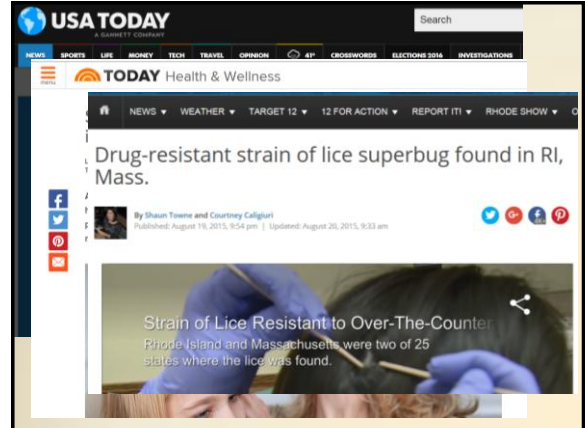


Lice and Resistance: "Super Lice" – Reality or Hype?

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A Lousy Topic....

- Head lice found worldwide for millenia
- Good news:
 - Only feed on humans
 - No wings
 - Don't live long off host
 - Don't transmit disease
 - Worldwide research results



Protecting Kids Through Integrated Pest Mgmt Strategies: Keep Pests Out – Don't Attract Them

- Prevent
- Inspect & Monitor
- Identify
- Manage
- Educate and Communicate



Inspecting drains for conditions attractive to pests

Integrated Pest Management Basics



EPA Center of Expertise for School IPM

Why Use Integrated Pest Mgmt in Our Sensitive Environments?

General considerations

- Children present
- Food safety issues
- Safer environment
 - Reduce pesticide use
 - Reduce exposure risks
 - Reduce allergens
- Cost savings



Integrated Pest Mgmt Strategies Applied to Head Lice

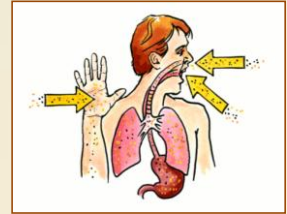
- Inspect, monitor, **IDENTIFY**
- Prevent through education
- Use treatments that reduce impacts on health
 - Only treat if find live lice
 - Non-insecticidal options
 - Follow directions on products
- Everyone contributes to safety
 - Teachers, nurses, parents, and administrators



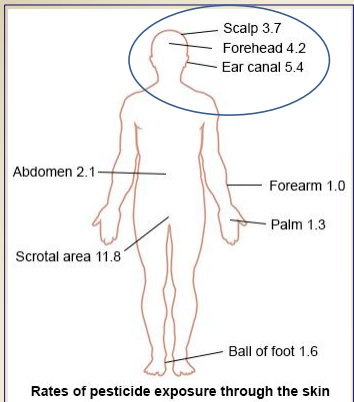
Photo: Consumer Reports, Sept. 2015

Pesticide Exposure Routes

- **Children vs. adults**
 - Breathe more air per lb body wt
 - More skin surface area relative to body wt
 - Eat, drink more
- **Put hands in mouths**
- **Floor contact**
 - Contaminants, dusts, residues



Pesticides can be inhaled, ingested, or absorbed through skin



Rates of pesticide exposure through the skin

Boston University School of Public Health

Integrated Pest Management Basics



EPA Center of Expertise for School IPM

Head Lice Biology

CDC photo



Egg to adult: ~20 d

- Eggs
 - Glued on hair shaft
 - 1/4" Rule
 - Need temp near scalp to hatch
 - Hatch 8-9 d
- Nymphs for 9-12 d
- Adults live ~ 30 d
 - Several meals daily
 - Lay up to 10 eggs/d
- Survive < 1 d off host

Are we really this infested???

"6-12 million cases* of head lice/year in US"

