In future we are going to have to view our microbial world very differently?

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The International Scientific Forum on Home Hygiene (IFH) www.ifh-homehygiene.org

- Established 1997 - not-for profit, non-commercial, educational trust

Primary objectives:

- Developing and promoting hygiene in home and everyday life settings based on scientific principles

Target audience:

- Scientists, opinion formers, health professionals, media, private sector

IFH Website offers:

- Scientific reviews, guidelines, training resources, fact/advice sheets etc.

IFH white paper on hygiene in home and everyday life 2018

- March 2017, 25 experts from UK, Europe and US met at RSPH, London.
- Agreed to prepare consensus paper:
  - why hygiene in HEDL is important
  - what needs to be done to change public attitudes & hygiene behaviour.

- www.ifh-homehygiene.org

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Opportunities

- Wider appreciation of importance of hygiene - in all aspects of HEDL - offer **increasing opportunities** for hygiene promotion - and hygiene products

Challenges

- Awareness that microbe exposure is essential for health continues to grow and is a **significant challenge**.
- More robust approach to hygiene in HEDL needed
- Sustainability is a key issue

Threats / barriers to change

- Consumer misunderstanding of hygiene & hygiene issues - must be addressed if hygiene promotion is to succeed and opportunities realised.

IFH targeted approach to hygiene

- IFH has developed an approach to hygiene in the home and community based on risk management

- Known as “targeted hygiene”.
  - means breaking the chain of infection by targeting critical points at key times
- Current tendency to view hygiene” as “getting rid of dirt consudered as the main source of harmful germs”

- Adoption of Targeted hygiene is central to white paper

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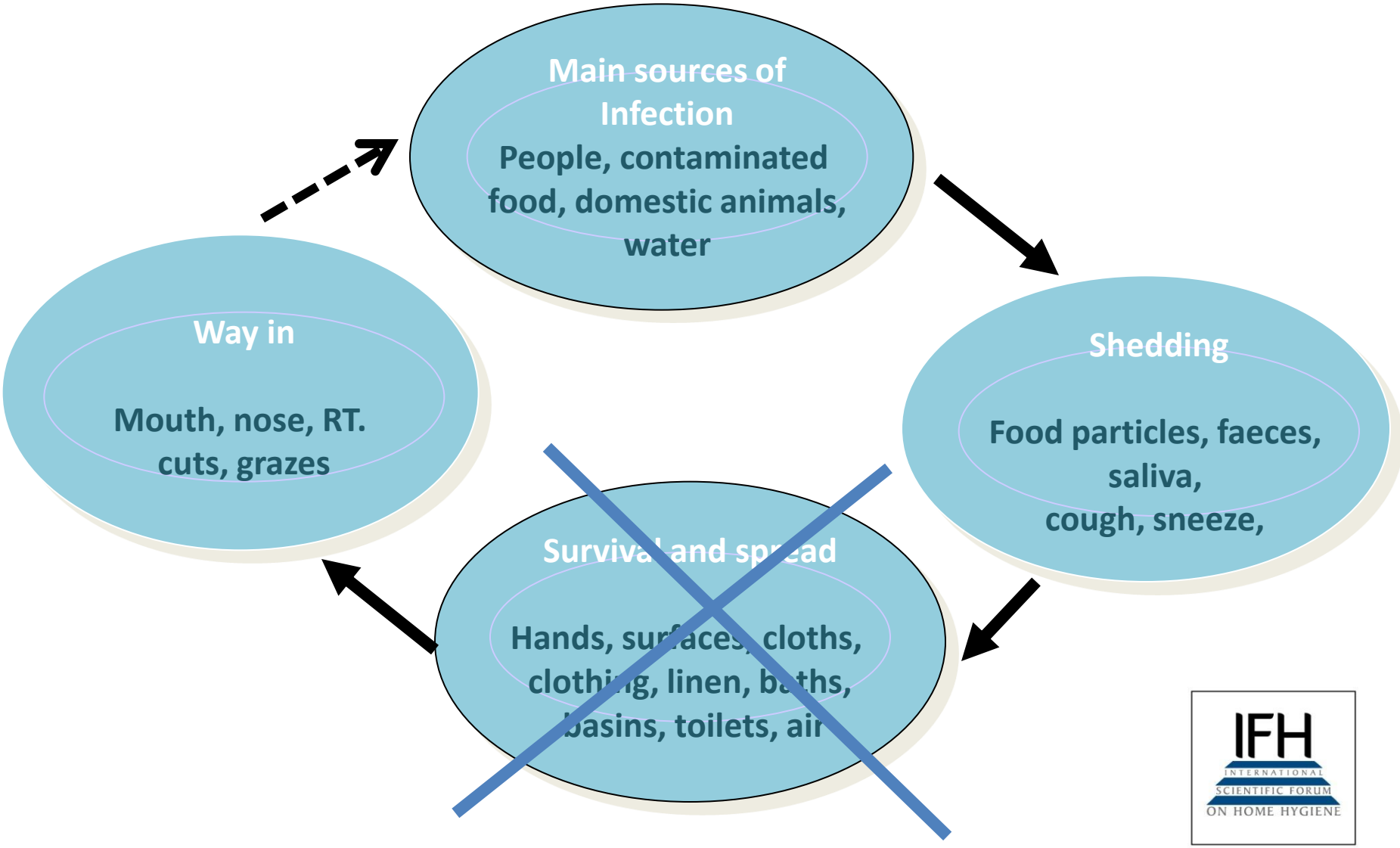
Breaking the chain of Infection



