The Stealth of Scabies Endemic to Outbreak

Recognition Diagnosis Treatment
Maintain a Clinical Index of Suspicion

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Scabies Overview

- Description
- Transmission
- Symptoms
- Diagnosis and treatment
- Control measures
- Significant Challenges

'Underestimate at your peril'

From:
"The Itchiest I have Ever Been in My Life"

To:
No Symptoms At All

Especially in the elderly
because of reduced immune responses

Differential Scabies Diagnosis

Most Likely

- **Atopic dermatitis**
- **Pyoderma**
  Impetigo, folliculitis, papular urticaria
- **Contact dermatitis**
- **Insect bite reaction**
- **Dyshidrotic eczema**
  pompholyx blistering

Consider

- Dermatitis herpetiformis
- Psoriasis
- Bullous pemphigoid
- Drug eruption
- Systemic pruritus causes
- Parasitosis delusions
- 2^0 syphilis, etc, etc

Common Itchy Skin Causes

- **Dry skin** usually older age or environmental factors excess bathing, etc
- **Many skin conditions itch** e.g. infections, psoriasis, bites, dermatitis, eczema, scabies, lice, chickenpox, hives
- **Underlying systemic illness** e.g. liver or kidney, iron deficiency anaemia, thyroid, cancers including leukaemia and lymphoma
- **Nerve disorders** e.g. multiple sclerosis, diabetes, pinched nerves and shingles (herpes zoster)

Common Itchy Skin Causes

- **Irritation and allergic reactions** e.g. Chemicals, dyes, cosmetics, soaps, foods, clothing, plants, etc
- **Drug Reactions** e.g. antibiotics, blood pressure, heart, pain medications, metabolic, etc
- **Pregnancy** - not in the elderly (but ? visitors/staff potential)

Epidemiology

- Any age or race regardless of personal hygiene though hand hygiene can play a role in prevention (if < 3 hrs post skin contact)
- Often seen in more crowded living LTCF, schools, i.e. sociability increases risk
- Humans only reservoir animals have different strains
- Our own immunity suppresses numbers to < 15
- Immunocompromised more likely to develop 'Norwegian' (crusted) scabies $>10^6$

'Diagnose Clinically and Treat'

1. ?? 30% cases 'clinically typical' intense itch ≥ one linked case, tracks seen 'treat & cure'

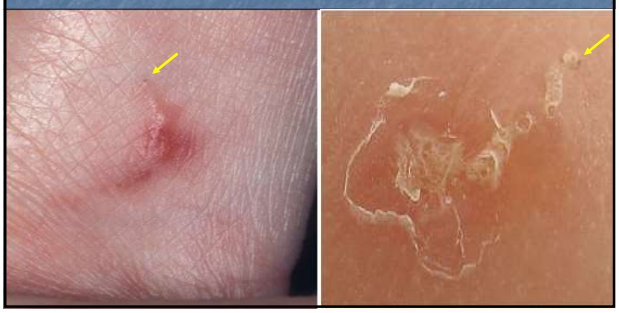
BUT

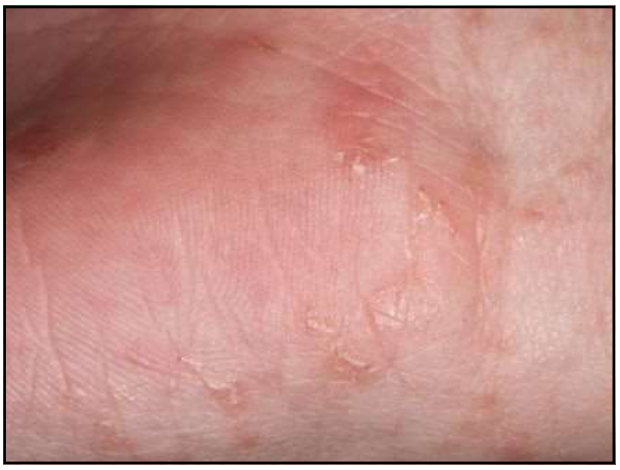
2. ?? 40% cases clinically possible but single case itch, no obvious tracks seen ? treat BUT if failed treatment ??!
3. ? 30% cases very atypical clinical presentation Accurate differential diagnosis needed How/who?? Mass institution treatment considerations ($$$)