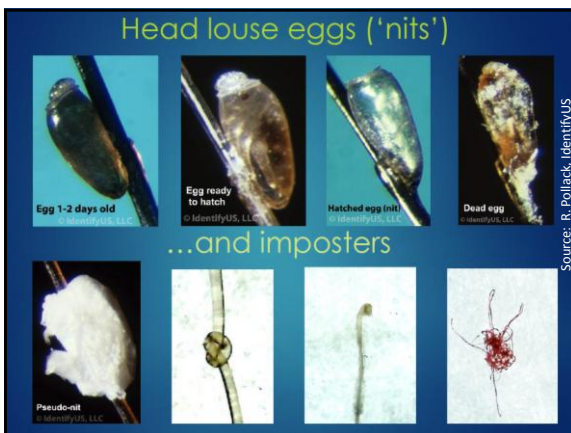
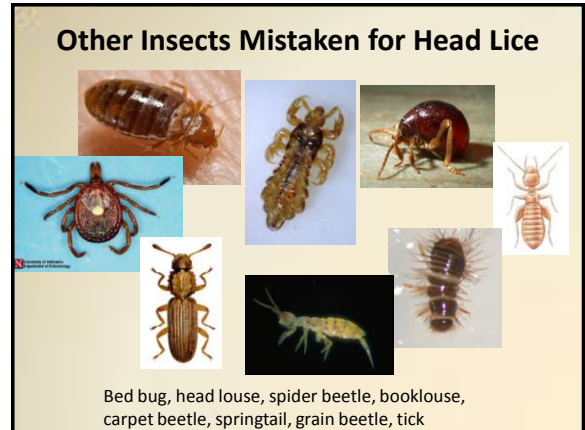
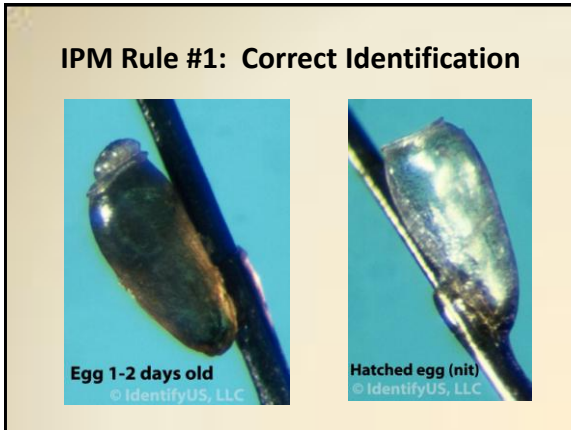
Enrolled (2009 US Census Bureau)	Number (millions)
Nursery and Kindergarten	8.8
Grades 1-4	15.3
Total	24.1

25-50% of children infested?

Mis-identification happens!

* Based on sales of pediculicides, not actual infestations

Source: Dr. Richard Pollack, Harvard School of Public Health, EPA Head Lice webinar Oct. '15



Diagnostic Acumen?

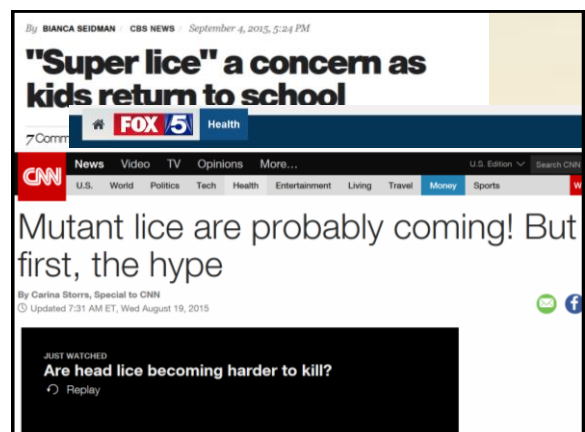
Diagnostician	Correct assessment of infestation status (%)	
	Extinct & active	Active
Nurse / school nurse	70	32
Teacher / daycare	63	34
Relative	61	36
Barber / beautician	36	18
MD	21	9
Self	15	8

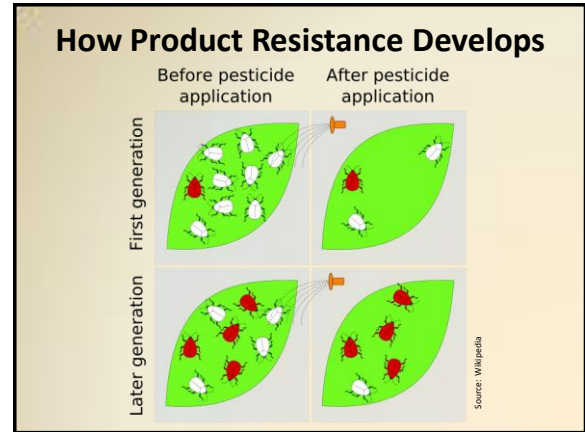
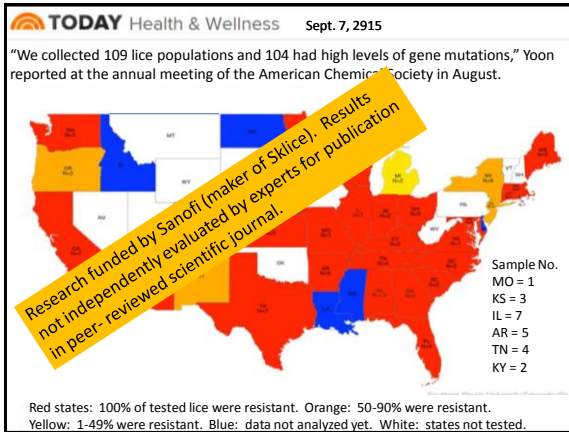
Pollack et al. Overdiagnosis and Consequent Mismanagement of Head Louse Infestations in North America. *Pediatr Infect Dis J.* 2000; 19:689-93

Pollack et al. Overdiagnosis and consequent mismanagement of head louse infestations in N. America; *Ped. Infect. Dis. J.*, 2000

Results

- Health care professionals as well as nonspecialists frequently overdiagnose *Pediculus capitis*.
- Fail to distinguish active from extinct infestations.
- Non-infested children quarantined as often as infested children.
- Traditional anti-lice formulations are overapplied as frequently as are "alternative" formulations.
- Pediculicidal treatments are more frequently applied to non-infested children than to children who bear active infestations.





