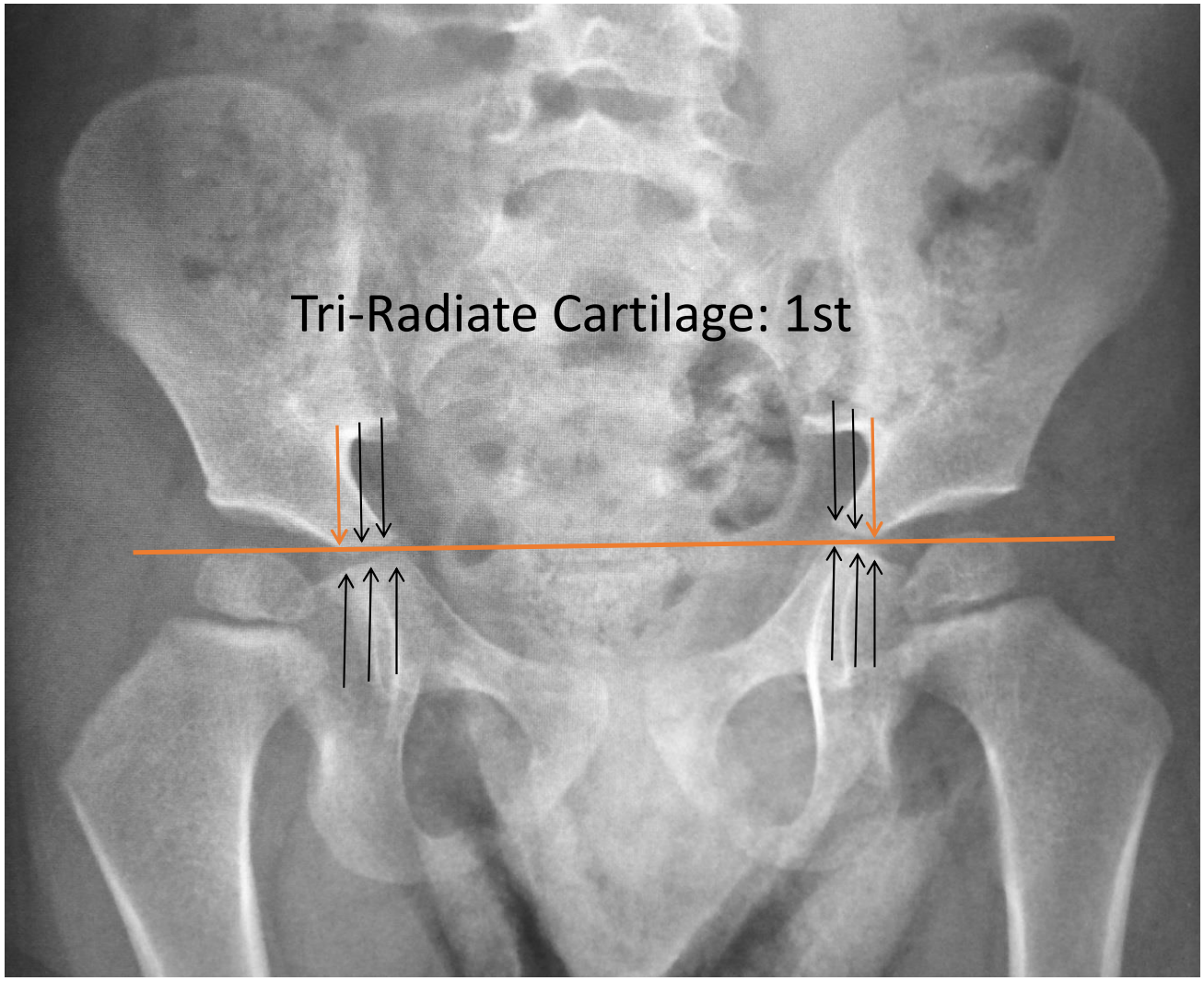
STEP 2:

- Establish the pelvis horizontal axis, or **H-line**, by connecting one of the pair of landmarks outlined below.
- The most common landmark to use is the Tri-Radiate Cartilage.



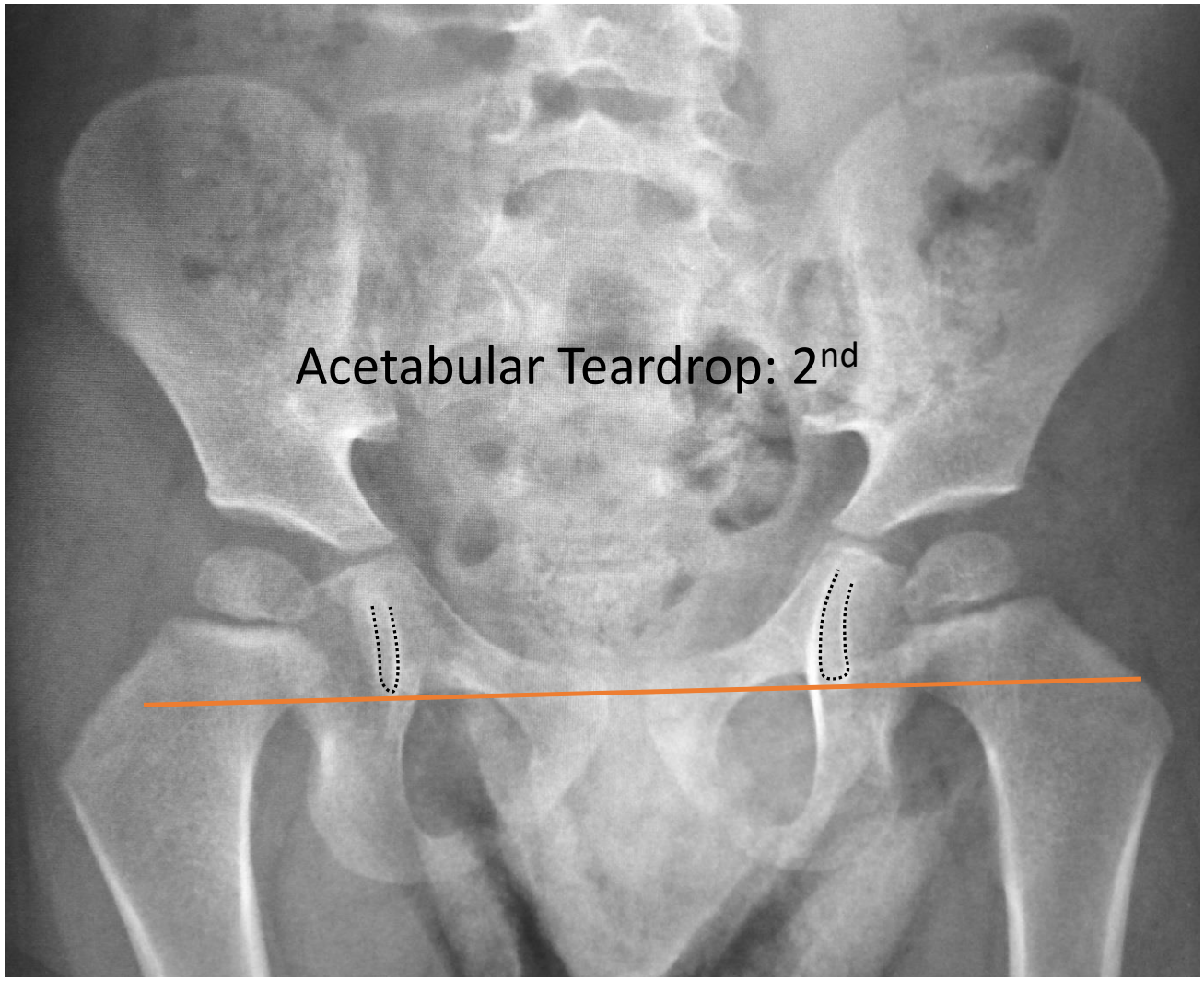
Shriners Hospitals for Children®— Northern California

