

Respiratory and GI Outbreaks in Long Term Care

Dr. Chesley Richards, Centers for Disease Control & Atlanta VA Hospitals
A Webber Training Teleclass

Respiratory and GI Outbreaks in LTCF: Investigation and Control

Chesley Richards, MD, MPH
Division for Healthcare Quality Promotion
National Center for Infectious Diseases
Centers for Disease Control and Prevention

Hosted by Paul Webber
paul@webbertraining.com
www.webbertraining.com

Objectives

- Review elements of outbreak investigation in long term care facilities
- Discuss infection control approaches in LTCFs for outbreaks
- Discuss key clinical and epidemiologic features of respiratory and gastrointestinal infectious disease outbreaks in LTCFs



How common are infections in LTCFs?

Infection	per 1000 pt-days per yr,	100 bed NH
RTIs	0.3 to 4.7	73
UTIs	0.2 to 2.2	37
SST	0.1 to 2.1	37
GI	0.1 to 2.5	37
BS	0.2 to 0.4	11

RTIs (respiratory tract infections), UTIs (urinary tract infections), SST (skin & soft tissue infections), GI (gastrointestinal infections), BS (bloodstream infections)

Adapted from Strausbaugh et al. Infections in Residents of Long Term Care Facilities in Mayhall CG, *Hospital Epidemiology and Infection Control*



Risk factors for infections in LTCF residents

- Individual
 - Decreased immunity to infections
 - Malnutrition
 - Chronic disease
 - Functional impairment (e.g., diminished cough reflex, urinary and fecal incontinence, immobility)
 - Medications (e.g., CNS suppressants)
 - Invasive devices (e.g., catheters, I.V.s, NGTs)

Richards CL, Jarvis WR. Epidemiologic Investigation of Infectious Disease Outbreaks. In Yoshikawa TT, Ouslander JG (eds). *Infection Management for Geriatrics in Long-term care facilities*. Marcel Dekker, New York, 2002.



What are risk factors for infections in LTCF residents?

- Institutional
 - Larger LTCFs
 - Group activities
 - Low immunization rates
 - Excessive antimicrobial use
 - Widespread colonization, antibiotic resistant bacteria
 - Single nursing units, or multiple units with a single nursing station

Richards CL, Jarvis WR. Epidemiologic Investigation of Infectious Disease Outbreaks. In Yoshikawa TT, Ouslander JG (eds). *Infection Management for Geriatrics in Long-term care facilities*. Marcel Dekker, New York, 2002.



Unique challenges for investigating and managing outbreaks in LTCFs

- Cognitive impairment complicates data collection, communication and interventions
- Multiple comorbidities, group exposures
- What are appropriate outcomes?
 - Preventing death ?
 - Preventing hospitalization?
 - Maintaining health status, function, quality of life are probably more important



Respiratory and GI Outbreaks in Long Term Care

Dr. Chesley Richards, Centers for Disease Control & Atlanta VA Hospitals
A Webber Training Teleclass

Unique challenges for investigating and managing outbreaks in LTCFs

- Residence vs health care setting
 - “Residents” not “patients”
- Nurse staffing is suboptimal
- Limited
 - medical provider presence
 - medical record documentation
 - laboratory diagnostic studies
- In the U.S., for-profit industry



Key aspects of outbreak investigation and control in LTCFs

- Have an infection control plan and program
- Ask 2 important questions
 - Is this surveillance artifact?
 - Is an epidemiologic investigation needed?
- Develop a case definition and line listing, ascertain cases
- Determine person, place, time
- Develop preliminary hypotheses and evaluate
- Implement interventions
- Evaluate the impact of interventions

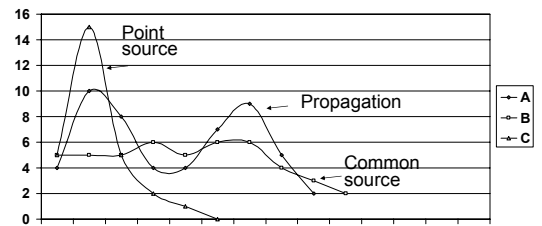
Richards CL, Jarvis WR. Epidemiologic Investigation of Infectious Disease Outbreaks. In Yoshikawa TT, Ouslander JG (eds). *Infection Management for Geriatrics in Long-term care facilities*. Marcel Dekker, New York. 2002.