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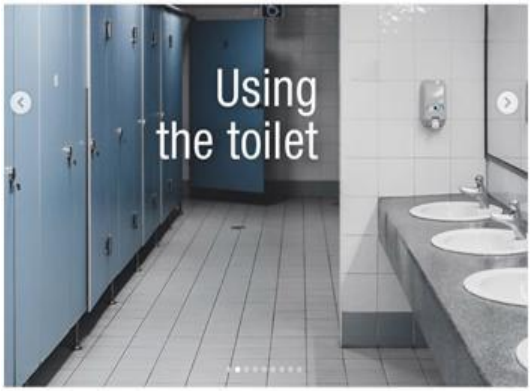

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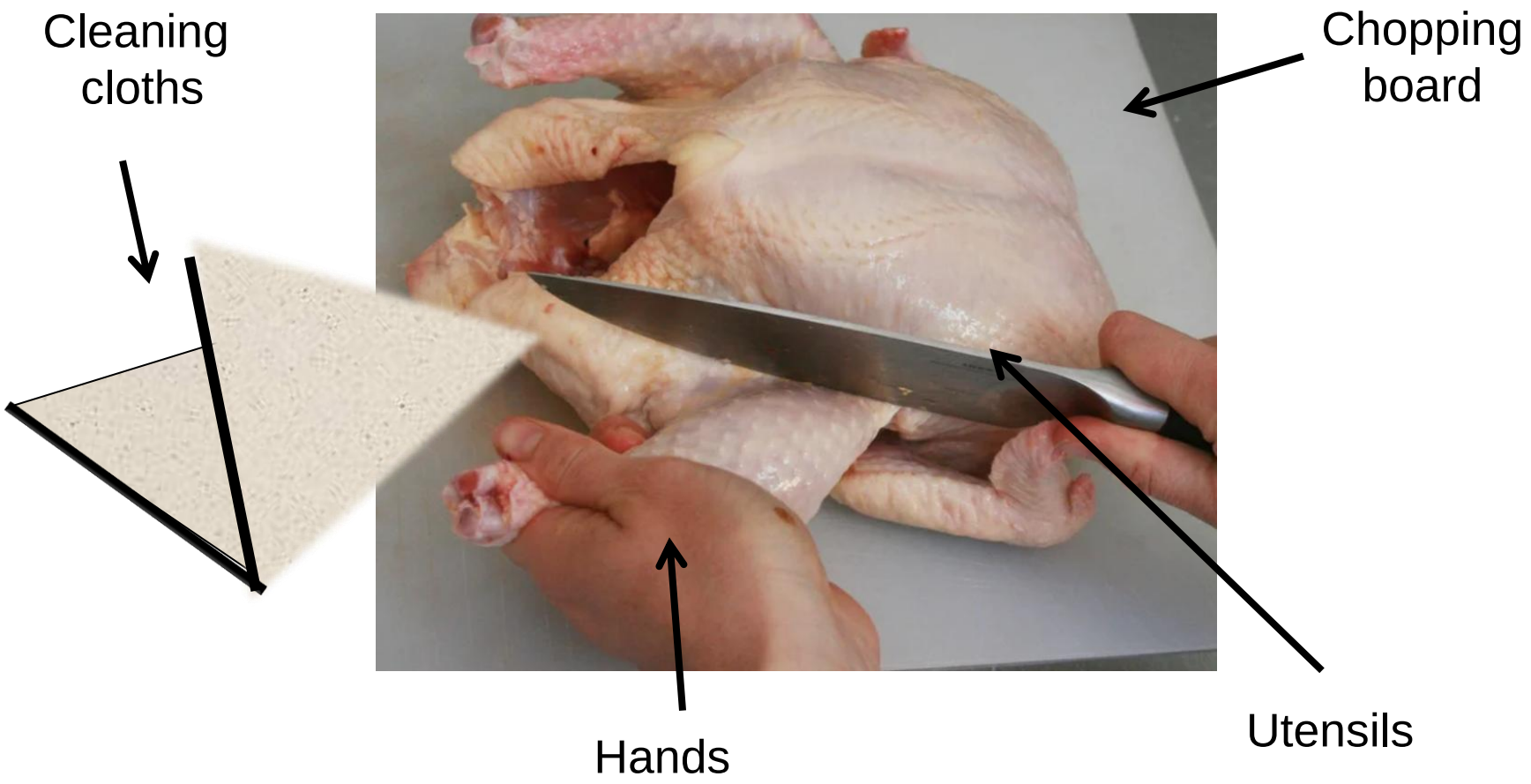
Identifying critical points in the chain of infection

Risk moment “when handling foods” critical places/points where hygiene is needed are:



What methods are available for “hygienic cleaning”

- Purpose of hygienic cleaning - to reduce organisms on critical sites/surfaces to acceptable safety target level.
- Safe level may vary for different pathogens and may be lower for those “at risk”

- Hygienic cleaning can be achieved by:
  - **Removal** c. cleaning products (e.g detergents or soap) & cleaning utensils, and water
  - **Inactivation in situ** using products/processes i.e. heat, UV light, disinfectants, hand sanitizers

Opportunities

Why is home & everyday life hygiene important?