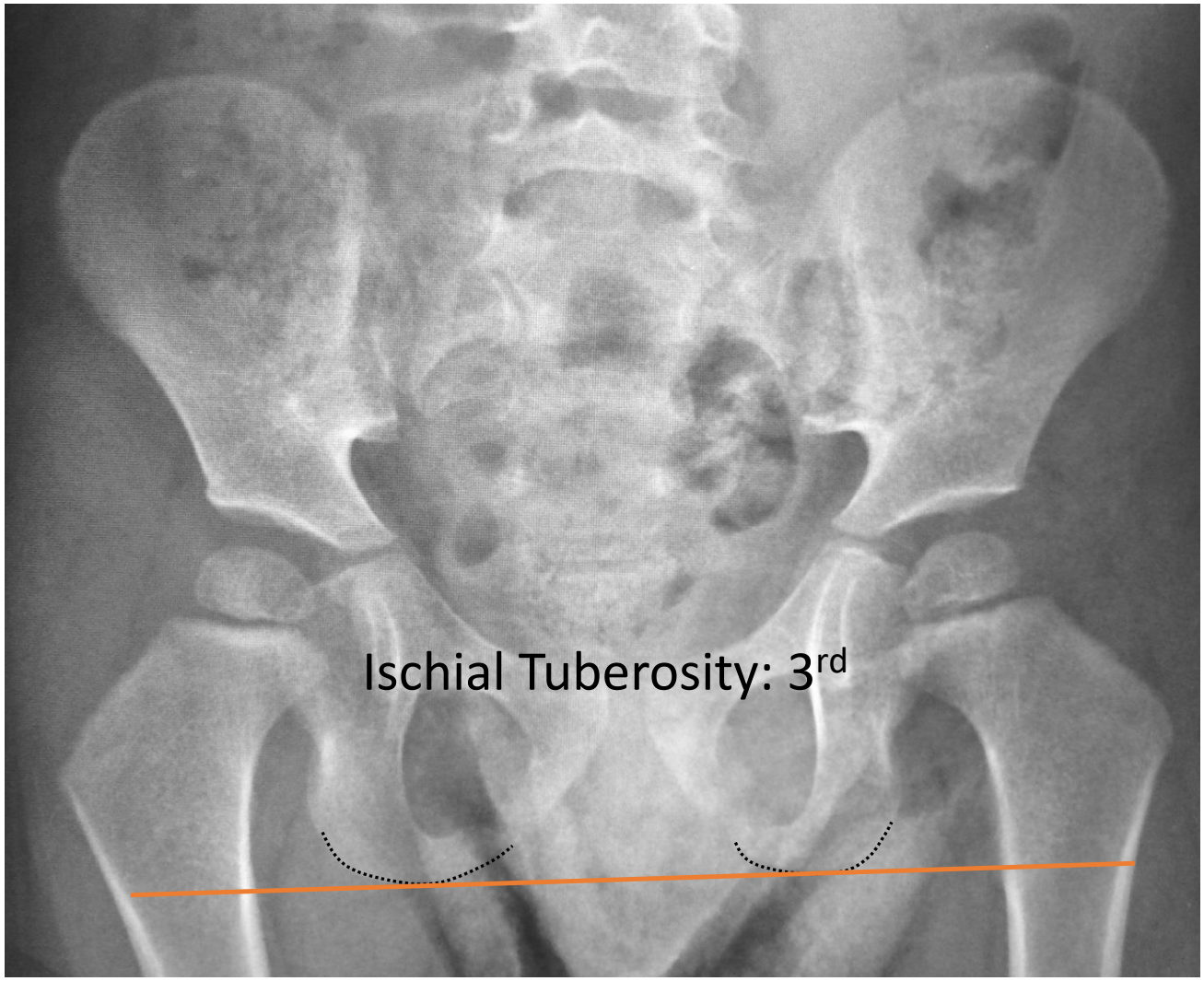
hipscreen.org



Shriners Hospitals for Children®— Northern California

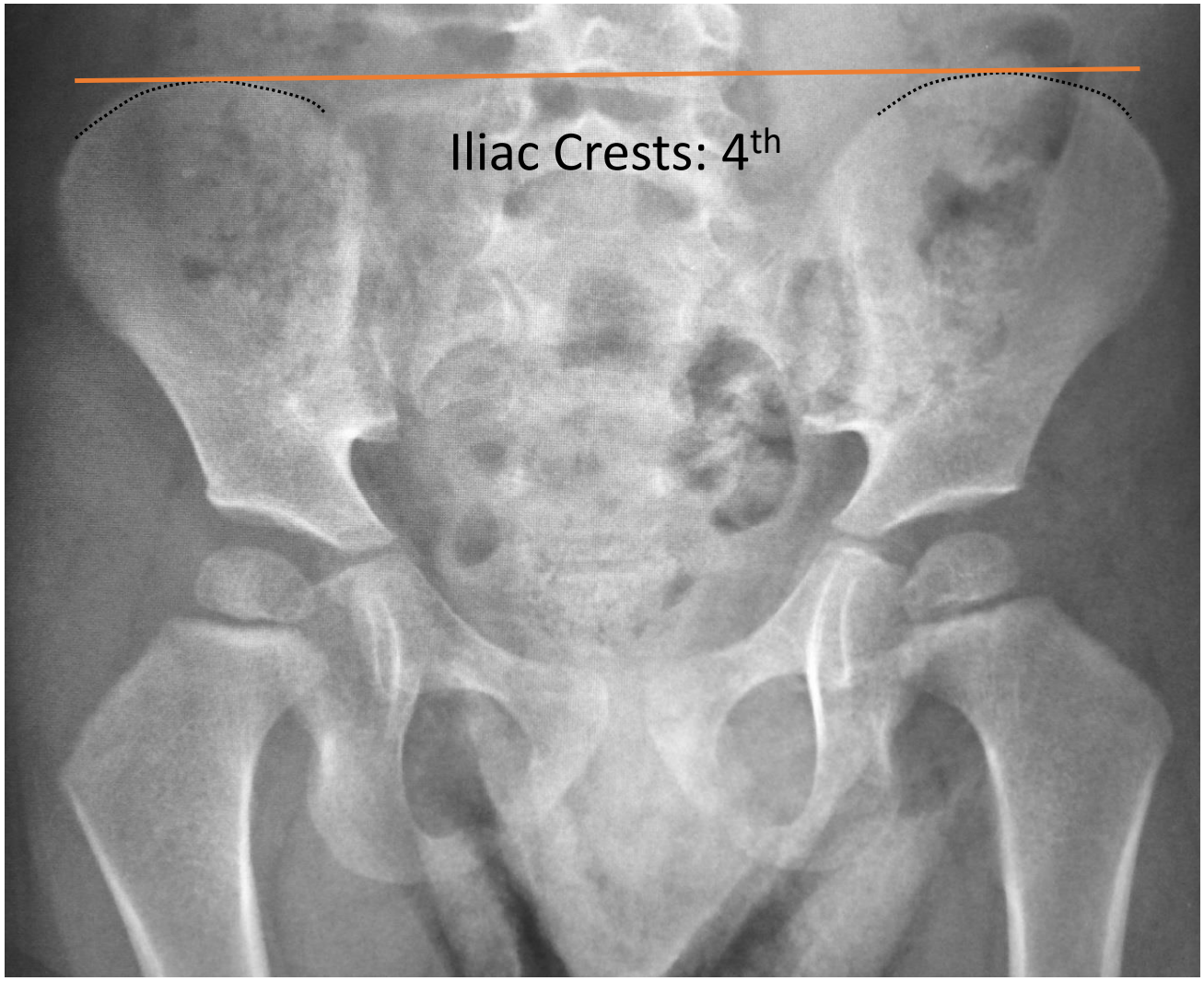
hipscreen.org




Ischial Tuberosity: 3rd

Shriners Hospitals for Children®— Northern California

hipscreen.org

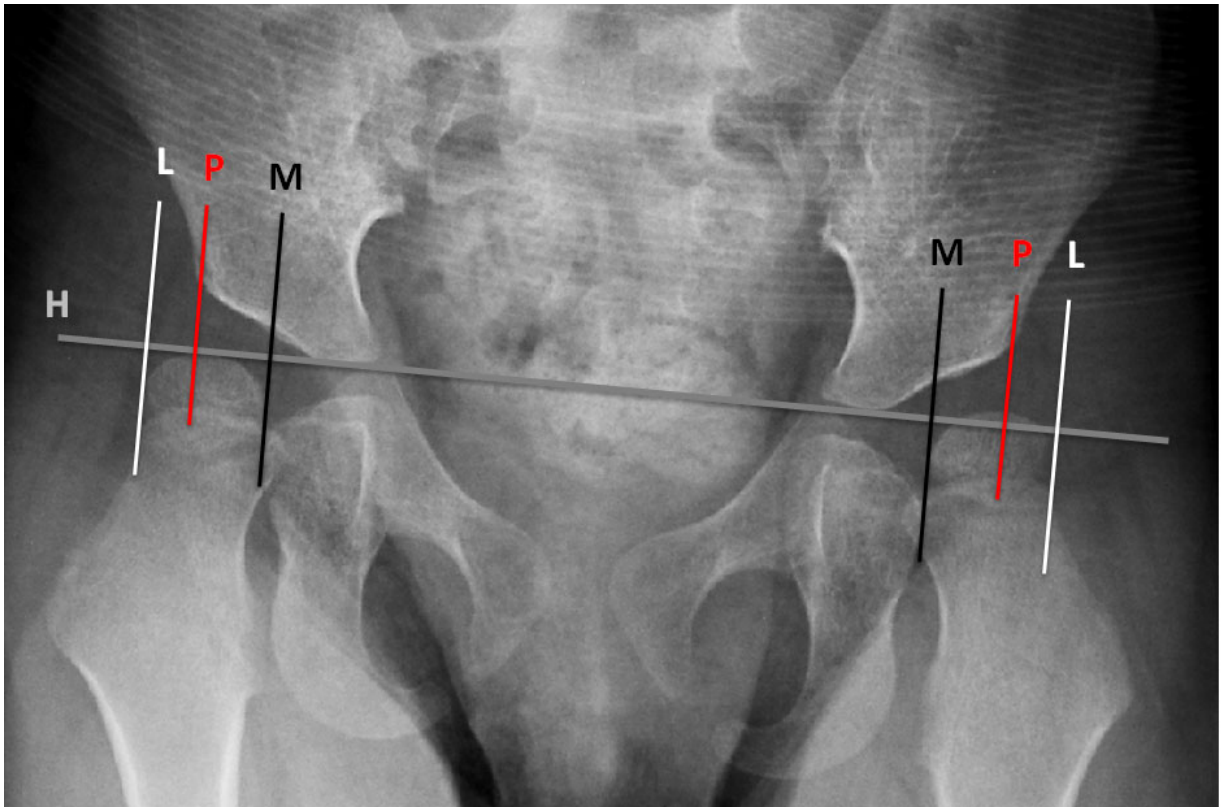


Shriners Hospitals for Children®— Northern California

hipscreen.org

STEP 3: Draw three perpendicular lines to the H-Line:

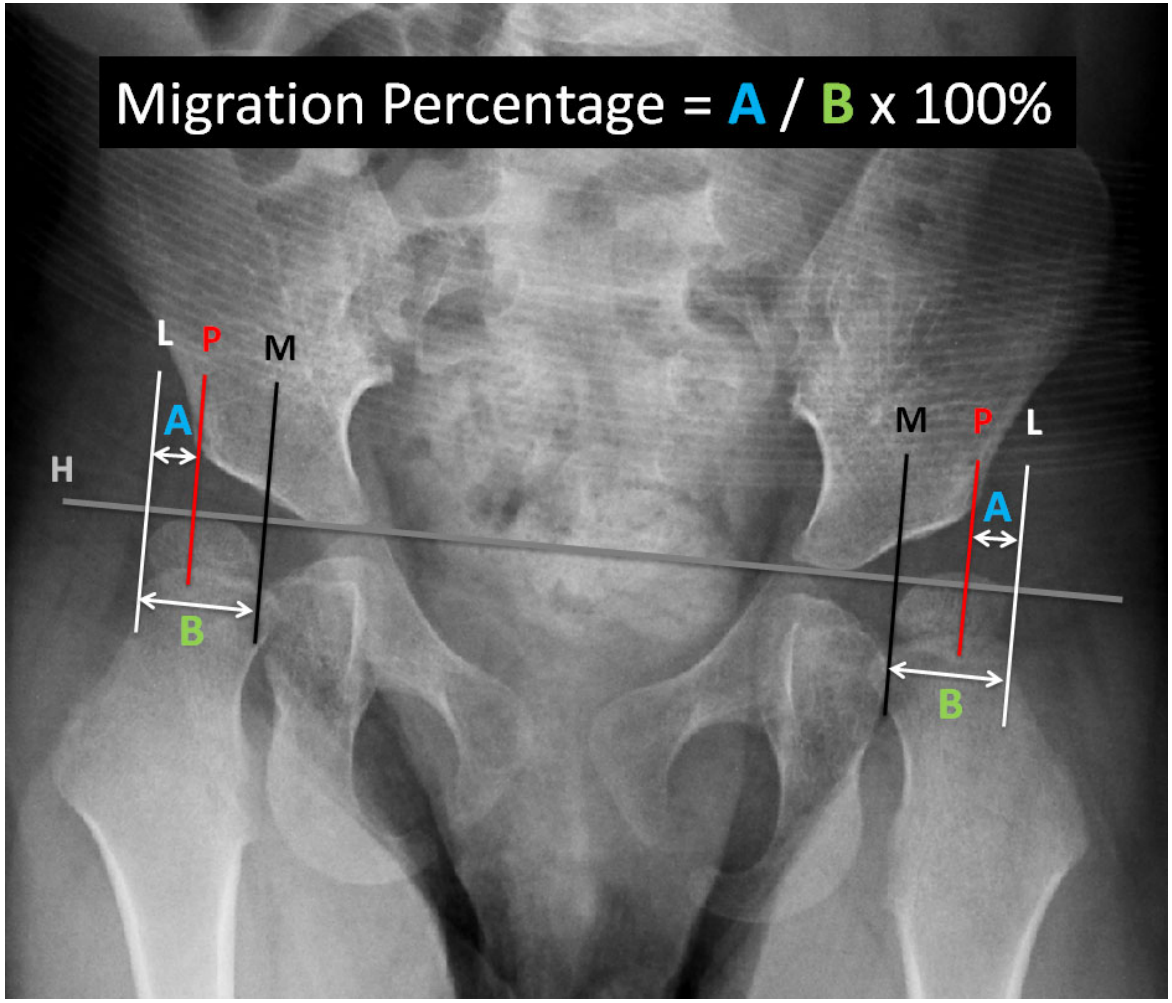
- **M-line:** medial most edge of the femoral head
- **P-line:** lateral edge of the acetabulum
- L-line: lateral most edge of the femoral head