Case	Age	Sex	Ward	Room	Onset	Cough	Fever	CXR	Cult	Meals	Phys therapy
1	87	M	4A	401	3/01/01	YES	YES	+	+	In room	YES
2	90	M	3A	304	3/02/01	YES	NO	+	+	On ward	YES
3	99	F	2A	208	3/02/01	YES	YES	-	+	DR	YES
4	80	F	2A	208	3/03/01	YES	NO	+	+	DR	YES
5	90	F	2B	240	3/05/01	YES	YES	-	-	DR	YES

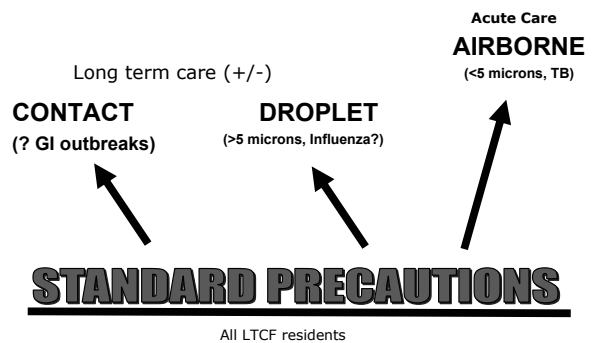


Epidemic Curves



Some questions to ask about your Infection control plan and program

- Is there an ICP? Is the ICP trained? Does the ICP train staff?
- Who **really** provides care for the residents?
- What's the reporting chain?
- How would handle isolation? Cohorting?
- How would handle mass treatment/vaccination?
- How do you monitor/restrict visitors?



Respiratory and GI Outbreaks in Long Term Care

Dr. Chesley Richards, Centers for Disease Control & Atlanta VA Hospitals
A Webber Training Teleclass

CDC Infection Control Precautions

Component	Standard	Contact	Droplet	Airborne
Hand hygiene	YES	YES	YES	YES
Room	Any	Private or Cohort	3 feet	Negative pressure
Gowns	Optional	Yes	Yes	Yes
Mask	Optional	Surgical	Surgical 3 feet	N-95
Eyewear	Optional	Yes	Yes	Yes
Equipment	Not dedicated	Dedicated	Dedicated	Dedicated

Garner JS. *Am J Infect Control* 1996;24:24-52.



Respiratory Infection Outbreaks in LTCFs



Respiratory Infection Outbreaks in LTCFs

- 5 LTCFs, Ontario, 3 years
- 37% of residents affected
- Year-round, no seasonal pattern
- Pathogens
 - Influenza, para-influenza, RSV
 - Legionella, Chlamydia pneumoniae

Loeb M et al. *Can Med Assoc J* 2000;162:1133-1137



Respiratory Infection Outbreaks in LTCFs

Symptoms	
Cough	83%
Fever	40%
Coryza	45%
Outcomes	
Pneumonia	15%
Hospital transfer	12%
Death	8%



Loeb M et al. *Can Med Assoc J* 2000;162:1133-1137



Influenza

- Influenza virus
 - Single stranded RNA virus
 - Virus type: A or B
- Epidemics reported since 1510
 - 21 million deaths during 1918-19 pandemic
- Clinical characteristics
 - Incubation period 1-5 days
 - Respiratory transmission with viral shedding 5-10 days
 - Fever, non-productive cough, myalgias, sore throat, headache
- 95% of deaths are in people 65 and older
- Antivirals for treatment and prophylaxis



Influenza Vaccine Efficacy in the Elderly

For preventing	Estimate	95% C.I.
Respiratory illness	56%	39 to 68
Pneumonia	53%	35 to 66
Hospitalization	50%	28 to 65
Death	68%	56 to 76

Source: Gross PA, et al. *Ann Int Med* 1995;123:518-527



Respiratory and GI Outbreaks in Long Term Care

Dr. Chesley Richards, Centers for Disease Control & Atlanta VA Hospitals
A Webber Training Teleclass

Why Vaccinate LTC Residents?