- "In places where people have been using over-the-counter lice products continuously for a long time, resistance is not unexpected"
 - While there is resistance, it is not clear how common the problem is
 - Over-the-counter products should be the first line of treatment
 - Prescription treatments much more expensive and may be covered by insurance only after no relief from non-prescription options
- Dr. Barbara Frankowski, Professor of Pediatrics at University of Vermont, lead author on Head Lice Clinical Report, 2010 in *Pediatrics*

- "I expect that we will see resistance to any product with the exception perhaps of combing and heat and smothering the lice"
 - "Lice salons as a cottage industry are spreading faster than lice themselves...and are not regulated by the medical community"
 - Lice businesses also may lack the expertise to diagnose lice
- Dr. Richard Pollack, Public Health Entomologist, Harvard University's School of Public Health

Louse / nit removal services

An unregulated industry

Diagnose
Rarely hold medical credentials.

Comb & snip hair
Rarely licensed as barbers / beauticians.

Formulate, sell and apply anti-lice products
Rarely approved by FDA or EPA, nor are the salons licensed as pest control professionals.

Source: Dr. Richard Pollack, EPA's *Managing Head Lice in Schools* webinar

Clinical Report: Head Lice

Devore and Schutze in *Pediatrics*, Vol 135, No. 5, May 2015
American Academy of Pediatrics (updated from 2010 review)

Treatment

- Only treat if live lice found
- Efficacy studies and comparative trials not consistent
- "Prevalence of resistance has not been systematically studied but seems to be highly variable from community to community and country to country."

Clinical Report: Head Lice

Pediatrics, 5/2015; Devore and Schutze

Over-the-counter products

- Nix and RID (same mode of action, class 3)
 - Conditioners and silicone-based additives in most shampoos reduce chemical adherence to hair and reduce residual
 - **Need to follow directions**
- Combing (wet) with conditioners or lubricant
 - Germany: study with > 300 kids, wet comb found infestations in 91% of cases vs dry hair/visual inspection finding 29%.
 - Repeat combing every day till no live lice seen then every few days for a month

Clinical Report: Head Lice

Pediatrics, 5/2015; Devore and Schutze

Prescription products

- Ovide (malathion, MOA class 1)
- Ulesfia (benzyl alcohol, asphyxiate)
- Ivermectin:
 - Insecticide as Sklice topical lotion (EPA)
 - Drug as oral Stromectol (FDA)
 - Mass treatment with ivermectin used for ectoparasitic diseases but resistance starting to show up in lab tests

Topical Pediculicides Cost Estimate

Product	Availability	Cost Estimate
Nix (Permethrin 1% lotion)	OTC	\$
Rid and others (Pyrethrins)	OTC	\$
Ovide (Malathion, kills eggs)	Prescription	\$\$\$\$
Ulesfia (Benzyl alcohol)	Prescription	\$\$-\$\$\$\$
Natroba (Spinosad 0.9%, kills eggs)	Prescription	\$\$\$\$
Sklice (Ivermectin)	Prescription	\$\$\$\$
And.....Lice salons	In some areas	\$\$\$\$ and up

Prescription Cost Comparisons

Product	Approximate Price
Ulesfia (Benzyl alcohol)	About \$195 for 7.7 oz
Lycelle (Citronellyl acetate)	About \$190 for 3.4 oz
Sklice (Ivermectin)	About \$300 for 4 oz
Lindane (no longer rec by AAP)	About \$125 for 2 oz
Ovide and generic (Malathion)	About \$230 (generic) and \$265 Ovide for 2 oz
Natroba and generic (Spinosad)	About \$265 (generic) and \$280 Natroba for 4 oz

Source: Consumer Reports, Sept. 2015

Clinical Report: Head Lice

Pediatrics, 5/2015; Devore and Schutze

Identification

- Accurate id prevents unnecessary treatment
 - Non-infested children treated almost as often as those with active infestations (62% vs 70%)
 - Pesticides pose risks to children

Almost half of the head lice samples submitted to IdentifyUS lab were not lice or nits at all

Clinical Report: Head Lice

Pediatrics, 5/2015; Devore and Schutze

Prevention

- Educate about risks of head-to-head contact
- Teach kids to not share combs, brushes, and hats (good hygiene practice but very low transmission risk)
- Protective head gear (very low transmission risk) but high risk of injury
- Adults should recognize signs of infestation and treat promptly to minimize spread.

