The Effectiveness Of Mold Treatments On The Post Katrina Gulf Coast

The Preliminary Findings of the Hope VI Experiment, Biloxi, Mississippi, 2006

History

- Taken directly from the proposal:

  "The post-Katrina landscape had a scope and abundance of mold growth that mold abatement experts had never seen before. The large-scale response to this problem was historically slow. Due to lack of research data, governments and major non-profit organizations have balked at devoting resources, conducting inspections, and assuming liability for the mold issue."

- The purpose of the Hope VI Experiment, as explicitly stated in the study proposal, is to **"identify the effectiveness of 4 mold removal methods being used on houses affected by Hurricane Katrina and to determine cost effectiveness and efficiency of the various processes."**
- The following presentation outlines the preliminary findings of the study, and concludes with a recommendation.

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4 Processes, Varying Levels of Time, Labor, and Expenses

- 1) **Hands On Network** Cleanup Recommendations
- 2) **Kolopro** Mold Systems & Solutions Chemical-Free, Anti-Static Mold Treatment
- 3) **Mississippi Department of Health** Recommendations
- 4) **LSU** Recommendations for Mold Cleanup

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- Process recommended to Hands On over the Fall of 2005 by various mold professionals.
- Considerable visible scoring success in the field. 4 Step Process.

Step 1: Grinding and Scraping

-Purpose: To physically remove visible, living mold as well as invisible spores from the wood.

-Procedure: Scrape mold off all surfaces of house using wire brushes and angle grinders

Step 2: Vacuuming

-Purpose: To physically remove dislodged spores from the house

-Procedure: Use a vacuum equipped with a HEPA filter to vacuum every surface in the house

Step 3: Wiping

-Purpose: To collect any spores that were not removed by vacuuming or grinding and scraping, and remove from the house

-Procedure: Using a rag that has been dampened with an ammonia-based sanitizing solution, hand-wipe every surface in the house

Step 4: Sealing

-Purpose: To create a surface that inhibits future mold growth

-Procedure: Using a paint primer, paint every wood surface in the house.

Kolopro Mold Systems

- Chemical-free, anti-static method of fogging as an alternative for people with multiple-chemical sensitivities
  - Specifically, use of **trisodium phosphate** derivative that **polymerizes surfaces with a dry encapsulating film** via fog application, debilitating mold membranes on a microscopic level and retarding further growth
- Chemical is applied by fog machines, approximately 10 minutes per room in the building, with appropriate ventilation via fans.
- After fogging is complete, visible mold wiped off with Kolopro Solution

Mississippi Department of Health Recommendations

- Removal of Moldy Materials
- Soap Cleanup
  - Non-ammonia soap or detergent, in hot water, scrub the entire area affected by mold. Use stiff brush on block walls and uneven surfaces
- Disinfection
  - Use solution of 10% household bleach

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LSU Recommendations for Mold Cleanup

- Clean and Disinfect
  - "Cleaning should remove, not just kill, the mold, because dead spores can still cause health problems."
  - "Disinfect wall cavities and other materials after cleaning"
- Consider Borate Treatment
  - "Having a professional pest control applicator apply a borate treatment to wood framing can provide resistance to termites, decay and mold."
  - ReddPest Solutions contracted to apply Boracare with MoldCare to wood following cleaning/disinfecting

Pre-Experimental Considerations?

- Weather Conditions
  - Weather conditions on given days were qualitatively assessed. A record of temperature and humidity inside and outside units was kept.
- Documentation
  - Before & After Pictures of Every Building Were Retained
- The **Main Idea**
  - The thrust of the Hope VI experiment is based around the idea of volunteer, non-skilled mold removal, and all results should be interpreted with that facet in mind.