- Residents are at risk for complications from influenza and pneumococcal disease
 - (ACIP, MMWR 1997; ACIP, MMWR 2000)
- These diseases have outbreak potential and group living conditions foster outbreaks
 - (Nuorti, NEJM 1998; ACIP, MMWR 1997; ACIP, MMWR 2000)
- Antibiotic-resistance of *Streptococcus pneumoniae* is increasing
 - (Whitney C, NEJM 2000)



Influenza Outbreaks

- Outbreak definitions
 - No universally agreed definition
 - 10% of a ward or LTCF with ILI
 - 2-3 residents within 48 to 72 hours
- If outbreak occurs
 - Chemoprophylaxis should be considered
 - Revaccination
- Reinforce standard precautions
- Isolation/cohorting for residents with ILI
- Limit group activities and visitors
- Close LTCF or ward to new admissions



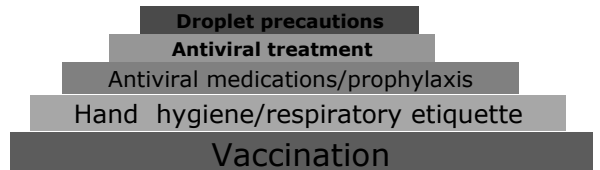
Antiviral prophylaxis or testing?

	Peri-Influenza Season (<10%)	Peak Season (33%-44%)	Regional Epidemic (70%-87%)
High (24%)	Empirical oseltamivir	Empirical oseltamivir*	Empirical oseltamivir*
Intermediate (10%)	Unvaccinated patients: Empirical oseltamivir Vaccinated patients: Test, oseltamivir	Empirical oseltamivir	Empirical oseltamivir*
Low (4%)	Unvaccinated patients: Test, oseltamivir Vaccinated patients: No antiviral therapy	Unvaccinated patients: Empirical oseltamivir Vaccinated patients: Test, oseltamivir	Empirical oseltamivir

Rothberg MB, et al. Ann Intern Med 2003;139:321-329



Steps to prevention and control of influenza



Respiratory/Cough Etiquette

- Cover the nose/mouth when coughing or sneezing
- Use tissues to contain respiratory secretions
- Perform hand hygiene after contact with respiratory secretions or contaminated objects/materials.
- Healthcare facilities should
 - Provide tissues and no-touch waste receptacles
 - Provide conveniently located dispensers of alcohol-based hand rub or sinks with adequate supplies

<http://www.cdc.gov/flu/professionals/infectioncontrol/resphygiene>



Indications for antiviral therapy

- Prophylaxis
 - For the entire season for individuals who cannot be vaccinated
 - Following suspected exposure or when community activity increased
 - 70-90% effective in preventing illness
- Treatment
 - Within 48 hours of the onset of influenza like symptoms



Respiratory and GI Outbreaks in Long Term Care

Dr. Chesley Richards, Centers for Disease Control & Atlanta VA Hospitals
A Webber Training Teleclass

Drugs for Influenza

Agent	Influenza Virus Affected	Administration	Primary Side Effects	Treatment	Prophylaxis
Amantadine ²	Influenza A	Oral	CNS/GI	100mg twice daily ³	100mg twice daily ³
Rimantadine ⁴	Influenza A	Oral	CNS/GI	100mg twice daily ³	100mg twice daily ³
Zanamivir	Influenza A&B	Oral inhalation	Respiratory	100mg twice daily	NA ⁶
Oseltamivir	Influenza A&B	Oral	GI	75mg twice daily ³	75mg twice daily ³

CDC

Nursing home acquired pneumonia

- Incidence
 - 13 to 48% of infections in LTCFs
 - Up to 44% mortality
- Risk factors
 - Swallowing difficulty, inability to take p.o. meds; witnessed aspiration
 - Lack of influenza vaccination
 - Sedative-hypnotic drug use
 - Cognitive impairment
- In residents with influenza, post-viral bacterial pneumonia is a major cause of morbidity/mortality
 - *S. pneumoniae* is leading cause of bacterial pneumonia in LTCF residents

Medina-Walpole AM, et al. J Am Geriatr Soc 1999;47:1005-1015

CDC

Predictors of mortality

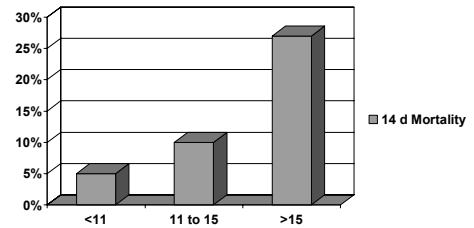
- Activities of Daily Living (ADL) dependence
- Hypothermia
- Increased blood urea nitrogen
- Infiltrate on chest xray
- Tachypnea