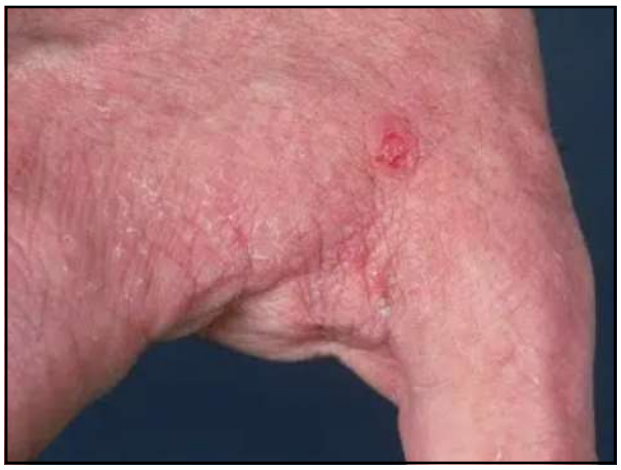
'Diagnose Clinically and Treat'

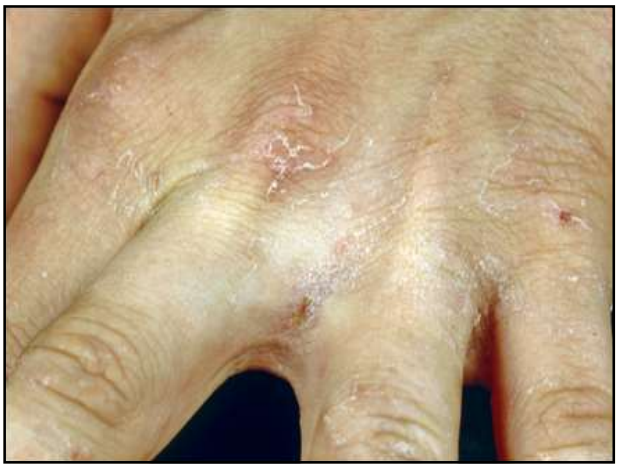
? Only 30% cases clinically typical

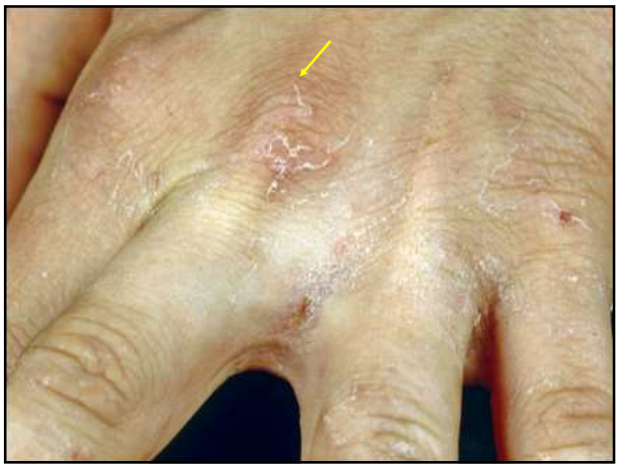
intense itch, ≥ one case, tracks seen, 'treat & cure'









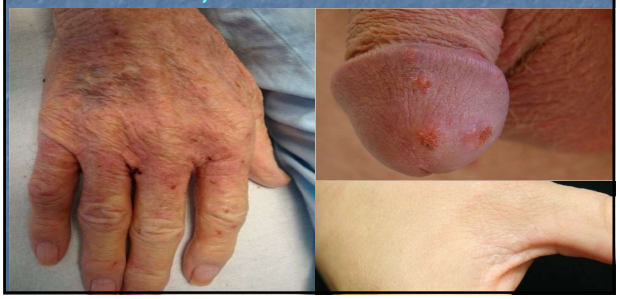


'Diagnose Clinically and Treat?'