- Hygiene is fundamental to containing burden of infectious diseases
  - Gastrointestinal (inc foodborne and norovirus), respiratory infections
  - Emerging infections – new agents/strains
  - Increasing healthcare and at risk groups at home – particularly growing elderly population
  - Gvt action plan to tackle antibiotic resistance inc.reducing need for ab prescribing by prevention of infections
    - UK 2019 Action plan: "*Health & social care providers can only do so much to prevent infections; when it comes to infections in the community, the public have a huge part to play*"
  - Gvt strategies focused on selfcare - empowering public to take care of own health
  - IFH taking opportunities for partnership

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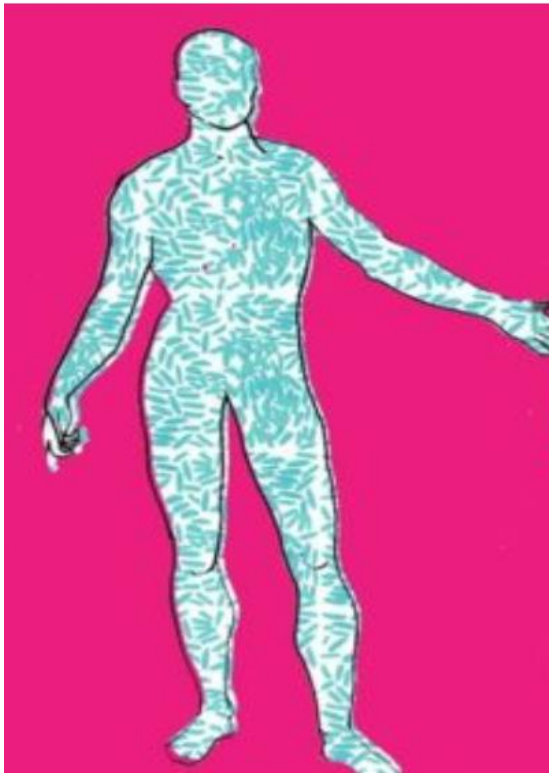
Challenges

Blowing the “are we too clean?” myth

- Since 2000 explosion of research
  - Exposure to “friendly” microbes essential to health
  - Required to build human microbiome (diverse range of microbes which inhabit gut, respiratory, skin etc)
  - Microbiome essential role in a significant range of human functions – inc regulation of the immune system
  - Diversity appears to be key

The human microbiome



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	Disease states	Linked to dysbiosis of microbiome due to lack of exposure to	Due to
Hygiene hypothesis 1989	Rapid rise in childhood allergies	Childhood	- Smaller families, - Higher standards of home & personal cleanliness
Old Friends Hypothesis 2003	Allergies Autoimmune diseases, Diabetes, IDB, Obesity, Depression	"friendly" microbes from: • other humans, • animals, • natural environment,	**Lifestyle changes:** Fewer siblings, less outdoor activity, C-section & bottle feeding, antibiotics, diet

If it's not infection exposure we need – it can't be hygiene?

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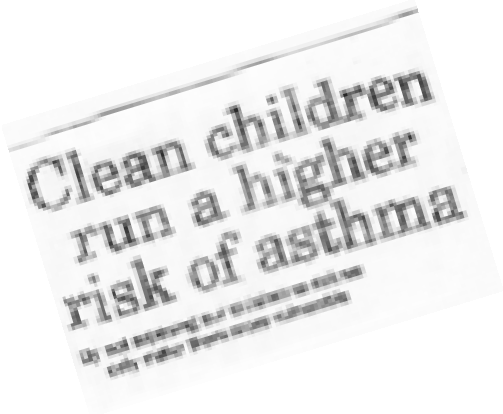
Hygiene myths

- "We have become too clean for our own good"
- "too hygienic"
- "Over-sterilizing our homes"
- "We need exposure to "germs" to build a strong immune system"?



Are we too clean?

- There's no good evidence to support this

- If routine home and personal cleanliness contribute at all, likely to be small, because
  - Clean-looking homes are full of bacteria, viruses, fungi, etc.
  - Routine weekly cleaning - no sustained effect on microbe levels

But -Many people still believe it

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Survey of UK and US media coverage

- Media articles 1999-2017
  - 30/36 articles mentioned home or personal cleanliness as underlying cause of reduced microbe exposures responsible for rising allergies etc.

- Of concern
  - 17/25 cited antibacterials/hand sanitizers as factor
  - In 15/25 this was quoted as an expert opinion
  - No evidence for this

  - Another example of fake news!

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RSPH public questionnaire 2018 – 2000 people

Which of the following factors do you believe is preventing children coming into contact with enough good bacteria?

Taking too many antibiotics	59%
Spending less time outdoors	56%
Keeping our homes too clean	**55%**
Using too many antibacterial cleaners	**52%**
Reduced contact with other children	49%
Bottle rather than breast feeding	22%
Having lots of baths/ showers	**21%**
Eating processed foods	18%
C-section rather than natural childbirth	9%
None of the above	3%

A “more robust” approach to hygiene

- Targeted hygiene
  - risk management through hygiene targeted at critical control points at critical “moments”
  - Ensuring hygiene procedures are appropriate and proportionate to their intended use

Plausible to health professionals as well a consumers?