Medina-Walpole AM, et al. J Am Geriatr Soc 1999;47:1005-1015

CDC

Acute Pneumonia Mortality in Long Term Care Residents:

Impact of ADL Score



Muder et al. Arch Intern Med 1996; 156:2365

CDC

Invasive Pneumococcal Disease Burden by Age, 1998



Invasive *Streptococcus pneumoniae* in older adults in LTCF and Community

- Incidence four-fold higher in LTCFs
 - 194 vs 44 per 100,000 (RR 4)
- Levofloxacin non-susceptible *S. pneumoniae* five-fold higher in LTCF
 - 4.2 vs 0.4 (RR 10)
- The majority of *S. pneumoniae* serotypes for both LTCF and community-living older adults covered by the current vaccine

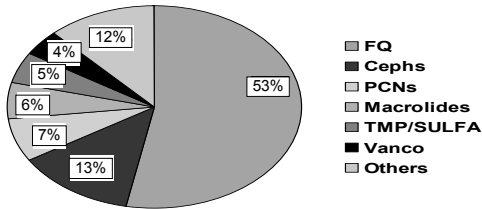
Kupronis B, Richards C, Whitney C. J Am Geriatr Soc 2003;51:1520-1525

CDC

Respiratory and GI Outbreaks in Long Term Care

Dr. Chesley Richards, Centers for Disease Control & Atlanta VA Hospitals
A Webber Training Teleclass

Antibiotic Rx in 6 LTCFs
Atlanta GA, 2000
(n=103 antibiotic courses)



Richards C, et al. (in press, JAMDA)



Respiratory Infection Outbreaks Key points

- Influenza, pneumococcal vaccination
- Active surveillance strategy
- Institutional preparation and commitment
 - Rapid testing
 - Institution of antiviral prophylaxis
 - Infection control isolation
- Secondary bacterial pneumonia



GI Outbreaks in LTCFs



Diarrhea in Nursing Home Patient

Non-infectious causes

Hyperosmolar solutions
Laxatives
Antacid
Antibiotics
Impaction
Ischemic bowel
Functional disorders

Infectious causes

Norovirus/Rotavirus
Foodborne
Salmonella, Shigella,
Campylobacter, E. coli
Parasites
Giardia, Cyclospora
Cryptosporidium, etc.
Clostridium difficile



Etiologic agents of GI outbreaks in LTCFs

- Viruses
 - Caliciviridae
 - Rotaviridae
 - Adenoviridae
 - Astroviridae
- Parasites
 - Entamoeba histolytica
 - Giardia lamblia
 - Cryptosporidium
- Bacteria
 - Salmonella
 - Shigella
 - Staphylococcus
 - Clostridium difficile
 - E. coli 0157:H7
 - Aeromonas hydrophilia
 - Campylobacter
 - Bacillus cereus

Strausbaugh et al. Clin Infect Dis 2003;36:870-876



Selected Foodborne Outbreaks in LTCF

- *Salmonella hadar* in TN LTCF
 - 14% residents (250 bed) developed diarrhea
 - 244 HCW, attack rates
 - 27% laundry workers, 3% nurses, 4% kitchen staff
- *Clostridium perfringens* in Australia LTCF
 - 25 residents affected; pureed food not reheated
- Campylobacteriosis at a Senior Center
 - Hawaiian Luau allowed for cross-contamination between raw meat and vegetables

Winquist, et al. J Am Geriatr Soc 2001;49:304-307



Viral outbreaks: Selected Cases

- Norovirus
 - Washington LTCF: 57% residents, 39% HCWs
 - Molecular typing: debilitated residents, HCW transmission
- SRSV
 - Maryland LTCF: 51% residents, 47% HCWs
 - Index case: Nurse working ill x several days



Rotavirus

- Diarrhea in aged-care facilities in Australia
 - 13% Rotavirus
 - 44% Norovirus
 - 2% Astrovirus
- Mid-winter to mid-spring
- Diarrhea, vomiting 1-5 days