Shriners Hospitals for Children®— Northern California

STEP 4: Calculate Migration Percentage

hipscreen.org



Shriners Hospitals for Children®—Northern California

hipscreen.org

Methods of Measuring MP

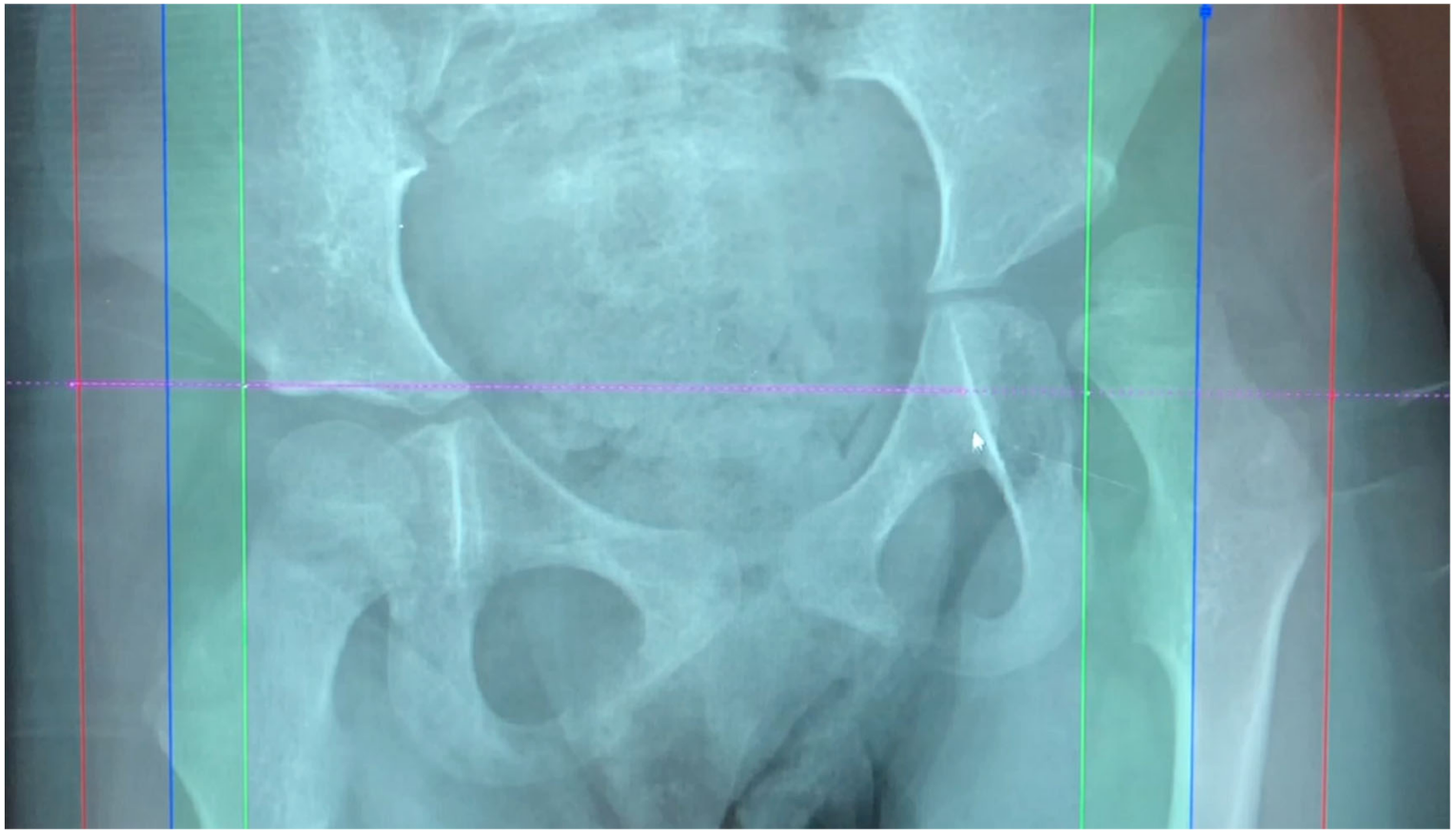
Digital Measurement on PACS Workstation

Shriners Hospitals for Children®—Northern California

hipscreen.org

Methods of Measuring MP

Computer Aided Digital Templating

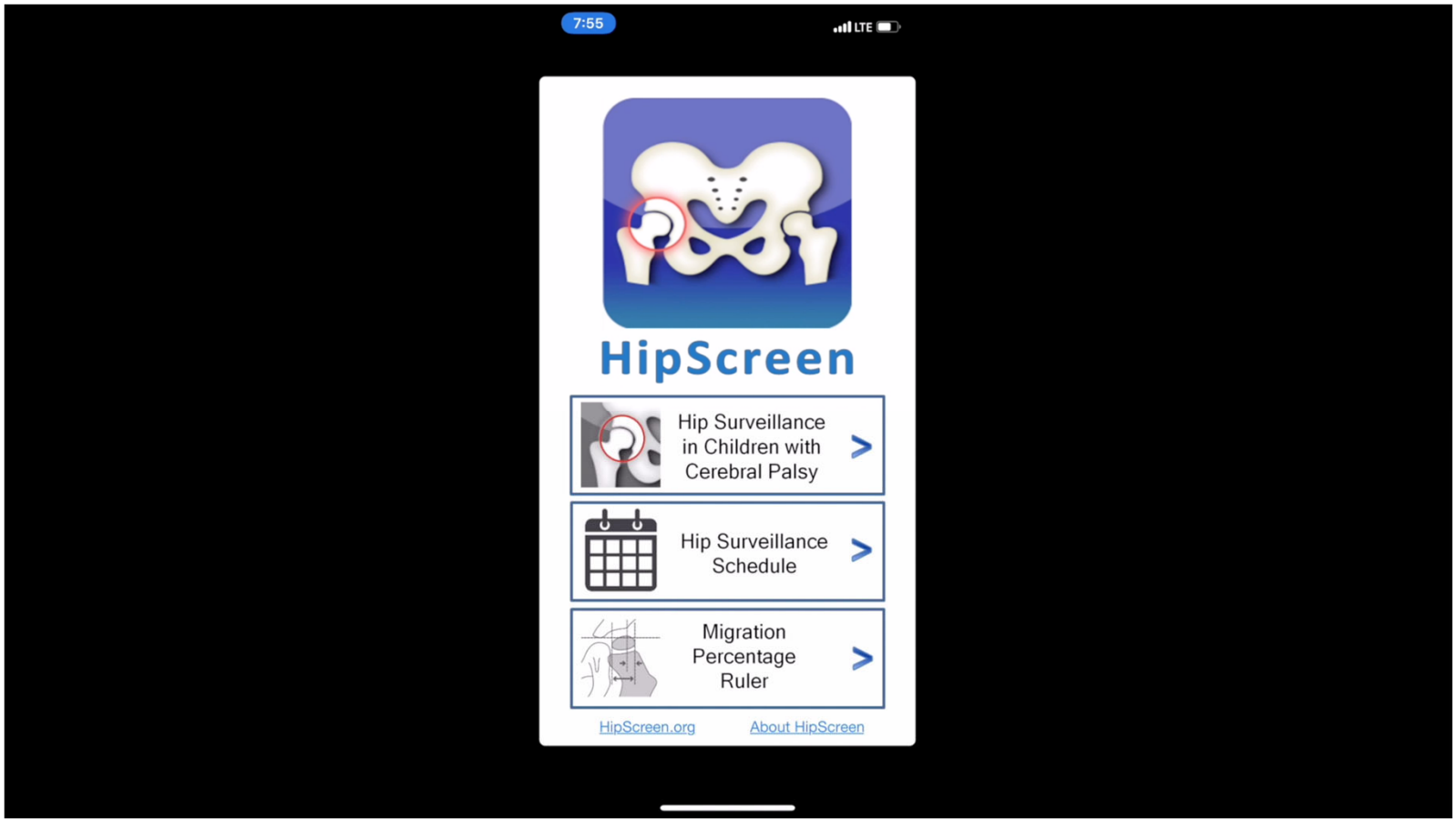


Shriners Hospitals for Children®—Northern California

hipscreen.org

Methods of Measuring MP

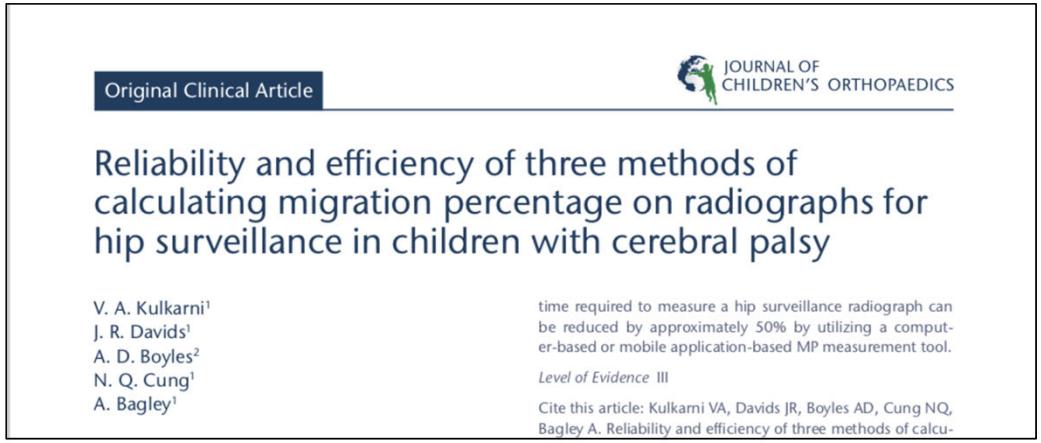
HipScreen App Measurement Technique



Shriners Hospitals for Children®— Northern California

hipscreen.org

Journal of Children's Orthopaedics 2018; 12(2): 145-151.



Original Clinical Article

JOURNAL OF CHILDREN'S ORTHOPAEDICS

Reliability and efficiency of three methods of calculating migration percentage on radiographs for hip surveillance in children with cerebral palsy

V. A. Kulkarni[1]
J. R. Davids[1]
A. D. Boyles[2]
N. Q. Cung[1]
A. Bagley[1]

time required to measure a hip surveillance radiograph can be reduced by approximately 50% by utilizing a computer-based or mobile application-based MP measurement tool.

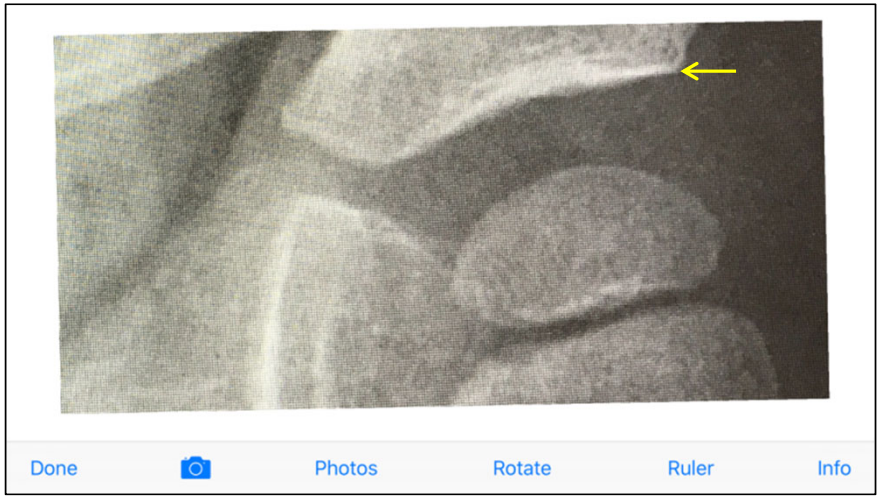
Level of Evidence III

Cite this article: Kulkarni VA, Davids JR, Boyles AD, Cung NQ, Bagley A. Reliability and efficiency of three methods of calcu-

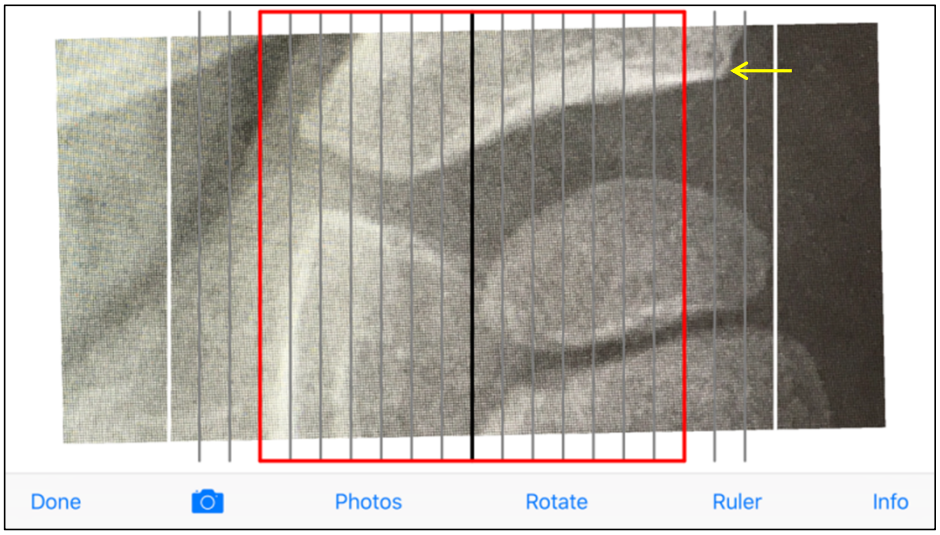
- Migration Percentage measurement with HipScreen:
  - As **accurate** as Computer Aided or Manual Digital Measurement (error in MP 2.8 – 3.6%)
  - Has **excellent reliability** and is equivalent to other methods
  - **Significantly faster** than manual measurement (by 1 min) and **clinically equivalent** to commercially-available computer templating methods (7 sec slower)