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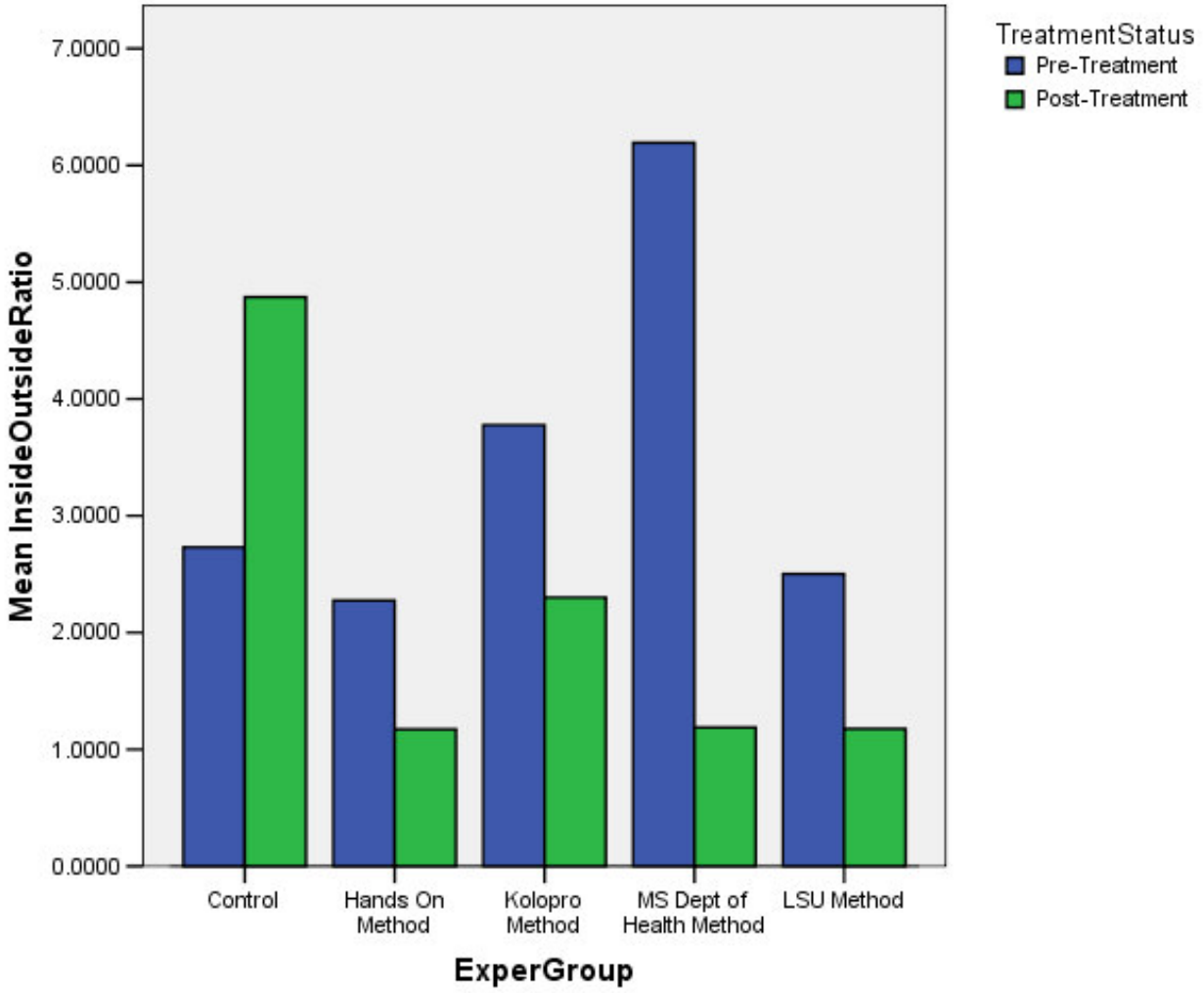
More Pre-Experiment Facts

- 51 Buildings with 1, 2, or 4 housing units
- All buildings homogeneously prepared for mold removal by the BHA and HOGC interiors crews
- Each building randomly assigned to one of four experimental groups or a control group
- Post-experiment, control buildings and fail buildings would be treated by the most successful method

Non-viable Air Samples

- Collected using a Zefon^{tm} Bio-Pump, calibrated to collect 75 Liter air flow sample into a slit-impaction sampling device
- Air samples analyzed at Envrionmental Microbiology Laboratory, Inc.
- Outside air samples necessary in order to compare inside to outside spore counts
  - Spore counts vary by day, therefore environmental relativity is crucial for determining scoring
- In fully mucked post-Katrina homes built in 2004-2005, an inside to outside ratio of 1 or less is ideal.