Bloomfield SF 2018 Developing an Evidence-Based Approach to Domestic Hygiene Which Protects Against Infection Whilst Also Addressing Sustainability Issues. Tenside Surf Det 2018 5 356-363. https://www.hanser-elibrary.com/doi/pdf/10.3139/113.110576

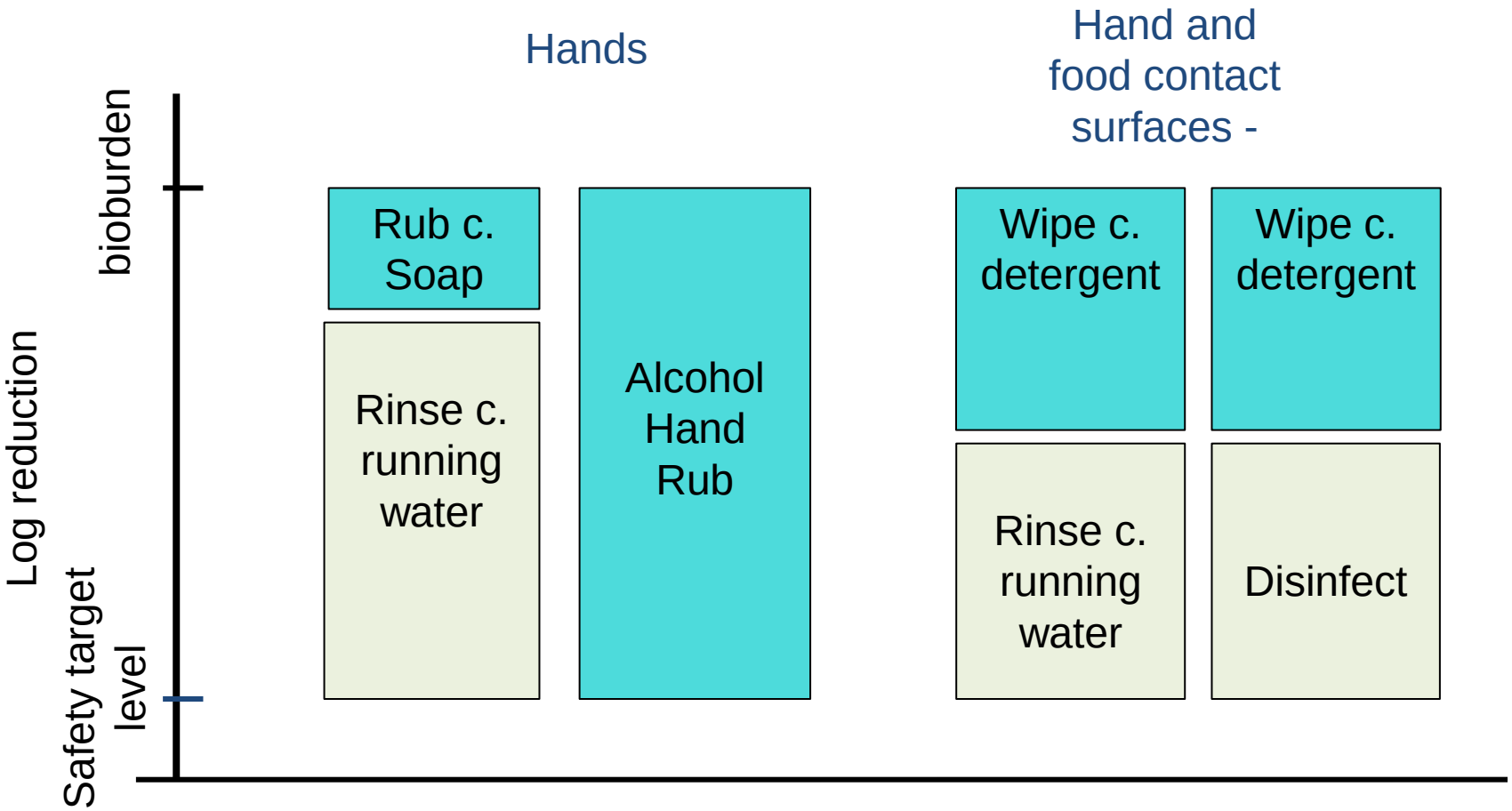
Ensuring hygiene procedures are appropriate and proportionate to intended use

- Quantitative Microbial Risk Assessment (QMRA)
  - Scientifically validated approach
  - developed for ensuring water quality.
  - Increasingly being used to develop infection prevention/hygiene strategies

- Efficacy of hygiene procedures currently assessed on basis of tests which measure Log Reduction

- QMRA uses LR together with published data relevant to use conditions to estimate health outcomes i.e. reduction in infection rates