Shriners Hospitals for Children®—Northern California

hipscreen.org

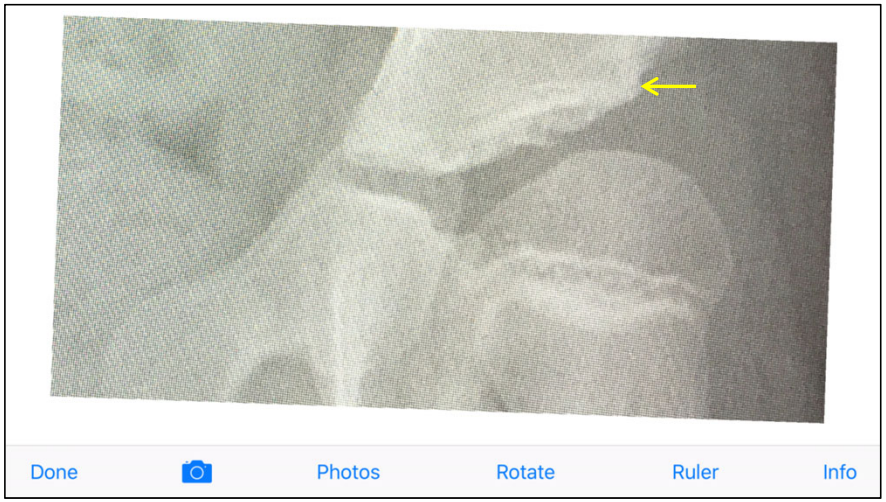


15% Example

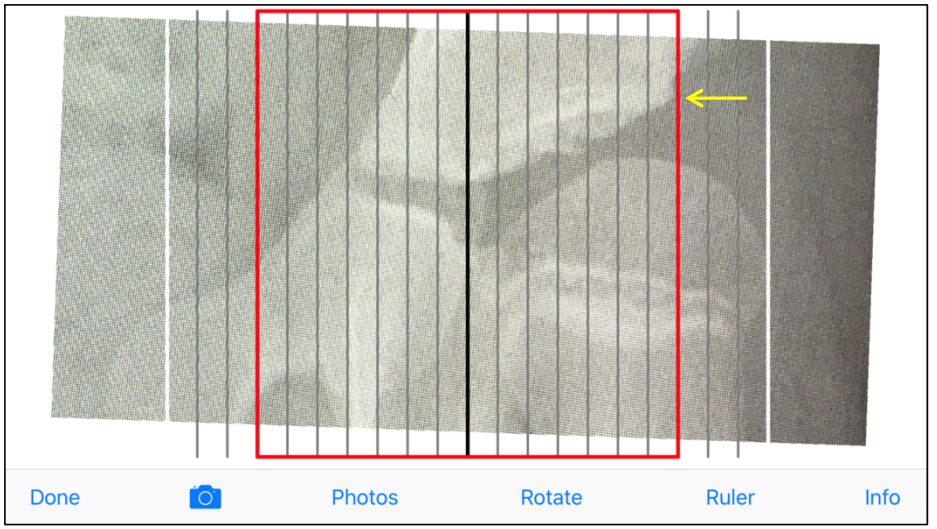


Shriners Hospitals for Children®—Northern California

hipscreen.org

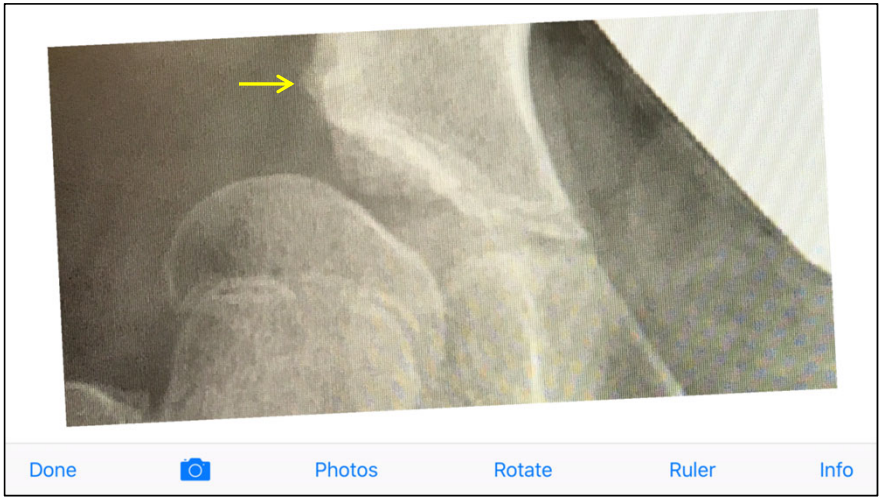


30% Example

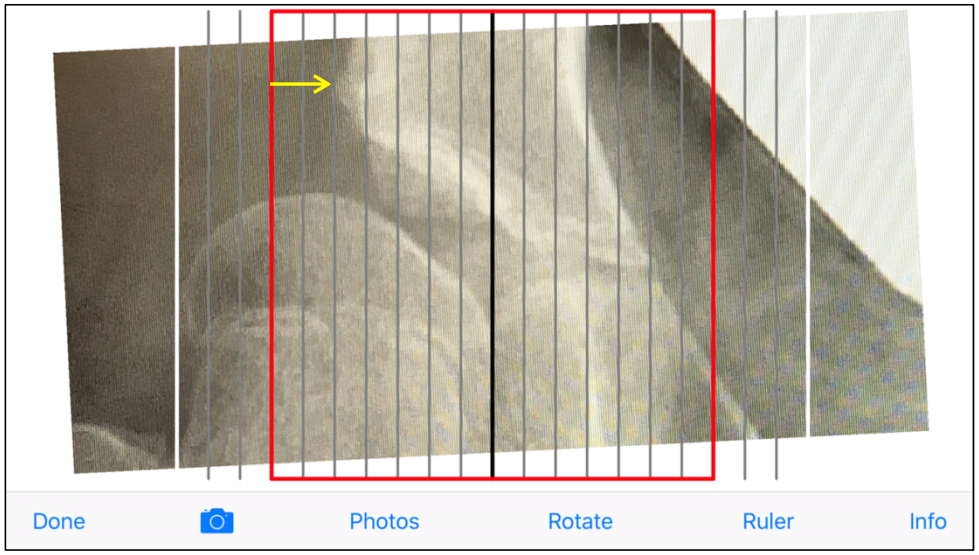


Shriners Hospitals for Children®—Northern California

hipscreen.org



50% Example



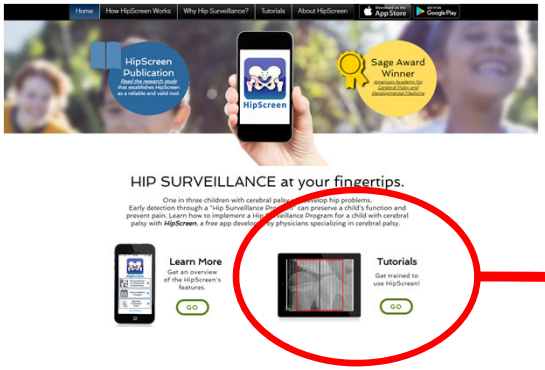
Now it’s your turn!