BUT ?? 40% cases clinically 'possible'

but if single case, itch, no obvious tracks

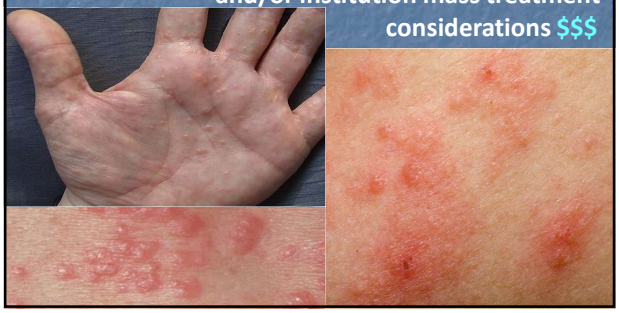
? Treat, or what if failed treatment??!



'Diagnose Clinically and Treat?'

BUT ? 30% very atypical clinical presentation

- differential diagnosis required how/who??
- and/or institution mass treatment considerations $$$



Scabies Description

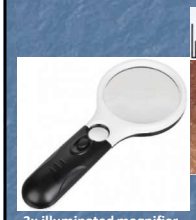
- 'Contagious' infestation of the skin
- Caused by human mites
  Sarcoptes scabiei subsp. *hominis*
- Distributed worldwide
- Reported incidence increasing since 1970's

Scabies Infestation:

Mites burrow under skin to feed and lay eggs

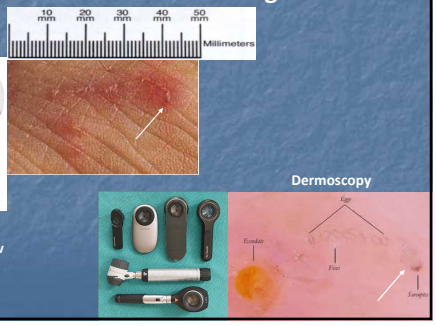
Can burrow beneath skin in 2.5 minutes

Adult female mite 0.3 - 0.4 mm long



3x illuminated magnifier

Allows wider field of view skin examination



Dermoscopy

Scabies Transmission

- Direct, prolonged skin–to-skin contact ⬆ risk
- Households, institutions, schools, daycare, etc
- Sexual contact
- Indirect transfer from clothing, towels, bedding
  much less common but occurs

Communicable:

- while infested and untreated
- while unrecognised or asymptomatic
- during incubation period

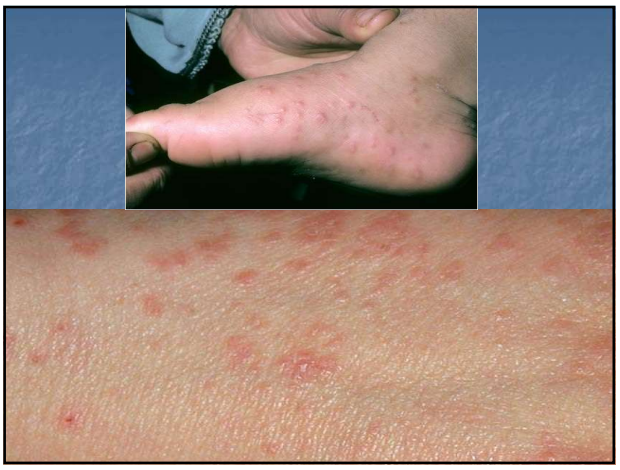
Scabies Symptoms

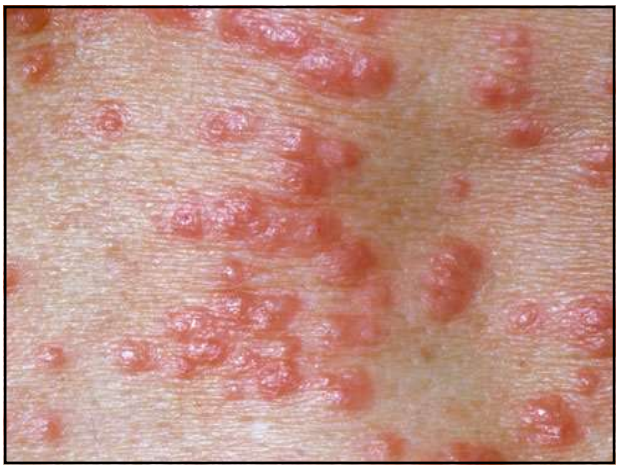
when not asymptomatic e.g. elderly!