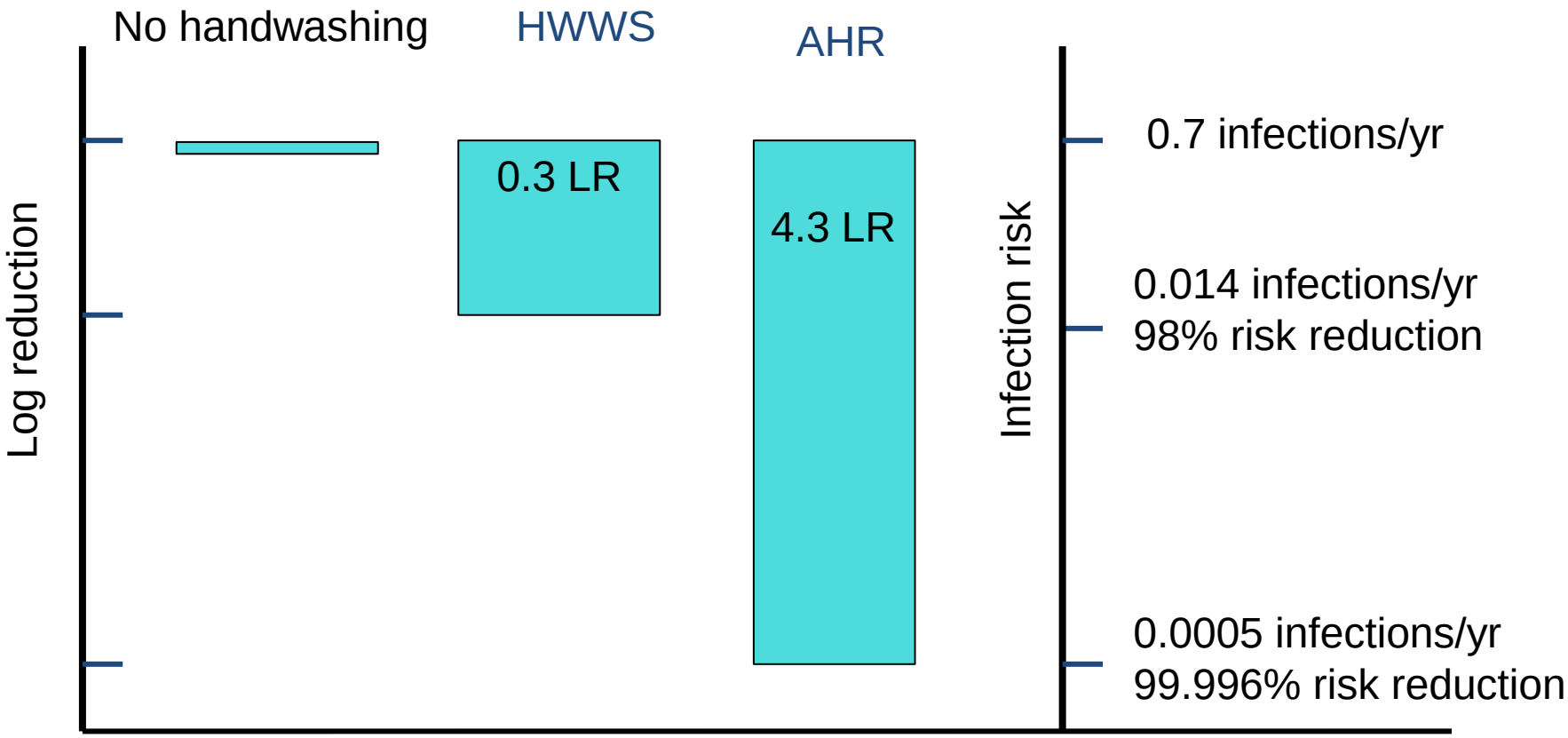
Hygienic cleaning of hands, surfaces, laundry



Safety target level: residual risk of infection e.g not more that 1 in 10^6 risk of infections

Hygienic cleaning of hands: health outcome

Impact of hand hygiene procedures on hand to mouth transmission of *E. coli* O157 following hand contact with contaminated minced beef during food preparation (US population 200 million)



Haas et al. Int J Hyg Environ Health. 2005;208(6):461-6.

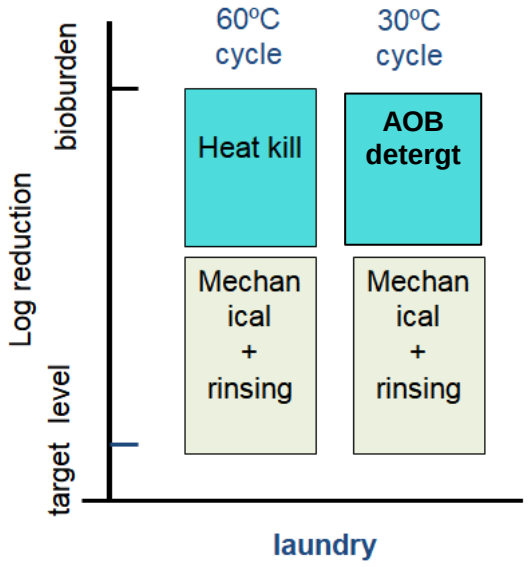
The risk management framework

- **Establishing where there is need for microbiocidal products**

- **Maximizing sustainability**
  Combining:
  - Inactivation by ‘cidal action of heat, detergents and microbiocides
  - Removal by mechanical action, detergency, water rinsing

  in an additive/synergistic manner to deliver safety target levels with **sustainable use** of energy, chemical agents water etc.

- **Innovation: new approaches to hygienic cleaning:**
  - new cleaning and disinfection agents,
  - new technologies, and surface modification to facilitate detachment.



(Microbicidal action of heat, detergents and active oxygen bleach as components of laundry hygiene. Tenside Surf. Det. 2016;*53*:495-501.)

The case for microbiocides

- In the past, recommendations for home and everyday life were based on the health status of family members
- Still argued that disinfectants should only be used in risk situations where people are infected or at increased risk of infection

- This limited vision is no longer acceptable -
- Ignores evidence from models simulating use conditions showing that, in some risk situations, wiping/detergent-based cleaning insufficient to reduce contamination to a safe level.

