Clinical imaging with an iPhone

Hon A/Prof Amanda Oakley
Waikato Hospital, 25 June 2015
This presentation

• Why take clinical images?
• Patient consent
• Smartphone cameras
• Best practice
• Anatomic views
• Close-up photography
• Dermatoscopy
• Some helpful apps
Why take clinical images?

- Documentation
- Compare clinical status at follow-up
- Referral to dermatologist
- Histopathology request
- Multidisciplinary review
- Personal education
- Teaching
- Publication
DocumentaDon

Samsung Galaxy S4, September 2014
Follow-up
Referral to dermatologist

The old way

The new way
Histopathology request
Multidisciplinary meeting
Personal education
Teaching
Publication

Exercise-induced vasculitis

What is exercise-induced vasculitis?

Exercise-induced vasculitis is a form of purpura vasculitis. It is a rare and serious condition.

It is an autoimmune inflammatory disorder involving the skin or mucous membranes, typically on the palms and soles.

What are the clinical features of exercise-induced vasculitis?

Exercise-induced vasculitis usually affects one or both lower legs and thighs, with multiple small red or purple spots or petechiae. Other sites may include:

- Lower back
- Hip
- Upper arm
- Shoulder
- Head
- Neck
- Face
- Forearm
- Hand
- Finger
- Toe
- Lip
- Stomach
- Abdomen
- Urinary bladder
- Intestines
- Nose
- Spleen

The condition is characterized by burning, swelling, pain, and sometimes numbness.

The affected area may itch, weep, or be sensitive to touch.

Differential diagnosis of exercise-induced vasculitis

Other forms of vasculitis include:

- Henoch-Schönlein purpura
- Wegener's granulomatosis
- Churg-Strauss syndrome
- Giant cell arteritis
- Polyarteritis nodosa
- Cogan's syndrome

It is also associated with certain medications and conditions.
Patient consent
Consent on iPhone

PicSafe Medi

Consent
Smartphone cameras

• Always with you
• High quality in top end models
• Sensors work in low light
• Easy to archive / back up
• Easy to email / message / upload to website
iPhone 6 or iPhone 6+
iPhone 6+ or iPhone Touch

- **8 MP iSight camera**
- **5.5” 1920-by-1080-pixel resolution at 401 ppi**

- **5 MP iSight camera**
- **4” 1920-by-1080-pixel resolution at 401 ppi**
Samsung Galaxy 6

- 16 MP
- Works well in low light
- HDR removes shadows and highlights
- 5.1” display
Other Androids

- HTC One M9 20 MP
- Sony Xperia Z3 20.7MB
Best practice

• Privacy + security
• Back up
• Removing image from the phone
• Quality images
Privacy

• Check privacy settings
• Avoid full-face images where possible
• Remove jewellery and clothing
• Tattoos are identifying
Security

- Lock your screen
- TouchID is best
- Use 8+-character memorable passcodes eg il2tlk2U!
Automatic encrypted backup

- iCloud Drive
  - Or, via iTunes when connected
- My Photo Stream
- Dropbox
Sharing the picture
Remove image from the phone
Picsafe Medi removes it for you

Email report

Online report
Image quality

- Ensure plenty of light
- Check exposure is adequate
- Suitable background
- Avoid extraneous objects
- Ensure focus
- Lens parallel with subject
Under-exposed

- Avoid side lighting
- Use flash if necessary (force flash)
Shadows rarely help diagnosis

Apple iPhone 4S, November 2014

Apple iPhone 3GS, August 2011
Tap & drag to adjust exposure
Use a plain matte background

- Neutral blue, green, grey
- Cloth, paper, wall, photographic backdrop
Avoid a busy background
Avoid extraneous objects
Avoid extraneous objects
Ensure focus

- Lens parallel with subject
- Don’t get too close
- Tap screen to guide the camera to focus point

Nokia N95, November 2008
Lens not parallel with subject

Samsung Galaxy S4, January 2015

Sony Ericsson K800i, April 2009
Anatomic views
Head and neck
Minimising shadows
Use a reflector to get rid of shadow
Trunk
Trunk
Arms
Hands
Nails
Legs
Legs
Legs

Good

Bad
Close-up photography

- With and without a ruler where relevant
- If too close, back off and zoom to improve depth of field
- Hold camera still or use tripod
Close-ups of curved areas

- Nose, ears, lips
- Use a neutral-coloured card with a hole in it if your camera is struggling to focus or exposure is wrong
Close-up tips

Auto exposure/focus lock

Flash on
Camera+
To keep camera still

Tripod

Timer
Skin lesion of concern

- Anatomic view
- Macro view
- Macro view with rule
- Dermatoscopic view
Locate the lesion precisely

- Anatomymapper.com
- Documentation
- Histopathology requests
Naevus

ID label

Remove hair
Dermatoscopic views

- Smartphone adapters for several devices
  - DermLite DL1, DL1 Basic, DL3, DLII HR Pro, DLII Hybrid
  - Opticlar
  - VEOS
  - Handyscope
Dermatoscopic images

- Contact with skin
- Polarised and/or nonpolarised views
- Apply fluid eg sanitiser
Why have a dermatoscopic camera?

• Referral to specialist
  – Dermatology
  – Teledermatology
  – Histopathology
• For follow-up
• It’s fun!
Two iPhone cameras for the non-dermoscopist or patient

- MoleScope
- DermLite Monitor
MoleScope
MoleScope device
MoleScope iPhone app

Register patient

Chose body site
Take the pictures

Overview image

Dermoscopy image
Annotate

On device

Online
Evaluate the lesion

Dr. Amanda Oakley made the following diagnosis: Normal with the following note: Benign naevus stable
6/21/2015, 10:33:03 AM
DrMoleScope.com
Automatic rotation for follow-up
Dermlite Monitor
Referral to dermatology at WH

• Electronic referrals permit attachments
• However, currently:
  – Images often printed in B&W or over 2 pages
  – Providing advice is time consuming; it’s easier to arrange an appointment
• In the future, we’ll assess referrals online, which will help in triage and in advice
Teledermatology referral

• New Zealand Teledermatology provides an online advice service for GPs
  – Drs Oakley, Rademaker, Yung, Hill

• It is currently free to Waikato GPs
  – We charge organisations in other parts of NZ
Collegium Telemedicus is an informal organisation to assist people who wish to start and operate telemedicine networks to deliver health care in remote or low-resource settings.

A common scenario is that one or more doctors visit colleagues in a developing country, usually to conduct teaching and training. Recognising the difficulties of obtaining specialist opinions there, they offer to support their colleagues by email on their return. Email support is duly provided, but proves not entirely satisfactory (confidentiality concerns, difficult to organise the right person to respond, no audit trail, etc). Establishing a formal telemedicine network is considered, but the initial start-up cost is a deterrent.

Collegium Telemedicus offers a new approach. There is no start-up fee (although we reserve the right to invite a donation towards running costs at a later stage). The software is made available on a secure server and can be accessed using any web browser.

Further Information
Acknowledgements

• Grateful thanks to David Oakley

• iPhone support
• Anatomymapper.com
• Camera+
• PicSafeMedi
• DrMoleScope
• Dermlite