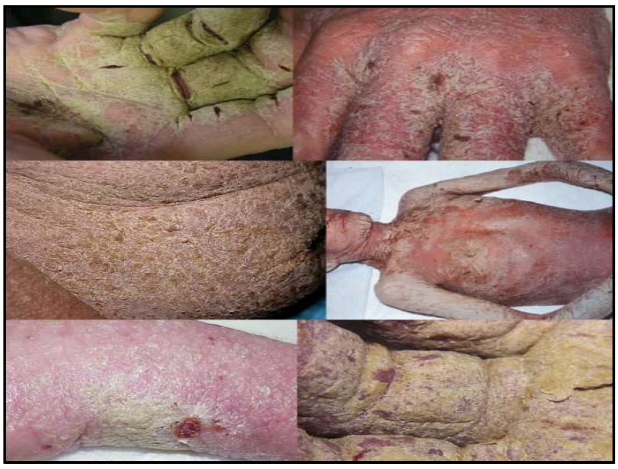
- **Delayed allergic hypersensitivity reaction**
  to mites or scybala (faeces), it NEVER bites (cf fleas)
- Rash or burrows between fingers, wrist, outer elbows, armpits, umbilicus, abdomen, buttocks, nipples male genitalia, feet especially instep
- Intense itching over most of the body, especially night
- Body sores caused by scratching ⇨ 2^0 bacterial infection including glomerulonepthritis sequela

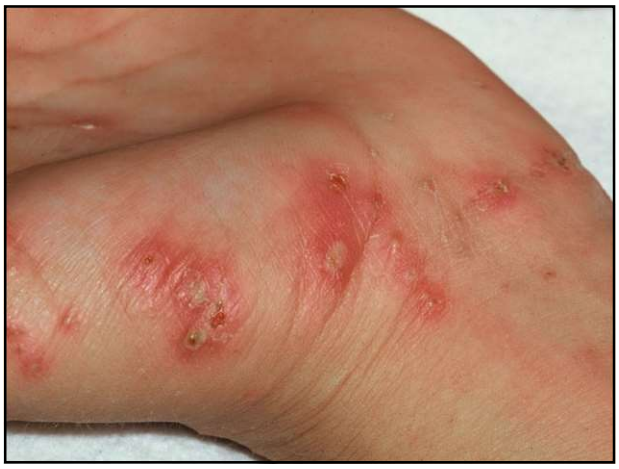
Incubation period:

- 2-6 weeks without previous exposure
- 1-4 days after re-infestation

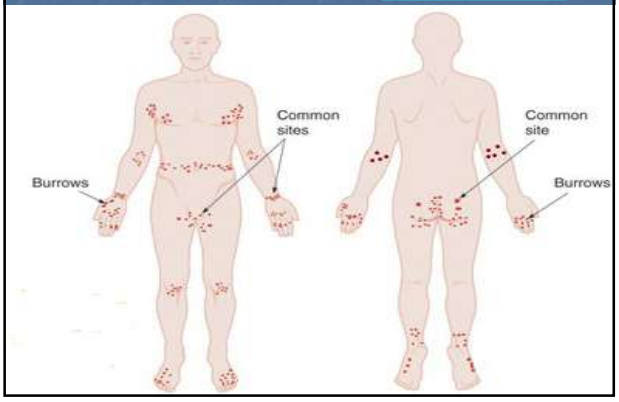




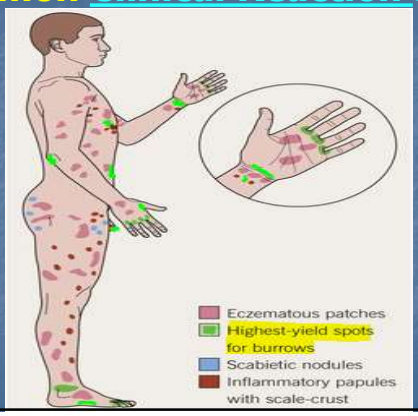




Common Scabies Mite Sites



Common Clinical Reaction Sites



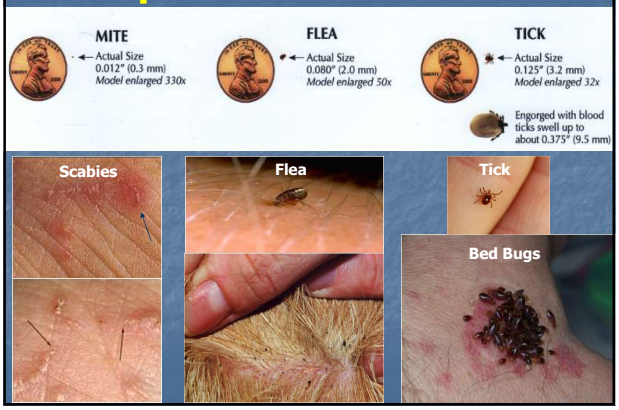
Scabies Definitive Diagnosis

- Confirmed by skin scrapings of papules or intact burrows to find
- Mites, eggs, scybala but few & difficult to find
- High level technical expertise, experience required!!
- Test sensitivity 0 - 95%!!
  N.B. Mainly 0-20% in practice

Key Point

A negative scabies test never rules out scabies

Ectoparasite Relative Sizes



In Practice

- Diagnosis usually based on
  - clinical impression
  - epidemiology clues
  - 'solidified' by empirical Tx response
- But.....

If No Clinical Response to Tx

- How thorough was treatment application ?
- Is there partial resistance tolerance to Tx ?
- Is there complete resistance of mite to Tx ?
- Have they become reinfested from source ?
- Is the mite killed but not yet evicted via skin turnover, so allergic hypersensitivity remains?

And/or .....

If No Clinical Response to Tx

- Is patient's immune system compromised ?
- Was mite completely eradicated but now 'post scabies dermatitis' ?
- Was it a correct diagnosis???

If definitive diagnosis now required there will be even fewer mites and even harder to detect!

Scabies Treatment

- Apply 5% permethrin cream/lotion scabicide over entire body below jawline for ≥8hrs (unless under 2 year olds, head also)
- Thorough, thorough, thorough!!!

Armpits, under fingernails, umbilicus, non mucosal private parts, buttock cleft, between toes, soles

** Reapply post hand washing (night toilet)

- repeat 7-10 days later

Environmental Protection

- Launder all clothing, sheets, towels used within previous 4 days of treatment in hot water and dry in hot dryer
- Vacuum carpets and chairs (?? fly spray)
- Store items that cannot be washed in closed plastic bag for ? 4 days, or flyspray or freeze or hot dryer or iron
- Clean all washable touched surfaces

Mattress and other bedding generally contain no mites unless ? Norwegian/crusted scabies

Scabies Treatment part 2

If no or reduced response, or institutional mass Tx setting:

- *Consider definitive diagnosis if not already tested*
- Oral Ivermectin ('Stromectol'), weight dependent dose, repeat 7-10 days. Consider concurrent topical permethrin for known or suspect positive cases (rash)
- Itching may continue for several weeks despite successful miticide treatment (? topical anti itch Tx)
- Re evaluate if symptoms increase after 3-4 weeks or persist post 6 weeks

Points to Note

- If marked overnight clinical response post Tx
  - Not consistent with scabies other than any psychological benefits of 'knowing it is treated'
  - May be emollient in cream/lotion soothing a dermatitis (scabies or non scabies associated)
- Ongoing topical treatments can induce skin allergic skin response, immediate or 2-3 days delay

NB the delayed response can give impression of 'almost working', need to treat more, vicious circle!

Scabies Control

- Prompt correct diagnosis and treatment of patients
- Simultaneous, prophylactic treatment:
  - household members with skin contact or symptoms
  - Friends with significant skin contact
  - sexual contacts
  - caregivers with (prolonged) skin-to-skin contact

Re evaluate weeks and months later especially institutions


Scabies Control

- Educate clients, staff about scabies overall to de-escalate and demystify any misconceptions
- Increase awareness and surveillance for rashes
  ? 3-6 month awareness of LTCF for ⬆ dermatitis trend
  ? Staff/family case notifications – encourage culture
- Report any suspect cases promptly
- Seek medical input as soon as possible
- Conduct contact investigation as soon as possible if indicated or practicable



Checklist for Scabies, think....

- How certain is the diagnosis, clinical or definitive?
- Who/where did mite likely come from, & when?
- Who should be treated?
- Who should be prophylaxed?
- Who should be alerted?
- Who should be isolated and for how long?
- Who should be monitored and for how long?
- What environmental treatment is needed?
- Who is responsible for follow-up?