Preparing a meal with a chicken contaminated with Salmonella or Campylobacter

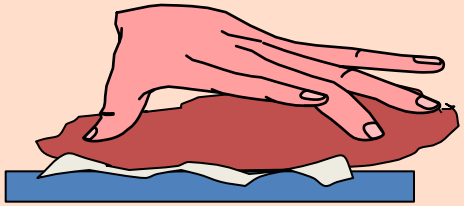
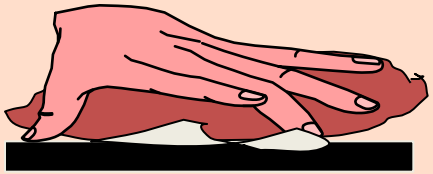
	Percentage of sites contaminated with Salmonella and/or Campylobacter		
No of participants in each group = 20	**After Meal Preparation**	**After Cleaning with Soap and Water**	**After Cleaning with soap and water + hypochlorite disinfectant**
Hands, Chopping board, Utensils Dishcloth Sink ,taps, Fridge, door handles etc	**17.3%**	**15.3%**	**2.3%**

33% contaminated sites had >1000 cfu/sample area

Infectious dose 500cfu

Cogan, Bloomfield and Humphries, Letters in Appl.Microbiology 1999, 29,354-358

Effectiveness of hygiene procedures in eliminating norovirus from e.g hand contact surfaces surfaces

Inoculate c. Norovirus in faecal suspension	Wipe c. clean cloth ↓ - sample surface & cloth	Use cloth to wipe another clean surface ↓ Sample surface, cloth, hands
		
Clean x 1	100% +ve	100% +ve
Clean x 2	100% +ve	100% +ve
Clean and disinfect c. bleach	0% +ve	0% +ve

Surfaces sampled using RTP-PCR

Infectious dose 1-10 particles

Barker, Vipond and Bloomfield, J. Hospital Infection 2004;58:42-9

Targeted hygiene: an effective and sustainable approach

Targeted hygiene provides the framework for maximizing protection against infection whilst:

- minimizing impact on microbial world and microbe exposure
- minimizing environmental impacts
- maximizing safety margins against any hazards
- ensuring prudent use of microbiocidal products to mitigate any risk of development of AMR.

- Arguing for a balanced approach where importance of hygiene is balanced against other issues

Threats

lack of public understanding of hygiene

represent a barrier to change

Barriers to change

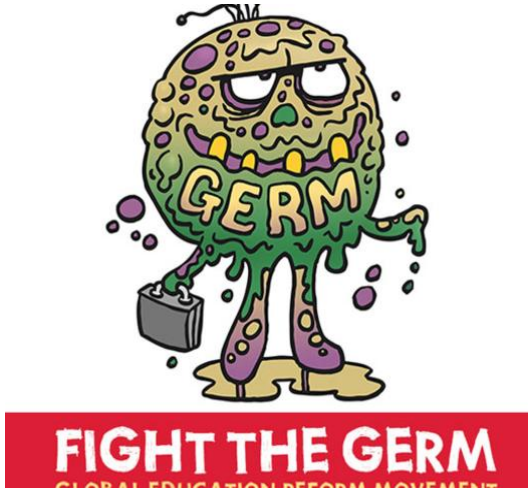
- Hygiene myths – being too clean – undermining confidence in hygiene

- Lack of public understanding of about hygiene
  - What is hygiene - how it differs from cleanliness
  - Visibly clean is not necessarily hygienically clean
  - Confusions about “germs”

Do we understand the difference between hygiene and cleanliness?

- Pilot study of 117 people asked – “What do YOU understand by terms clean and hygienic”

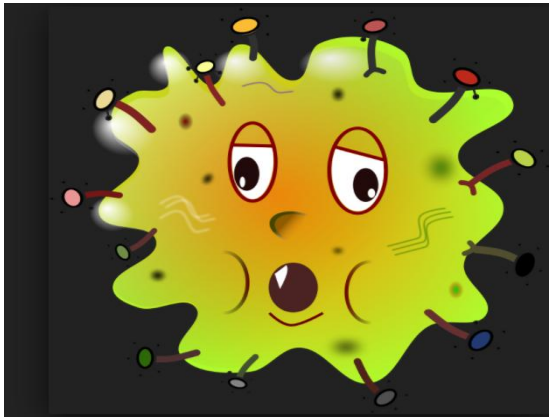
	Clean	**Hygienic**	
1.	Absence of visible dirt	numbers of germs is reduced	62 (53%)
2.	Both clean and hygienic mean dirt and germ reduction		45 (38.5%)
3.	Clean means using soap and water	Hygiene means using a disinfectant	10 (8.5%)



What are germs?

- Yuck!, Uurgh!
- Nasty dirty germs
- Poo – smelly!
- Don’t touch!
- Make you sick
- disgusting

- We are brainwashed as children with Germophobia



Messages reinforced by media articles

So you think your bathroom is clean?
Daily Mail – 10th April 2017

"Here's a map to help identify where germs love to lurk and help you to banish the bugs"

"Bathroom is a haven for bacteria, breeding in places you believe are sparkling clean"

But these millions are not harmful – and possible are beneficial

What do the public think about germs?

- RSPH survey showed that
  - 36% of people thought that germs can be good or harmful
  - 58% thought they were usually or always harmful.

- If we use the word “germs” we must qualify whether we are talking about harmful or beneficial microbes.

We are going to have to view our microbial world differently

The Challenge

- How do we develop lifestyles and hygiene regimes which protect us against infection whilst at the same time sustaining exposure to essential beneficial microbes ?