Marshall J, et al. J Clin Virol 2003;28:331-340



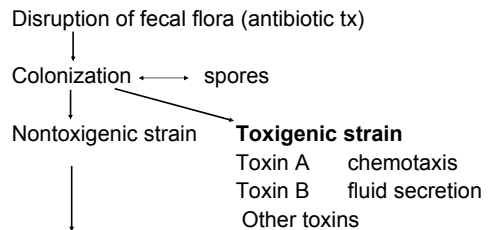
Clostridium difficile diarrhea*

- 25% of antibiotic associated diarrhea
- 300,000 cases per year
- Most frequent antibiotics: Clindamycin, Ampicillin, Amoxicillin, Cephalosporins
- Can occur **with any antibiotic**
- **Colonization**
 - Occurs in 21% hospitalized patients
 - 2/3 asymptomatic
 - Spores: person-to-person transmission

*Mylonakis E, et al. Arch Int Med 2001;161:525-533



Clostridium difficile diarrhea Pathophysiology



*Mylonakis E, et al. Arch Int Med 2001;161:525-533



Clostridium difficile diarrhea

Diagnosis and Treatment

- Diagnosis
 - Stool culture, Cytotoxin assay, ELISA
 - Endoscopy
- Treatment
 - **STOP** inciting antibiotic
 - Avoid anti-peristaltic drugs, opiates
 - Antibiotic treatment:
 - **Metronidazole** p.o. 250 mg QID, 10-14 days
 - **Vancomycin** p.o. 125 mg QID, 10-14 days
 - Retreatment as needed

Mylonakis E. Arch Int Med 2001;161:525-533



C. Difficile Outbreak Associated with Gatifloxacin in LTCF

- Gatifloxacin replaced Levofloxacin on LTCF formulary in October 2001
- *C. difficile* attack rate
 - Jan 2001-Sep 2001 17%
 - Oct 2001- Jun 2002 30%
- Formulary changed backed to Levofloxacin with return to lower rates of *C. diff*
- Hypothesis: Gatifloxacin has expanded anaerobic coverage

Gaynes et al. Clin Infect Dis 2004;38:640-645



Respiratory and GI Outbreaks in Long Term Care

Dr. Chesley Richards, Centers for Disease Control & Atlanta VA Hospitals
A Webber Training Teleclass

Controlling GI outbreaks

- Diarrhea and/or vomiting
- Dehydration is common and deadly
- Transmission may occur rapidly
 - Consider contact precautions, universal gloving
- Hand hygiene and standard precautions among residents and HCWs MUST be emphasized!
- Engage all staff including environmental staff
- HYDRATION! HYDRATION! HYDRATION!



Infection control considerations for outbreaks in LTCFs



LTC facilities have increased infection control efforts, but are programs sufficient?

- Survey of 136 skilled LTC facilities (≥ 25 beds) in NE states
- 98% report having a “designated” ICP
- 60% perform other jobs in addition to IC
- Average 8 hours per week doing IC tasks
- 52% received IC training
- 24% of facilities have MD with IC interest/responsibilities

Goldrick, BA, ICHE, 1997



Practical Considerations

- Emphasize hand hygiene
- Consider universal glove use for all resident care
- Respiratory etiquette protocol



Hand Hygiene Adherence

Year of Study	Adherence Rate	Hospital Area
1994 ⁽¹⁾	29%	General and ICU
1995 ⁽²⁾	41%	General
1996 ⁽³⁾	41%	ICU
1998 ⁽⁴⁾	30%	General
2000 ⁽⁵⁾	48%	General

1. Gould D, *J Hosp Infect* 1994;28:15-30. 2. Larson E, *J Hosp Infect* 1995;30:88-106. 3. Slaughter S, *Ann Intern Med* 1996;3:360-365. 4. Watanakunakorn C, *Infect Control Hosp Epidemiol* 1998;19:858-860. 5. Pittet D, *Lancet* 2000;356:1307-1312.