Institution Suspect Scabies Case

- Institutional staff report suspect case to supervisor
- GP alerted
- Should 'definitive diagnosis' be undertaken? Who by? and if so how reliable/sensitive is a negative test??
  person/process detection ranges from 0-95%
  commonly 0-10% in practice especially if not totally typical case
- Consider dermatologist consultation

Institution
Probable/Confirmed Scabies

- Isolate to minimise further exposure to others until post treatment
  but likely too late by now, unless recent admission?!
- Thorough education, communication to resident/patient, staff and families to demystify reduce fear factor
- Delayed, thorough, well thought out, informed mass treatment process required
  not rapid kneejerk process!!

Prevention and Handwashing

- Within Institutions:
  - Health Care Workers are likely the main transient asymptomatic scabies transmitters from one client/resident/patient to another
- Hand Hygiene is biggest factor in preventing spread of infectious diseases!
  But efficacy alcohol rubs against scabies is doubtful
- NB Shared Lift Hoists are a known transmission source

An Outbreak of Scabies in a Long-Term Care Facility: The Role of Misdiagnosis and the Costs Associated With Control

Gretha de Beer, RN; Mark A. Miller, MD, MSc;
Lucie Tremblay, RN, MSc;Johanne Monette, MD, MSc

In August 2003, an outbreak of scabies was detected in a Canadian long-term care facility. The outbreak was likely associated with 2 index cases, 1 involving classic scabies and the other involving Norwegian scabies. The scabies control costs totaled CDN$200,000, and the facility received negative publicity for a short period after the outbreak.

Infect Control Hosp Epidemiol 2006; 27:517-518

Scabies LTCF Outbreak Costs

387 residents — *Infect Control Hosp Epidemiol* 2006; 27:517-518

TABLE. Costs Associated With Control of the Scabies Outbreak

Item	Cost in Canadian dollars
Scabies treatment (topical permethrin)	40,000
Overtime and additional salary costs	56,000
Security guard at entrance to enforce precautions	22,000
Disposable gowns	55,000
Nonsterile gloves	12,000
Disinfectant cleaner	5,200
Cleaning supplies	3,500
Laundry costs	6,300
Total	200,000[a]

[a] Approximately US$183,000.

Scabies
Simplified Summary

- Human infestation caused by host-specific mite living its entire life cycle on/within the epidermis
- Causes diffuse, pruritic eruption after an incubation period of 1–6 weeks (unless asymptomatic)
- Transmitted by close physical contact or by fomites

Definitive diagnosis is key for the approx 50% infestations which are relatively atypical or for those with unrecognised differential diagnosis

Scabies
Simplified Summary

- Topical therapy highest efficacy – if thorough application, but oral ivermectin often effective if required (? combined with topical)
- Asymptomatic mite carriers common (esp elderly), 'all' family members, close contacts and institutional residents should be considered for simultaneous treatment
- Review post Tx, short and medium term

Scabies infestation independent of

- Socioeconomic
- Age
- Sex

Significant international public health problem whose role is often underestimated

Scabies Reality

- Commonly goes unrecognised
- Definitive diagnosis becoming a lost art
- So, commonly misdiagnosed & mistreated
- So, commonly able to spread
- Increasingly common worldwide

Scabies a Neglected Disease

- Spread often related to
  - late diagnosis and/or
  - incorrect diagnosis
- Treatment efficacy dependent on
  - Appropriate anti scabicide
  - Thoroughness of application (or dosage)
  - Patient's own immune system

Summary Scabies

- LTCF Outbreaks challenging to diagnose, stigmatising, costly to manage
- Close proximity of individuals, lengthy asymptomatic incubation period enables many residents and staff to become infested before detection, often delayed
- Staff commonly asymptomatic transient carriers/connectors between residents
- Any case must have come from someone else - think new residents, other resident, visitors, staff

Someone Near You?!

How Certain Are You?

Thank You
Did Anyone NOT Itch?!