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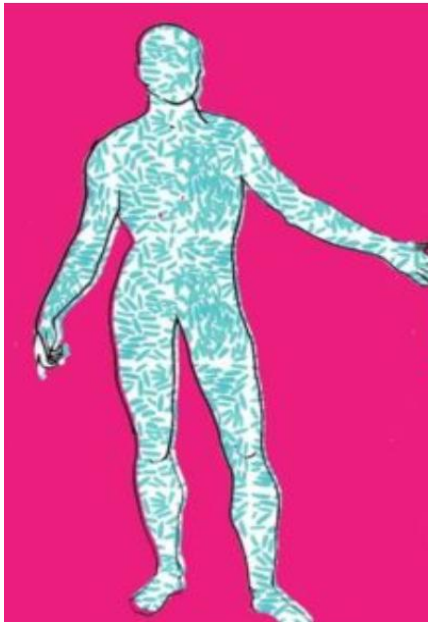
The importance of the human microbiome

- “Our microbiome is as important to our health as our liver. Kidneys etc”
- Digestion, allergies, autoimmune diseases, diabetes, IBD, obesity, antibiotic resistance, depression etc etc
- What is a healthy microbiome?
- How do we build and sustain a healthy microbiome?



- The answer lies in ----- lifestyle changes, probiotics ?
- “Cleanliness”?

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HOME » NEWS » HEALTH » HEALTH NEWS

Dog walkers and gardeners should avoid washing hands to encourage friendly bacteria

Friendly bacteria are disappearing from the body a
washing excessively, Stanford University has advise

Don't wash your hands! A bit of dirt is good for you: Experts say cleaning less often would protect against allergies by allowing to the body

Allergy in Children in Hand Versus Machine Dishwashing

Bill Hesselmar, MD, PhD

Parents Who Suck on Their Infants' Pacifiers May Protect Their Children Against Developing Allergy

Published: May 7, 2013 by University of Gothenburg

A germ-free childhood could trigger leukemia, scientist suggests

By Meera Senthilingam and Jessie Yeung, CNN

Updated 1614 GMT (0014 HKT) May 22, 2018

New York Times: How you can keep your microbiome healthy
Threats include over-usage of antibiotics, C-sections, bottle feeding over breast milk & antibacterial products.

The importance of hygiene in home and everyday life

- Protection against pathogen exposure essential to health:
  - Antibiotic resistance, food poisoning, norovirus etc, increasing elderly population, more healthcare at home, at risk groups at home, emerging pathogens

The need for clear & consistent communication to consumers

- What hygiene is, how it differs from cleanliness
- If we don't take steps to change understanding , our best efforts to change hygiene behaviour will not be successful
- Promoting hygiene practice on its own is not enough