Shriners Hospitals for Children®—Northern California

Download on the App Store

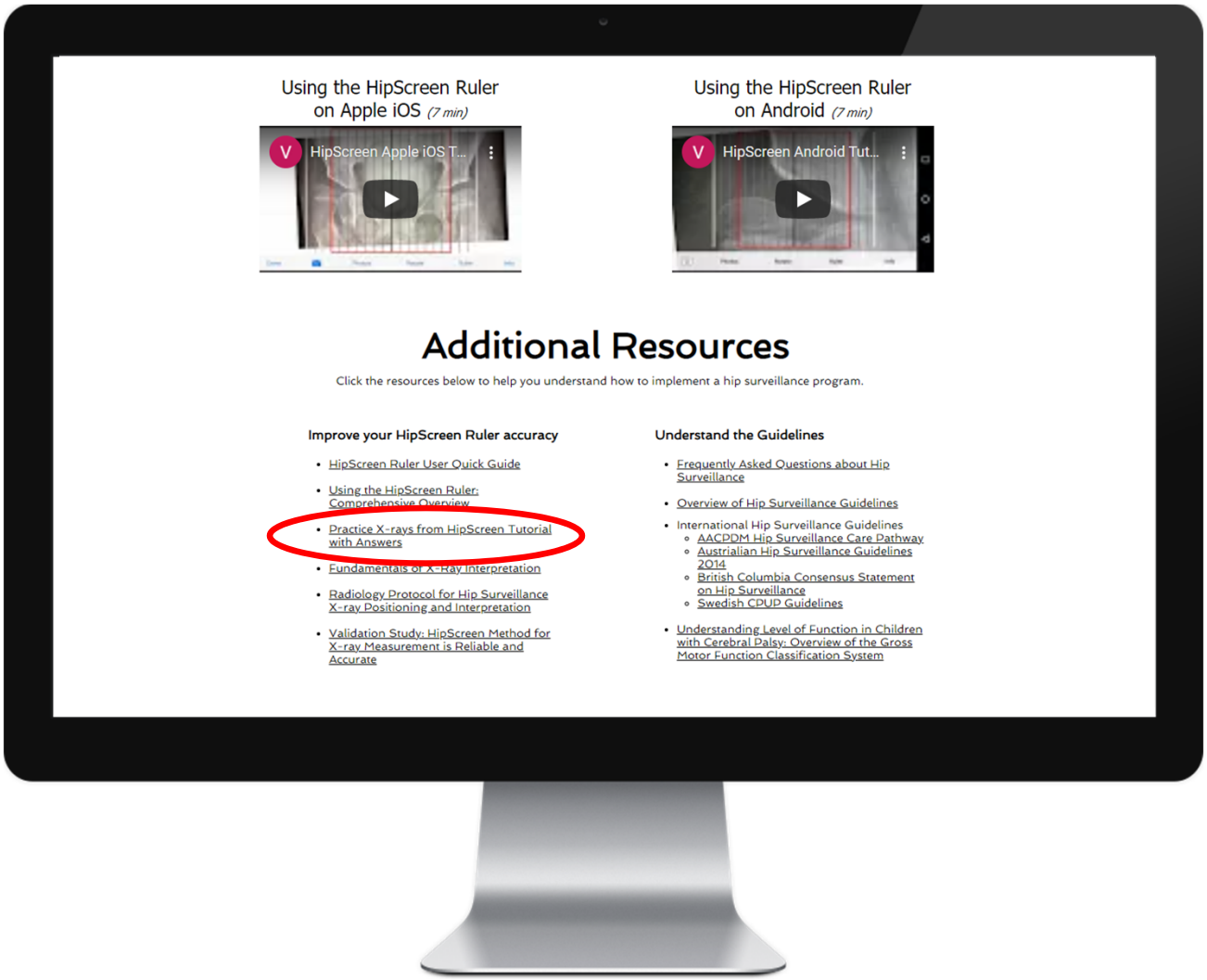
hipscreen.org

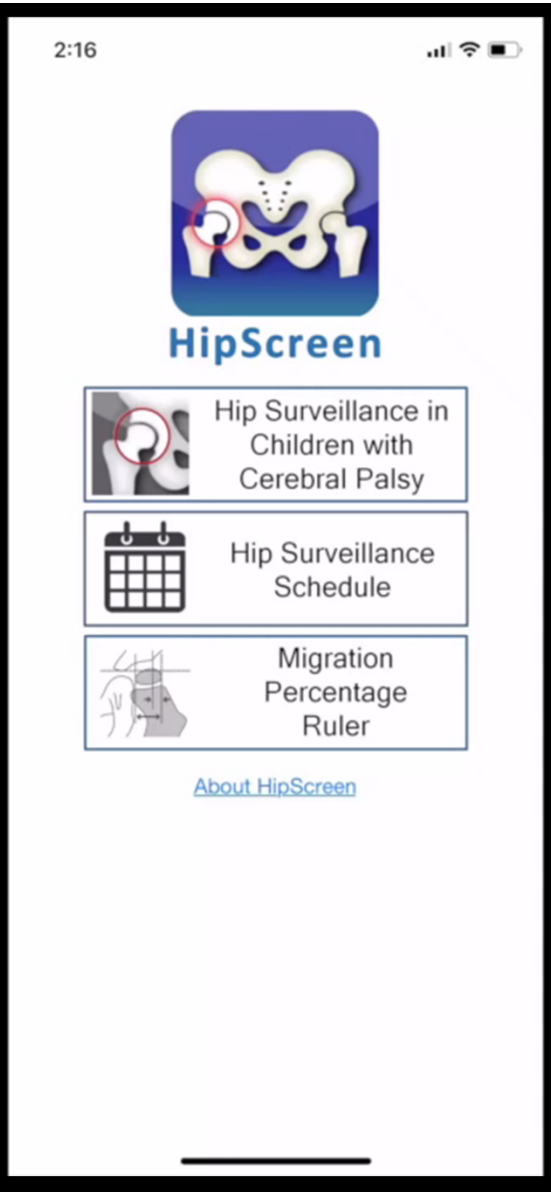
GET IT ON Google Play

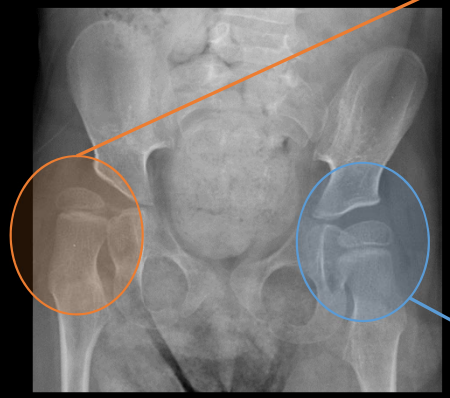


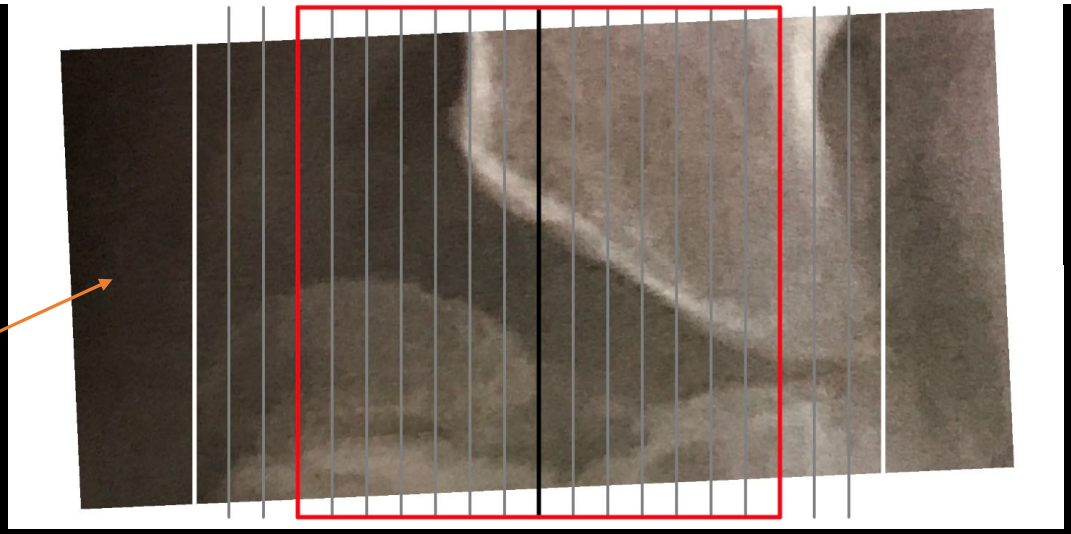
Answers!

(Don't cheat!)

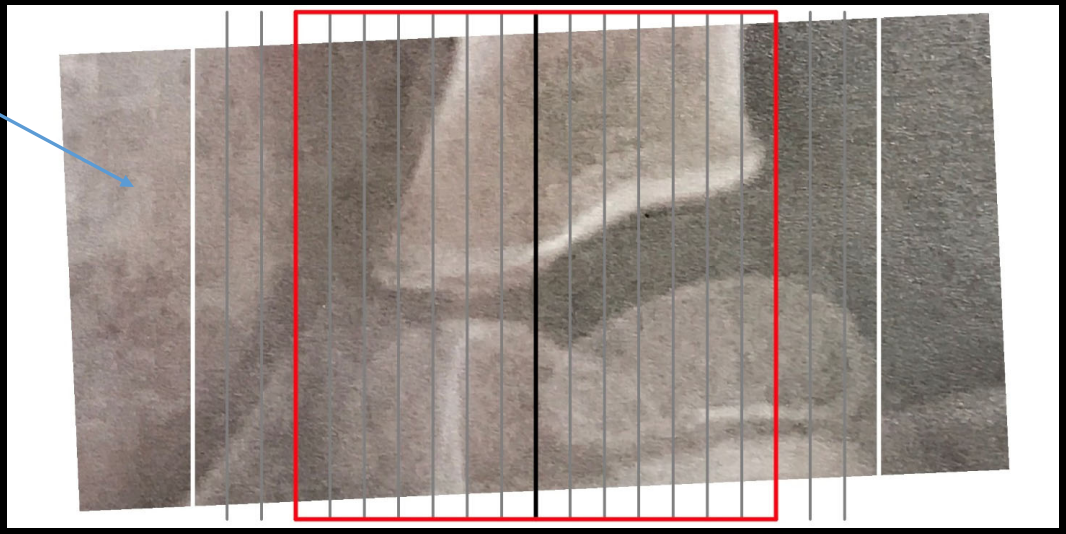



2:16
HipScreen
Hip Surveillance in Children with Cerebral Palsy
Hip Surveillance Schedule
Migration Percentage Ruler
About HipScreen

