


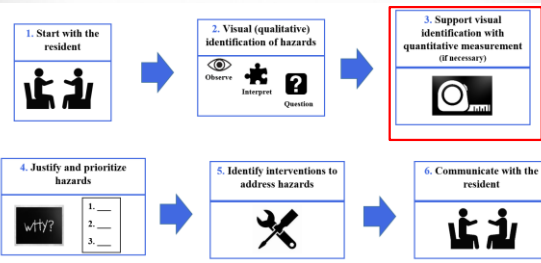
MODULE 4

STEP 3: SUPPORT VISUAL IDENTIFICATION WITH QUANTITATIVE MEASUREMENT



Healthy Housing Solutions^{INC.}

KEY STEPS



1. Start with the resident

2. Visual (qualitative) identification of hazards
Observe Interpret Question

3. Support visual identification with quantitative measurement (if necessary)

4. Justify and prioritize hazards
1. ___
2. ___
3. ___

5. Identify interventions to address hazards

6. Communicate with the resident

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MODULE CONTENT

- When to use quantitative measurement (as a support for qualitative assessment)
- Selecting the right tool or sampling method
- List of basic quantitative tools an evaluator should have
- Introduction to using basic quantitative tools
- Understanding data results
- Connecting results to evidence-based practice
- Case study


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QUANTITATIVE MEASUREMENT

A back to the basics moment . . .

What is the difference between a qualitative and a quantitative assessment?




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USE QUANTITATIVE TESTS WHEN NECESSARY TO:

Inform both identification and intervention


Provide baseline and visual indication of hazards for occupants.



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QUESTIONS COVERED IN THIS MODULE

1. Do I need to do quantitative measurement or collect a sample?
2. If yes, how do I select and use the right tool or sampling method?
3. What will my data look like?
4. How do I connect my results to evidence-based practice?



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**Question 1:
Do I need to do a
quantitative measurement
or collect a sample?**



Question 1: Do I need to do a quantitative measurement or collect a sample?

Do I see, feel, hear or smell a possible hazard and need to confirm whether it is a problem or not?

Yes

I need to do quantitative measurement / have a sample collected

No

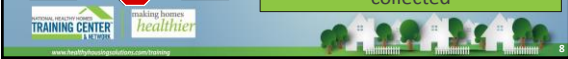
Does the resident report an issue even though I don't see, feel, hear or smell a hazard?

No



Yes

I need to do quantitative measurement / have a sample collected



EXAMPLE 1



- You don't see anything wrong with any of the gas appliances in a house.
- But the resident reports symptoms that sound like CO poisoning.

Do you need do quantitative measurement?



EXAMPLE 2



You see suspect mold on the interior of the basement wall.

Do you need to do quantitative measurement?



EXAMPLE 3



You observe a variety of surfaces in a home that are extremely damp but you don't directly observe any suspect mold.

Do you need to support your visual assessment with quantitative measurement?



EXAMPLE 4



- Your thermo hygrometer measures a somewhat high level of relative humidity in the house you are assessing.
- The resident told you that her son has a dust mite allergy but is pretty sure she dusts often enough and is not sure why her son is still having allergy symptoms.
- You think there might be a high level of dust mite allergen in the house despite the resident's cleaning, but maybe it's the family's dogs that are the problem?

Do you need to do quantitative measurement?



Question 2: How do I select and use the right tool or sampling method?



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Diagnostics – don't leave home without them

Your most important diagnostic tools are . . .



Your brain. To understand how a house's systems work.



Your eyes. To see the details of a hazard.



Your nose. To smell clues that may indicate a hazard.



Your ears. To hear clues that may indicate a hazard.



Your ability to breathe. To sense clues that may indicate an indoor air quality hazard.

How can you use these same diagnostics to relate to your client?



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Question 2: How do I select and use the right tool or sampling method?

Yes

I need to do quantitative measurement / have a sample collected

Okay, what tool should I use?

1. What is the purpose of the measurement?
2. What are the characteristics of the data that I need my measurement to produce?



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Question 2: How do I select and use the right tool or sampling method?


1. What is the purpose of the measurement?
2. What are the characteristics of the data that I need my measurement to produce?

I need to determine if there is enough air flow in a bedroom. My client tells me it often seems stuffy in the bedroom.

Maybe I'll use a vapor generator.

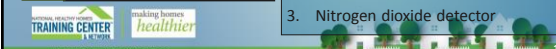
No, that only tells me which way the air flow is.

I'll use a velometer. That will tell me how much air is flowing in cubic feet per minute.



Question 2: How do I select and use the right tool or sampling method?