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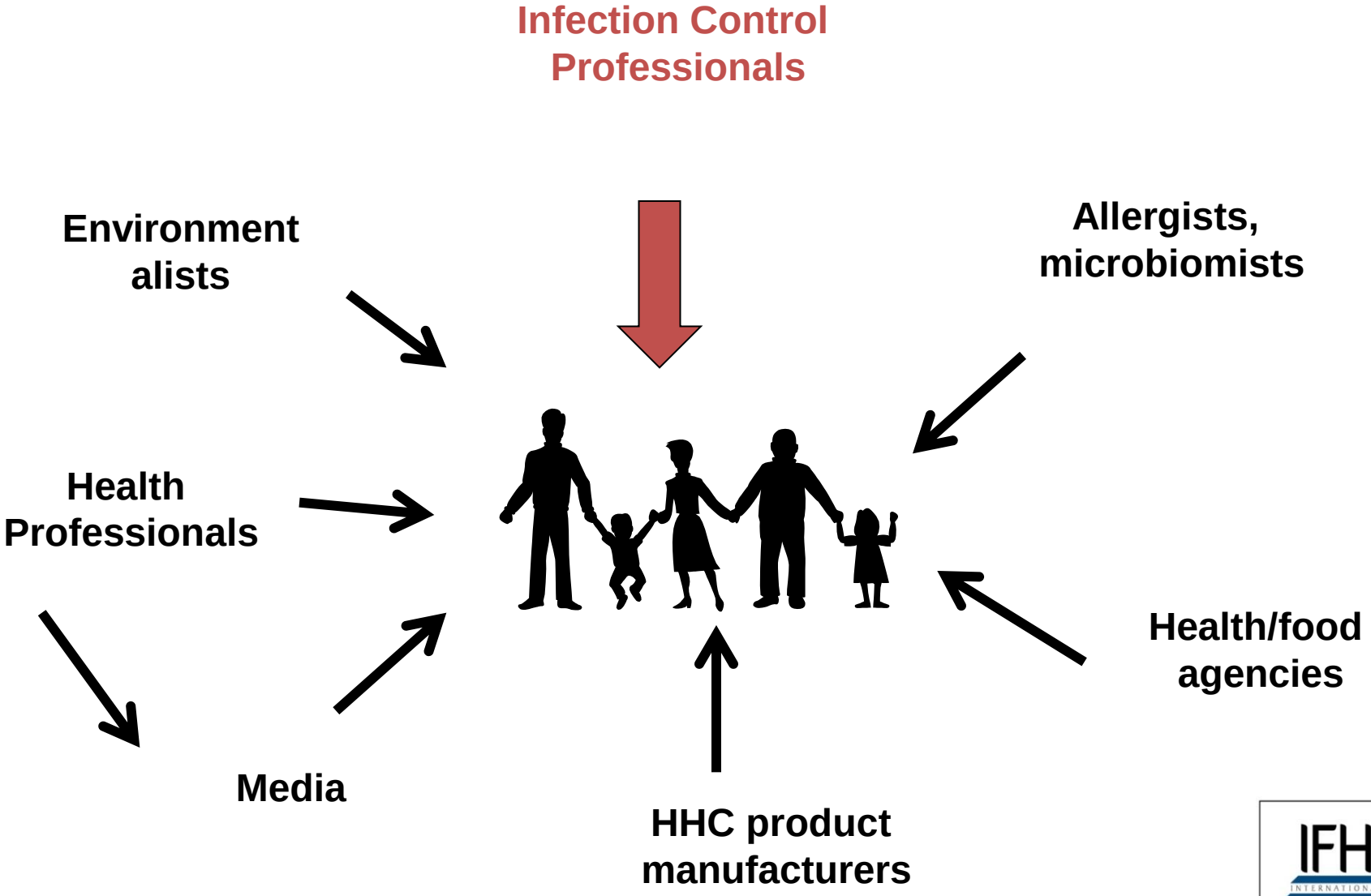
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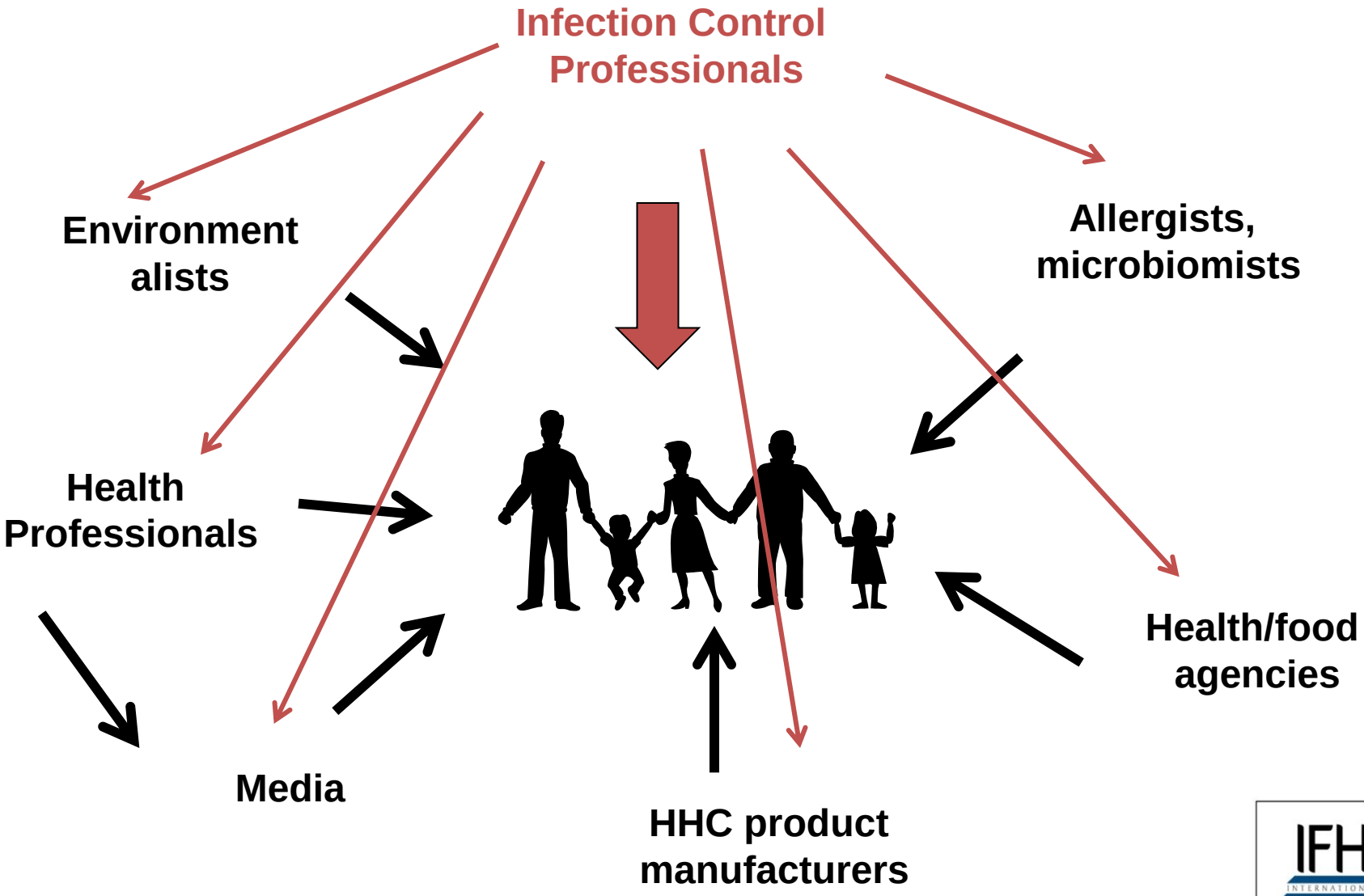
Environment alists
Allergists, microbiomists
Health Professionals
Health/food agencies
Media
HHC product manufacturers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IFH white paper calls to action

Gvt health agencies, policy makers, health professionals	Greater awareness and investment in hygiene in home & everyday life
Health professionals, allergists, microbiomists, environmentalists, media, regulators, private sector	Agree consensus approach to hygiene which balances infection risks against other issues
Those who communicate directly with the public - community workers, media, private sector	Consistent and coherent messaging to consumers
Academia & private sector	Strengthen scientific framework underpinning targeted hygiene by R&D showing how hygiene procedures (product + process) break the chain of infection and can reduce infection rates.