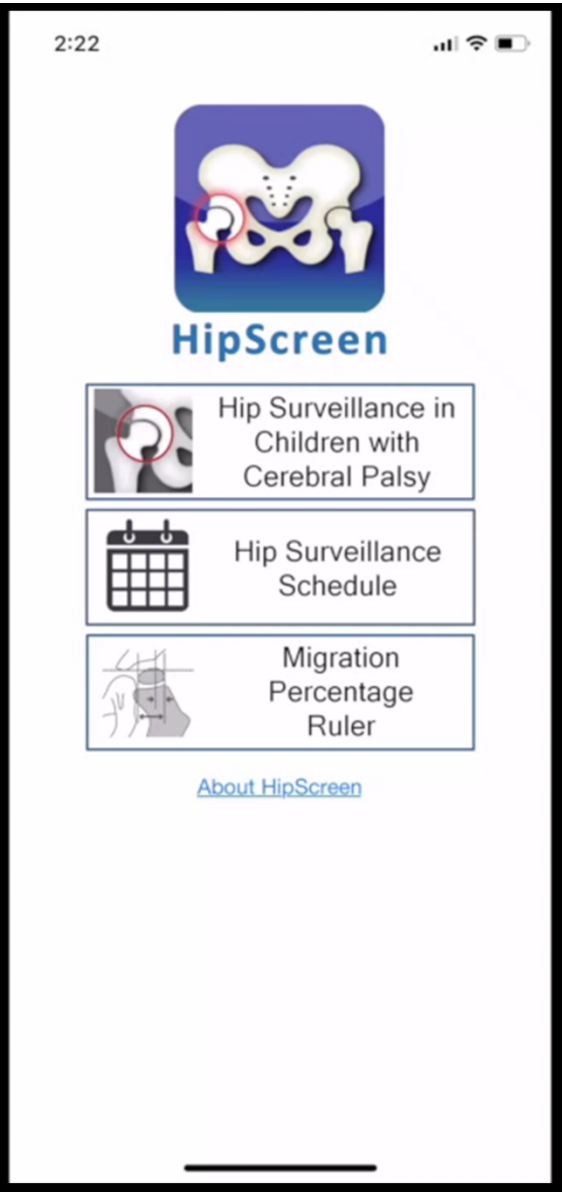


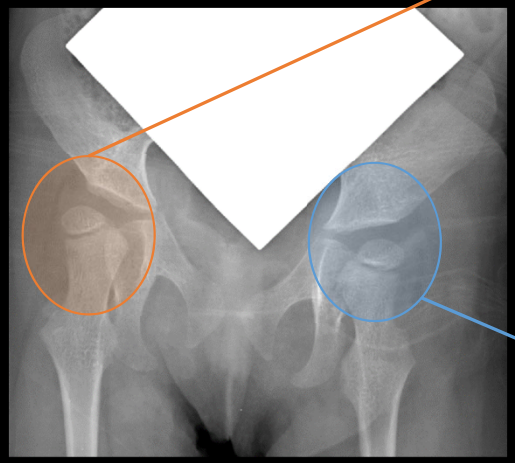


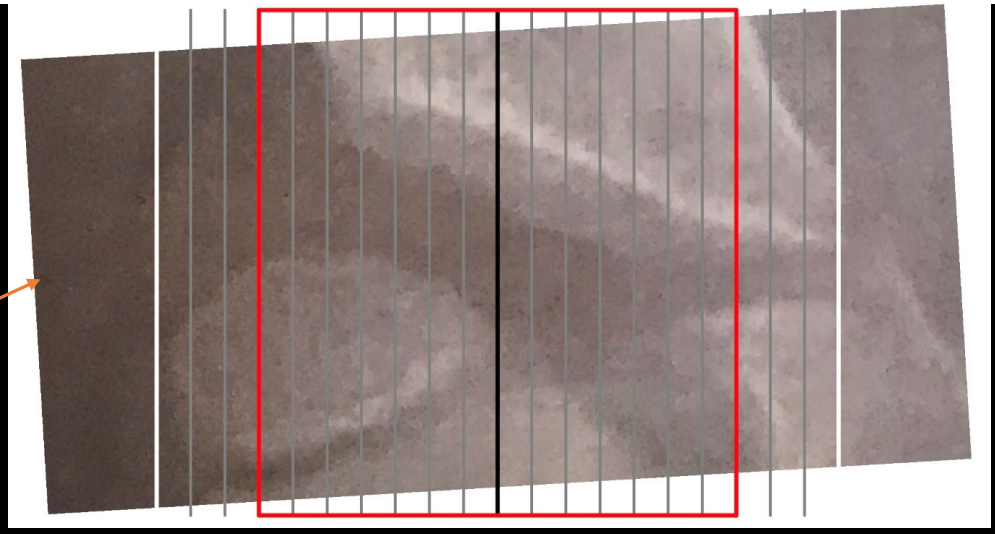
R: 75%



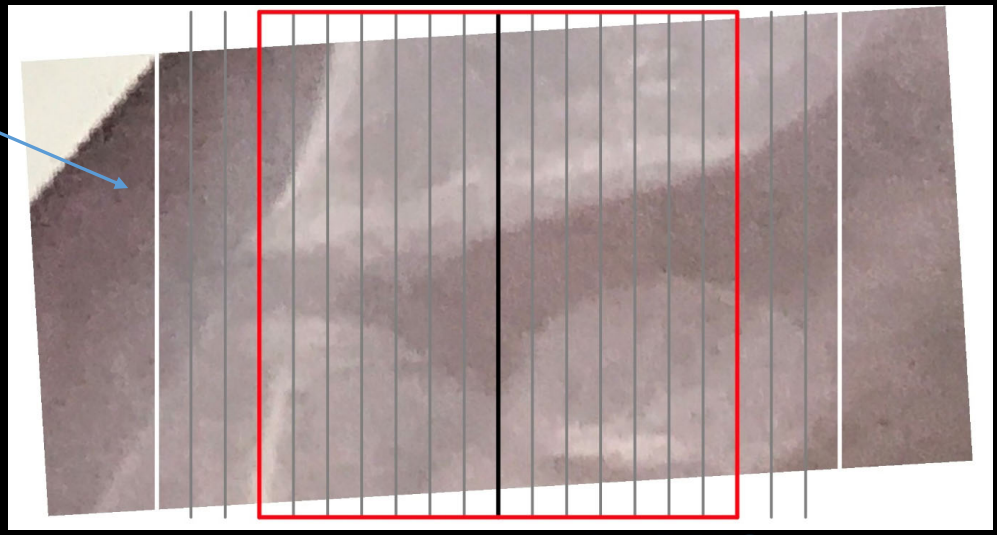
L: 33%


2:22
HipScreen
Hip Surveillance in Children with Cerebral Palsy
Hip Surveillance Schedule
Migration Percentage Ruler
About HipScreen