Mean Inside/Outside Counts



	Pre-	Post-
Control	**2.73**	**4.87**
Hands On	**2.28**	**1.17**
Kolo-pro	**3.78**	**2.30**
MS Dept. of Hlth.	**6.19**	**1.19**
LSU	**2.50**	**1.17**

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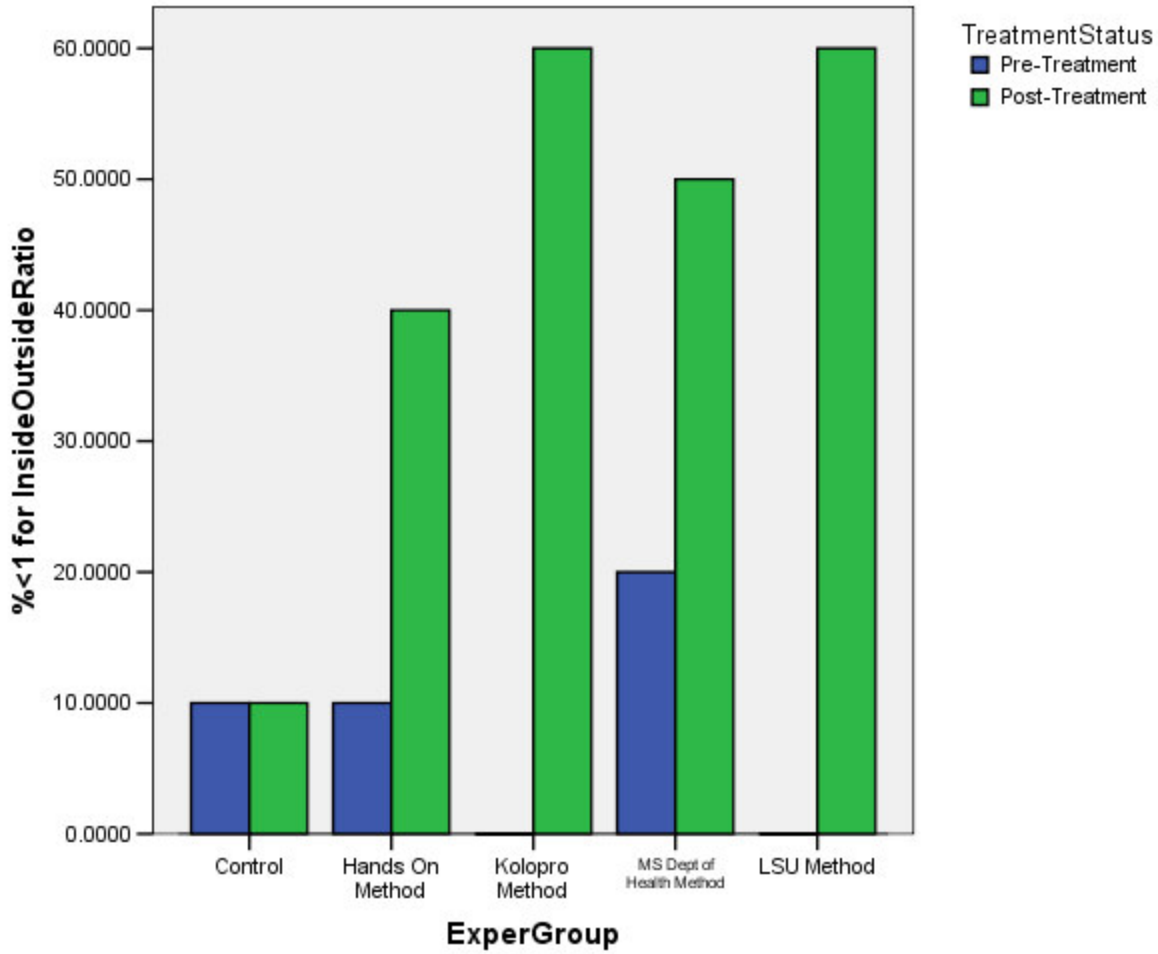
Of Pass Buildings



	Pre-	Post-
Control	10%	10%
Hands On	10%	40%
Kolo-pro	0%	60%
MS Dept. of Hlth.	20%	50%
LSU	0%	60%

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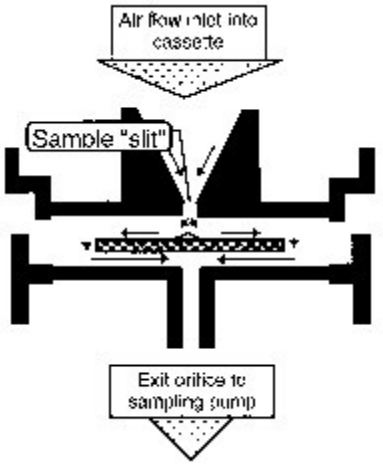
What Does This Mean?