Tool Options	Basic quantitative measurement tools:	Advanced quantitative measurement tools:
	<ol style="list-style-type: none"> 1. Combustible gas meter 2. Vapor generator / smoke stick 3. Carbon monoxide detector 4. Thermo-hygrometer (Portable psychrometer) 5. Infrared thermometer 6. Moisture meter 	<ol style="list-style-type: none"> 1. Velometer 2. Manometer 3. Flow hood 4. Blower Door 5. Particle counter 6. Carbon dioxide detector
	Premium quantitative measurement tools:	
<ol style="list-style-type: none"> 1. Formaldehyde detector 2. Multi-gas detector 3. Nitrogen dioxide detector 		



Question 2: How do I select and use the right tool or sampling method?



Combustible gas meter

vapor generator / smoke stick

Carbon Monoxide detector

Thermo-hygrometer


Infrared thermometer

Moisture meters




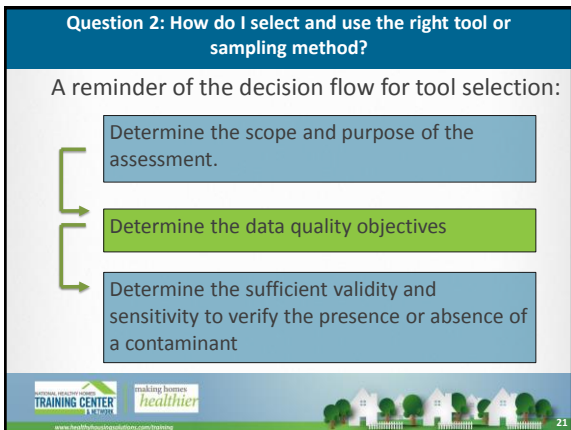
Question 2: How do I select and use the right tool or sampling method?

Tool	What it measures:
Combustible gas meter	Combustible gases, including: natural gas, propane, and methane
vapor generator / smoke stick	Direction of air flow
Carbon monoxide detector	Carbon monoxide gas
Thermo-hygrometer	Temperature and humidity
Infrared thermometer	Surface temperature of objects
Moisture meter	Moisture content in wood or drywall



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- Question 2: How do I select and use the right tool or sampling method?**
- Understanding instrument variables:**
- **Accuracy**
 - Ability to detect true value of a measured quantity
 - **Range**
 - Low and high values that encompass the purpose of measuring a given parameter
 - **Resolution**
 - Increment of change an instrument can detect
 - **Sensitivity**
 - Smallest increment that can initially be detected
- 
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Question 2: How do I select and use the right tool or sampling method?



Combustible gas meter



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Question 2: How do I select and use the right tool or sampling method?



Carbon Monoxide detector



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Question 2: How do I select and use the right tool or sampling method?



Moisture meters



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Diagnostics – Moisture meters

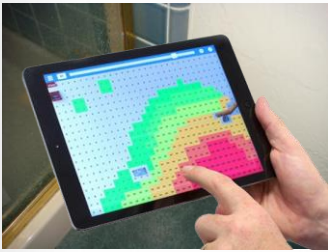
Basic Types:

- Pin Type
- resistance
- Impedance Type
- capacitance
- Combination units
- Resistance and capacitance in one



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Diagnostics – Moisture meters



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Question 2: How do I select and use the right tool or sampling method?



vapor generator / smoke stick



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Always have the Safety Data Sheets

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Diagnostics – basic to advanced

IR Camera

Powered flow hood

Passive flow hood

Blower Door

Depressurizing

Pressurizing

Pressure Pan

Inside the house

Question 2: How do I select and use the right tool or sampling method?

Thermo-hygrometer

[Click to launch video](#)

STANDARD OPERATING PROCEDURE

Quantitative Instrument Training

Quantitative Instrument Training Worksheet:

Instrument Name: _____ Brand: _____ Type: _____

What is the purpose of this instrument?

To Measure: _____

What hazards do you use this device to assess?

1. _____
2. _____
3. _____

What units of measure does this device use?

Test: _____ Units of Msrmt.: _____ Test: _____ Units of Msrmt.: _____

Test: _____ Units of Msrmt.: _____ Test: _____ Units of Msrmt.: _____

ASEPTIC TECHNIQUE

Aseptic technique involves using procedures that will not contaminate a sample:

- Do not touch critical areas of a sample
- Do not cross contaminate samples
- **Ideally surface sampling should only be conducted after all air samples have been collected**



SURFACE SAMPLES

	Swab	Tape
Turnaround time	Quick turnaround time	Quick turnaround time
Testing area	Large composite areas can be tested	Limited to tape surface area
Durability	Compact and rugged	Can break
Shelf life	Limited shelf life	Unlimited shelf life
Contamination potential	Inherently aseptic	More likely to be contaminated



Sample this.