Clinical Report: Head Lice

Pediatrics, 5/2015; Devore and Schutze

Transmission

- Primarily from direct, prolonged contact with head
- Indirect contact with personal belongings (combs, brushes, hats) much less likely but may occur rarely
 - Australia study: 1000 hats checked and NO LICE found but same students had 5500 lice on them
- Study: 4% chance of transfer to pillows so change cases
- Healthy louse unlikely to leave healthy head unless heavy infestation
 - Australia study: 118 classrooms with 466 students and 14,000 live lice on them but NO LICE in carpet



The image shows a screenshot of an NBC News article. The headline is "Selfies (Probably) Not Spreading Lice Among Teens, Expert Says". Below the headline is a photo of three teenagers taking a selfie. The article text includes: "Story source: owner of lice removal services in N. California (anecdotal evidence)" and a quote from Dr. Richard Pollack: "This is a marketing ploy, pure and simple...There is no evidence of an uptick in head lice in US, either among teens or elementary school children." Many times parents think dandruff or crumbs are lice but businesses charge \$\$\$\$ to rid kids of non-existent lice. "I'm trying to prevent people from over-treating, people should not be using insecticides on their kids unless there really is a reason to use them."

Clinical Report: Head Lice

Pediatrics, 5/2015; Devore and Schutze

Cleaning

- Clean items in contact with head of infested person 1-2 days before treatment
- Water or heat > 130 F kills lice and nits
- Bag item for 2 weeks to deny food source
- "Herculean cleaning measures are not beneficial."

Clinical Report: Head Lice

Pediatrics, 5/2015; Devore and Schutze

Alternative treatment

- Products to suffocate lice worth trying
 - No clinical trials
 - Avoids neurotoxins
 - Sensitive individuals
 - Example: Cetaphil and instructions
- Manual removal
 - Wet hair slows down lice
 - Products to loosen "glue" on nits not effective
- Heat treatment

Heat Treatment Combined with Combing



AirAllé heat treating device (formerly Lousebuster)



Clinical Report: Head Lice

Pediatrics, 5/2015; Devore and Schutze

Recommendations

- Screening programs not proven to be effective
 - Study: 1729 schoolchildren screened; 91 had nits but <1/3 had live lice. Only 18% of those with nits alone converted to an active infestation in 14 days
- No need to restrict child from attending school
 - Low contagion risk within classrooms
- Focus on reducing number of lice on head
- Lessen risks of head-to-head contact
- Instruction on proper use of products should be carefully communicated

Clinical Report: Head Lice

Pediatrics, 5/2015; Devore and Schutze

Recommendations

- International guidelines (2007)
 - No-nit policies unjust and should be discontinued because they are based on misinformation rather than objective science

<http://pediatrics.aappublications.org/content/early/2015/04/21/peds.2015-0746>

Consider effects of absenteeism and social stigma

CDC Recommendations

- Students diagnosed with live head lice do not need to be sent home early from school; they can go home at the end of the day, be treated, and return to class after appropriate treatment has begun.
- The burden of unnecessary absenteeism to the students, families and communities far outweighs the risks associated with head lice.
- Misdiagnosis of nits is very common during nit checks conducted by nonmedical personnel.

<http://www.cdc.gov/parasites/lice/head/schools.html>

IPM Approach for Lice

- Identification
 - Avoid unnecessary treatment
- Prevent with education
- Monitor
- Include non-chemical measures
- Pesticides not needed in classrooms, lockers, or buses
- Confidentiality important
- Effect of stigmatism.... Anxiety and bullying
- Work to change no-nit policy

What's Wrong with No-Nit Policies?

- No objective basis for no-nit or no-lice policy
- No medical or public health justification
- Training, equipment, regulation issues
- Mistakenly assume transmission within school
- Wrongly assume "nits" are viable and are transmissible
- Burdensome to children, school personnel, parents

Dr. Richard Pollack, Harvard School of Public Health, EPA Head Lice webinar Oct. 2015

General IPM Strategies for School or Home to Reduce Risks of Pests

- Health implications with pests
- Reduce clutter
- Sanitation is pest management
- Deny harborage
- Deny food – seal in containers
- Fix water leaks
- Education important
- Be aware – don't be a transporter

-- EPA school webinar series – Bed bugs on Dec. 15
<http://www2.epa.gov/managing-pests-schools>