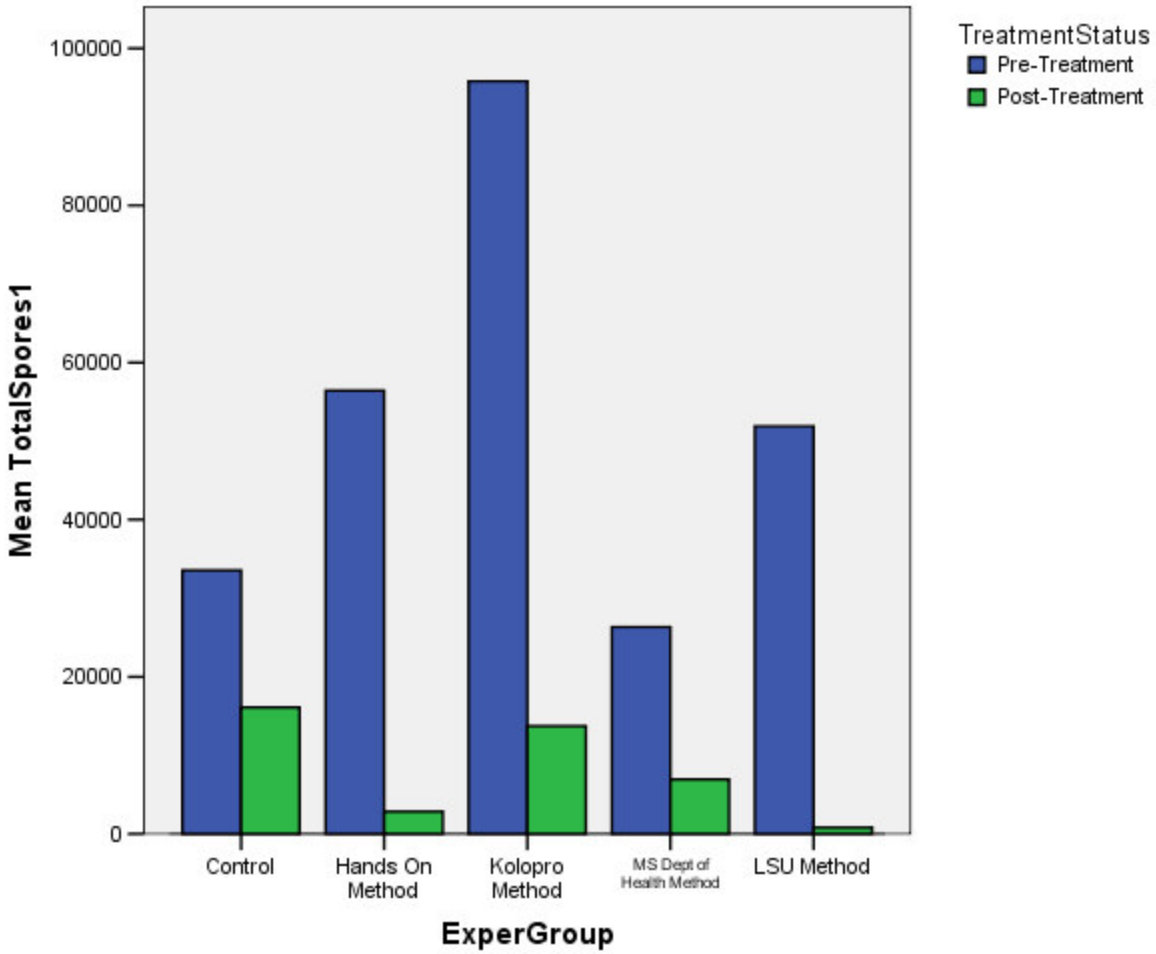
- The air samples were *non-viable*, meaning that the spore traps did not distinguish between live and dead spores
- Therefore, spore traps are a snapshot of post-remediation counts at a given moment
- Information needs to be considered along with *viable* sampling methods to predict sustainability of remediation…



Viable Mold Sampling

- In contrast to air sampling and tape lifts, fungal culture swabs provided information on the number of colony-forming units (or CFUs) that remained on pre-determined areas of growth after remediation.
- Results on these samples is much more indicative