Suspect Mold

Swab surface sample

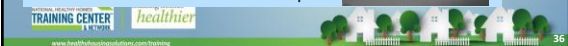
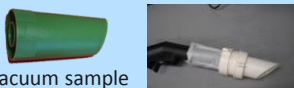


Tape surface sample



Dust mites

Vacuum sample



Question 2: How do I select and use the right tool or

Vacuum sampling for dust mites

Basic steps*

1. Locate area to sample
2. Plug in **HEPA Filtered** vacuum
3. Connect nozzle and insert/attach filter sleeve
4. Tilt the nozzle/vacuum attachment during collection and cover selected area twice.
5. Remove the filter sleeve / fold to trap dust inside
6. Label samples and record data.
7. Record Collection Data.
8. Ship sample to laboratory for testing.

* **These basic steps do NOT take into account many additional instructions you would need to follow.**



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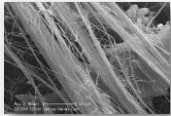
Question 2: How do I select and use the right tool or sampling method?

Know your limitations.



Wipe sampling for lead

Homeowners should have qualified lead inspectors or lead risk assessors evaluate and test a home for lead.



Asbestos

Bulk sampling

Only trained and certified asbestos professionals should take asbestos samples.






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Question 3: What will my data look like?






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Question 3: What will my data look like?


Combustible gas meter    50% LEL
 sound light Level


Vapor generator / smoke stick  Direction of air flow


Carbon monoxide detector  Parts per million



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Question 3: What will my data look like?

Thermo-hygrometer (Portable psychrometer)  Air Temperature
 % Relative humidity


Infrared thermometer  Surface Temperature



Moisture meter  Level of moisture in wood and drywall

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Question 3: What will my data look like?

Unit	Unit abbreviation	Hazard
parts per million	ppm	carbon monoxide
parts per billion	ppb	nitrogen dioxide, formaldehyde
micrograms per gram	µg/g	dust mite
micrograms per gram or units per gram	µg/g or U/gram	cockroach allergen
milligram per liter	mg/L	lead in water
micrograms per deciliter	µg/dL	lead in blood
milligram per kilogram	mg/Kg	Lead in soil
picocuries per liter	pCi/L	radon
micrograms per cubic meter	µm/m3	particulate matter 2.5
nanometer	Nm	Chemicals in the air



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Question 3: What will my data look like?

Units for fungal spores:

- Surface or swab samples
- Rank or score
- CFUs = Colony Forming Units

Units for allergens:

- Micrograms per gram = μ /g
- Units per gram = U/g



Question 3: What will my data look like?

Examples in your binder

- ◆ Quality Control Checks
- ◆ Maintenance and service log
- ◆ Quantitative measurement from data log
- ◆ Laboratory sample analysis report



**Question 4:
How do I connect my
results to evidence-based
practice?**



Question 4: How do I connect my results to evidence-based practice?

Hazard	Health standards
Carbon monoxide	Average level should not be above 6 parts per million.
	Maximum level in a 15 minute period should not be above 87 parts per million.
Radon	Level should not be above 4 picocuries per liter of air.

Health standards also exist for:

- formaldehyde,
- carbon dioxide and nitrogen dioxide,
- indoor particulate matter, and
- dust mite, cat, mouse and cockroach allergen levels.

See the list of Advanced Quantitative Measurement Tools



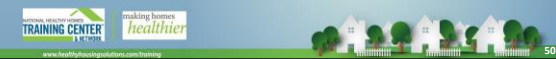
Question 4: How do I connect my results to evidence-based practice?

Dampness and Mold

The relationship between dampness, mold exposure and health effects cannot be quantified precisely.

There are no quantitative health-based guidelines or thresholds that can be recommended for acceptable levels of contamination with mold.

World Health Organization's Guidelines for Indoor Air Quality, Dampness and Mould, © World Health Organization 2009

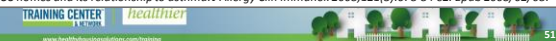


Question 4: How do I connect my results to evidence-based practice?

Allergens

Environmental Allergen	Published Threshold (µg/g)
Dust Mite (Der p 1)	2
Dust Mite (der f 1)	2
Cat (fel d 1)	8
Dog (Can f 1)	10
German Cockroach (Bla g 1)	2 U/gram
German Cockroach (Bla g 2)	0.04
Mouse (Mus m 1)	1.6

Salo PM, Arbes SJ, Jr, Crockett PW, Thorne PS, Cohn RD, Zeldin DC. Exposure to multiple indoor allergens in US homes and its relationship to asthma. J Allergy Clin Immunol. 2008;121(3):678-84 e2. Epub 2008/02/08.



CASE STUDY – THE ORLOVS ARE BACK PART 2

- Review the case study details as necessary.
- Fill out the form for this exercise to:
 - State whether you would use quantitative measurement for this case,
 - If yes, identify the quantitative assessment tool you would use,
- Small groups report back to class.