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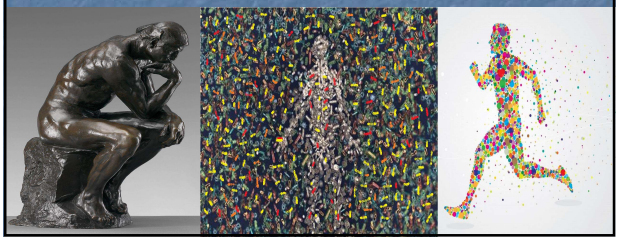

References

- American Academy of Pediatrics. Summaries of Infectious Diseases. In:Pickering LK, ed. *Red Book: 2006 Report of the Committee on Infectious Diseases*. 26th ed. Elk Grove Village, IL: American Academy of Pediatrics; 2003:584-587.
- Heymann, DL. *Control of Communicable Diseases Manual*. Washington DC: American Public Health Association; 2004:473-476.
- Isada, C. et al. *Infectious Diseases Handbook*. 6th ed. Hudson, Ohio: Lexi-Comp, Inc.; 2006:293-294.
- http://www.cdc.gov/ncidod/dpd/parasites/scabies/default.htm
- Massachusetts Department of Public Health
- http://www.waikatodhb.health.nz/assets/for-health-professionals/Primary-care-management-guidelines/Waikato-DHB-best-practice-guidelines-for-scabies-in-aged-care-revised-Feb-2013.pdf
- American Academy of Dermatology
- BMJ Best Practice (2017) Scabies. BMJ Publishing Group. bestpractice.bmj.com
- NICE Scabies Guidelines November 2017
- https://bpac.org.nz/2022/scabies.aspx

Canterbury Scabies Study 2012

200 patients referred for scabies examination seen at same large patient services centre, tested randomly over the same timeframe by either:

1. A specifically trained phlebotomist with known track record of being 'one of the best at finding scabies' from one of the two previous laboratories now joined laboratories (post earthquakes)

or

2. A medical lab scientist from the other laboratory also believed to have good track record of being proficient at finding scabies

Canterbury Scabies Study 2012

Results:

1. The 1st examiner: 2 positives from 100 random patients to rule out scabies i.e. 2% positivity rate

2. The 2nd examiner: 48 positives from 100 random patients to rule out scabies i.e. 48% positivity rate

So, ? 46 positives missed per 100 by tester #1 !!

Test positivity rates may provide some broadly indicative measure of how sensitive the scabies test is in that region, and/or on inter region comparison, and/or that individual examiner

Comment: the 2nd examiner had participated in a previous blinded study with dermatologists with 198 scabies detections of 200 patients referred by them as scabies i.e. 99% detection rate

Who Should Provide Scabies Testing???

No gold standard for test evaluation, so scabies testing evaluation and reliability tends to be believed on a 'local perception' basis

recent NZ wide survey feedback comments re scabies:

- *'This person(s) is good at finding them, in fact they are the only one(s) that can find them'*
  - but that does not relate in any way to actual test sensitivity!
- *'We mainly do rest homes, in the past months we looked at 19 homes, all negative!'* (AKL)
- *'Our trained phlebotomists have a good success rate but they are a pain in the proverbial for all involved . We get very few positives though!'*

Clinical vs Test Evaluation

Referrers in any region generally learn whether

- on their perceived clinical acumen
- versus test results
- coupled with treatment responses

how much confidence, if any, they have in results

One region GP CME recent response:

'we never send patients for scabies anymore because the results are almost always negative'

Outbreak Management

- Synchronised mass treatments with oral (ivermectin) +/- topical (permethrin) scabicide applied over whole body (jaw down) and environmental decontamination
- Mass treatments logistically challenging, labour intensive, and can distress residents, staff and families
- Residents with dementia might not understand why they are receiving treatment

Scabies Treatment Options

American Academy of Dermatologists (AAD) https://www.aad.org/public/diseases/a-z/scabies-treatment

Common scabies treatments :

5 percent permethrin cream

Oral ivermectin ('stromectol')

- The following Tx options very suboptimal for efficacy, allergy and toxicity reasons:
  - 25 percent benzyl benzoate lotion
  - 10 percent sulfur ointment
  - 10 percent crotamiton cream
  - 1 percent lindane lotion

Treatments for symptoms associated with scabies include:

antihistamines to help control itching

antibiotics for any secondary infections that develop as a result of constantly scratching skin

steroid creams to relieve swelling and itching