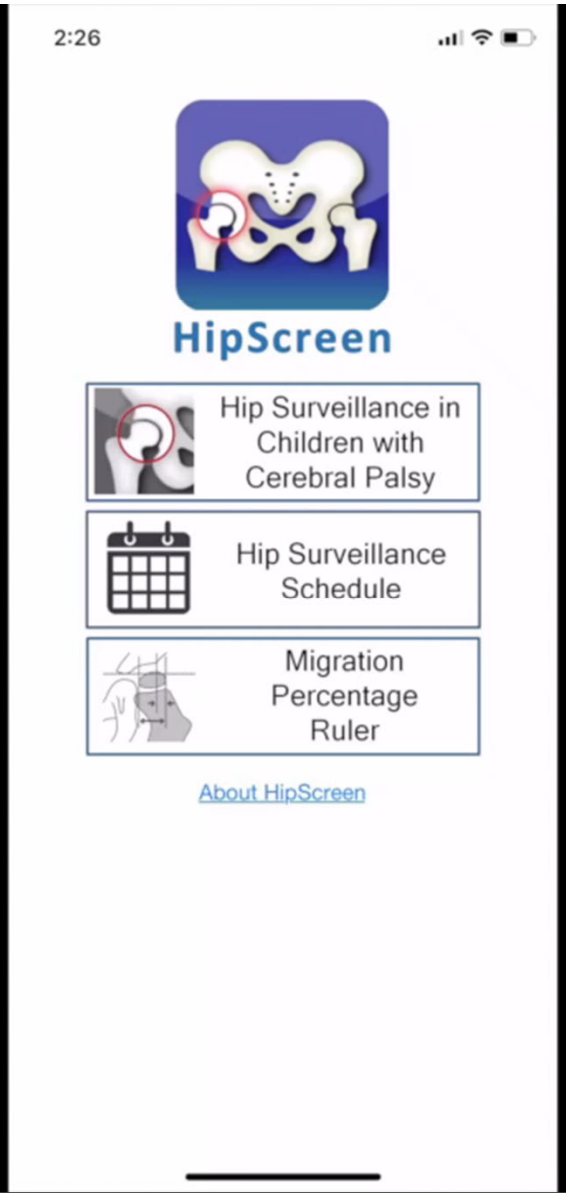


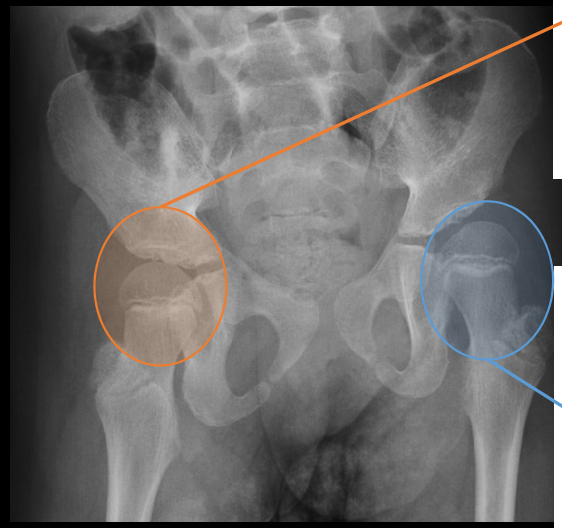


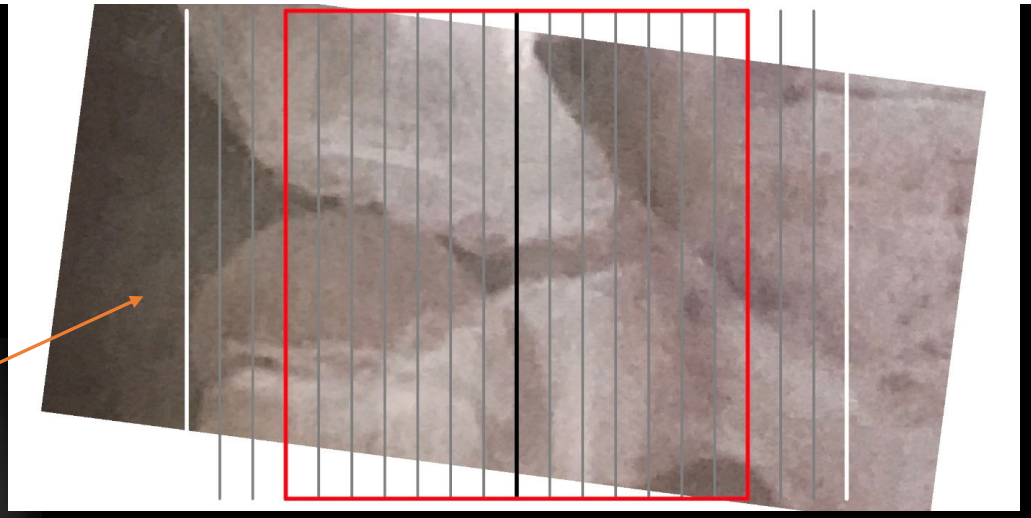
R: 50%



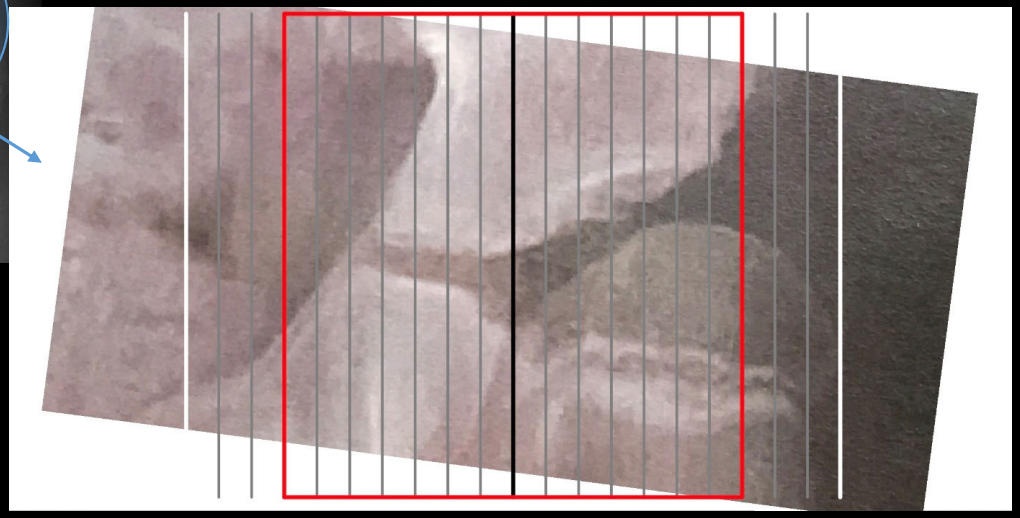
L: 30%


2:26
HipScreen
Hip Surveillance in Children with Cerebral Palsy
Hip Surveillance Schedule
Migration Percentage Ruler
About HipScreen





R: 20%



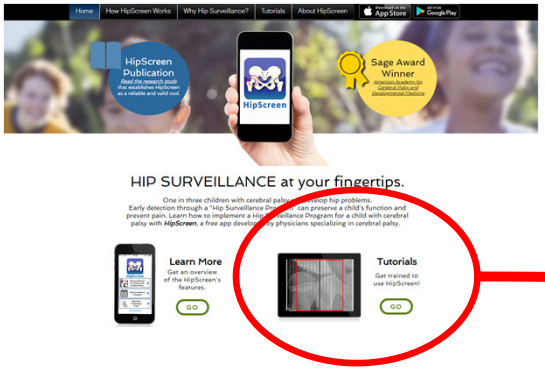
L: 35%

Shriners Hospitals for Children®—Northern California

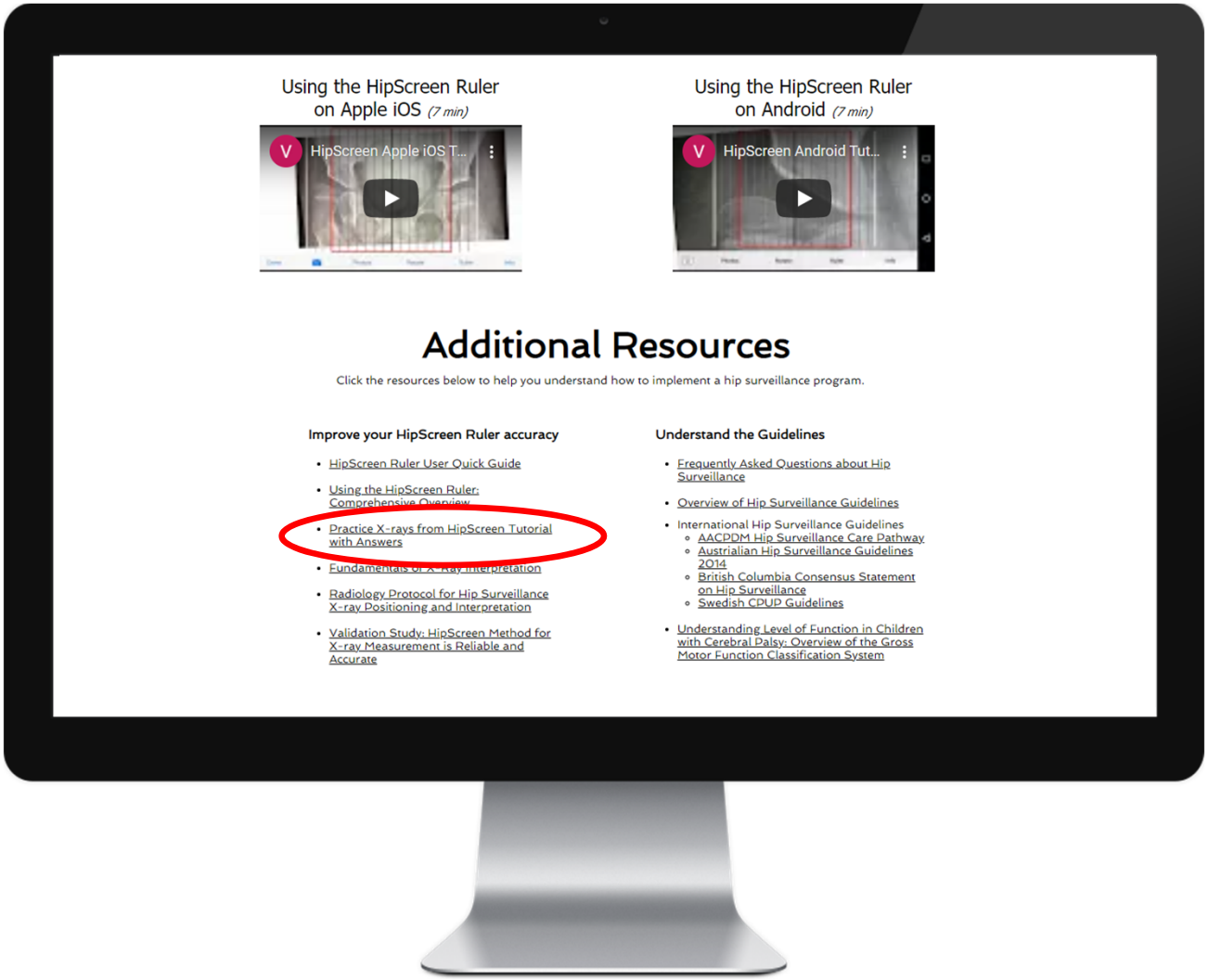
Download on the App Store

hipscreen.org

GET IT ON Google Play



Practice X-rays with answers!



Thank you to all!

Stacey Miller, MRSc, BSc (PT)

Kerr Graham, MD

Jon Davids, MD

Amanda Whitaker, MD