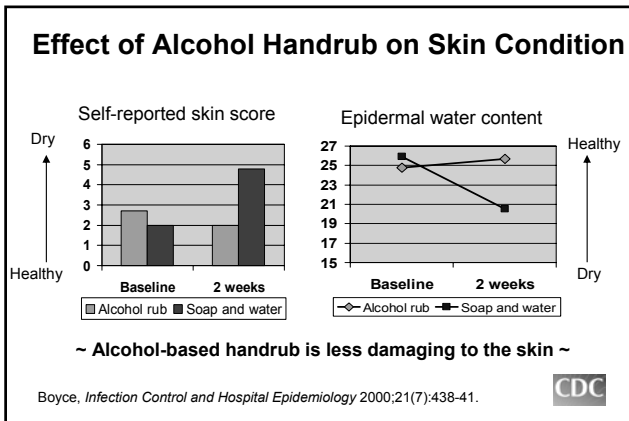
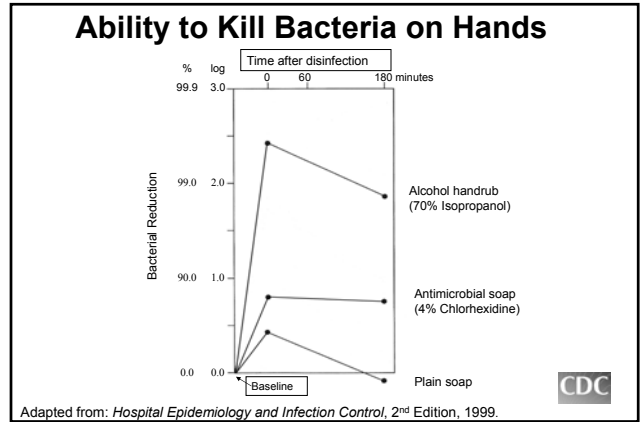


Self-Reported Factors for Poor Adherence with Hand Hygiene

- Handwashing agents cause irritation and dryness
- Sinks are inconveniently located/lack of sinks
- Lack of soap and paper towels
- Too busy/insufficient time
- Understaffing/overcrowding
- Patient needs take priority
- Low risk of acquiring infection from patients

Adapted from Pittet D, *Infect Control Hosp Epidemiol* 2000;21:381-386.





Time Spent Cleansing Hands: one nurse per 8 hour shift

- Hand washing with soap and water: 56 minutes
 - Based on seven (60 second) handwashing episodes per hour
- Alcohol-based handrub: 18 minutes
 - Based on seven (20 second) handrub episodes per hour

~ Alcohol-based handrubs reduce time needed for hand disinfection ~

CDC

Voss A and Widmer AF, *Infect Control Hosp Epidemiol* 1997;18:205-208.

Recommended Hand Hygiene Technique

- Handrubs
 - Apply to palm of one hand, rub hands together covering all surfaces until dry
 - Volume: based on manufacturer
- Handwashing
 - Wet hands with water, apply soap, rub hands together for at least 15 seconds
 - Rinse and dry with disposable towel
 - Use towel to turn off faucet

Guideline for Hand Hygiene in Health-care Settings. *MMWR* 2002; vol. 51, no. RR-16. **CDC**

Time Spent Cleansing Hands: one nurse per 8 hour shift

- Hand washing with soap and water: 80 minutes
 - Based on three (80 second) handwashing episodes per hour
- Alcohol-based handrub: 20 minutes

~ Alcohol-based handrubs reduce time needed for hand disinfection ~

CDC

Voss and Widmer, *Infection Control and Hospital Epidemiology* 1997;18:205-8.

Respiratory and GI Outbreaks in Long Term Care

Dr. Chesley Richards, Centers for Disease Control & Atlanta VA Hospitals
A Webber Training Teleclass

Summary

- Respiratory and GI outbreaks can be deadly in the vulnerable LTCF population
- Prior planning is crucial
 - Surveillance for outbreaks
 - Infection control plan
 - Authority to take rapid action
- Simple interventions can make a big difference
 - Immunization, hand hygiene, respiratory etiquette



Other 2005 Teleclasses

For more information, refer to www.webbertraining.com/schedule.cfm

- March 10 - **Biocide Use in a Healthcare Environment** with Dr. Jean-Yves Maillard
Sponsored by JohnsonDiversey www.johnsondiversey.com
- March 17 - **WHO's Global Patient Safety Challenge 2005/2006 Preventing Healthcare Associated Infection: A Worldwide Strategy**
with Dr. Didier Pittet
- March 24 - **Infection Control in Pre-Hospital Care** with Margaret McKenzie
- March 31 - **Voices of CHICA** Free Teleclass
- April 7 - **Root Cause Analysis for the Infection Control Professional**
with Dr. Denise Murphy
- April 14 - **Disinfectants and Environmental Impact** with Dr. Franz Daschner

Questions? Contact Paul Webber paul@webbertraining.com