Mean Number of CFUs



	Pre-	Post-
Control	33,541	16,107
Hands On	56,438	3,528
Kolo-pro	95,814	13,720
MS Dept. of Hlth.	26,345	6,948
LSU	51,893	809

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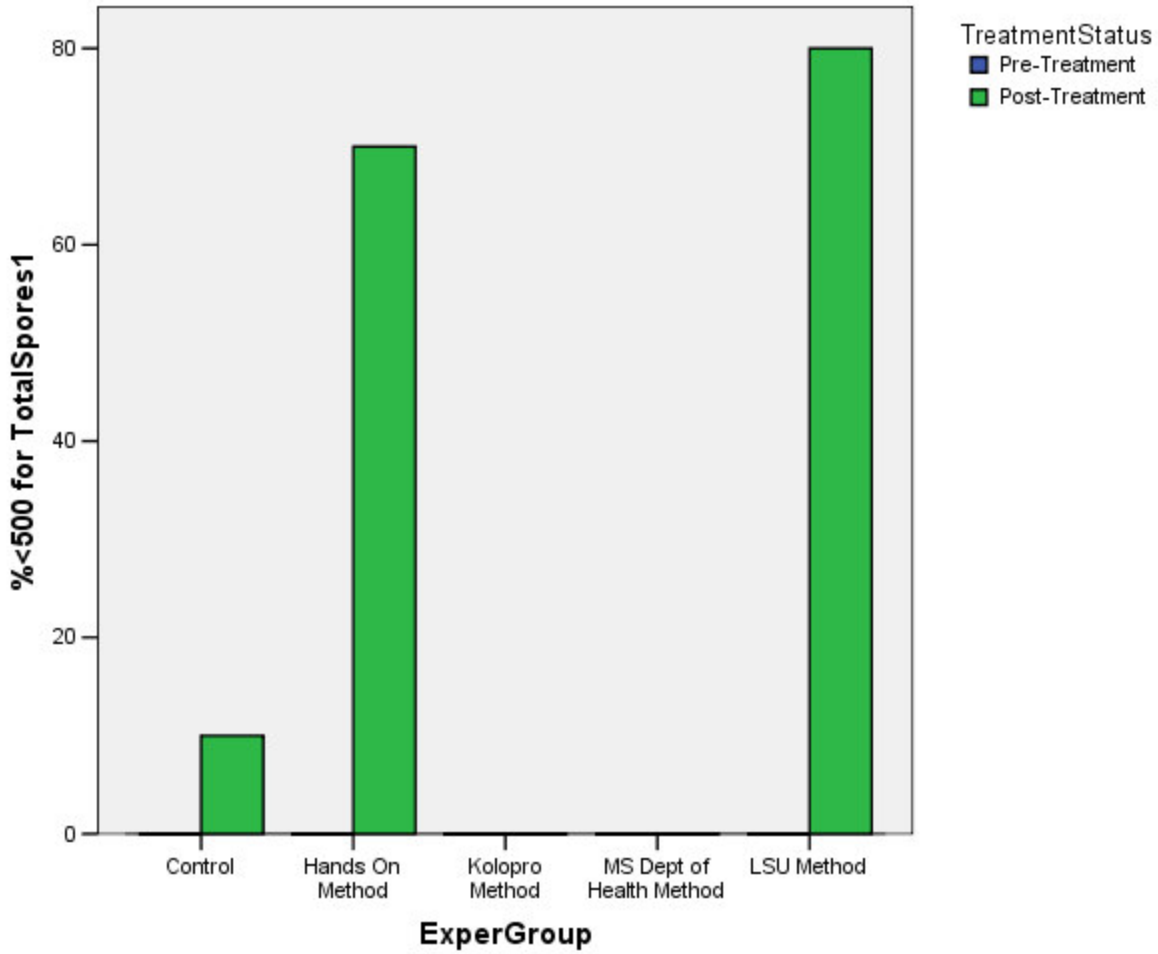
Percent of Buildings With 500 CFUs or Less



	Pre-	Post-
Control	**0%**	**10%**
Hands On	**0%**	**70%**
Kolo-pro	**0%**	**0%**
MS Dept. of Hlth.	**0%**	**0%**
LSU	**0%**	**80%**

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Tape Lifts

- Additional non-viable tests were taken utilizing direct microscopic examination methods
- EMLab Scoring Method

<1+ → Very Light Growth

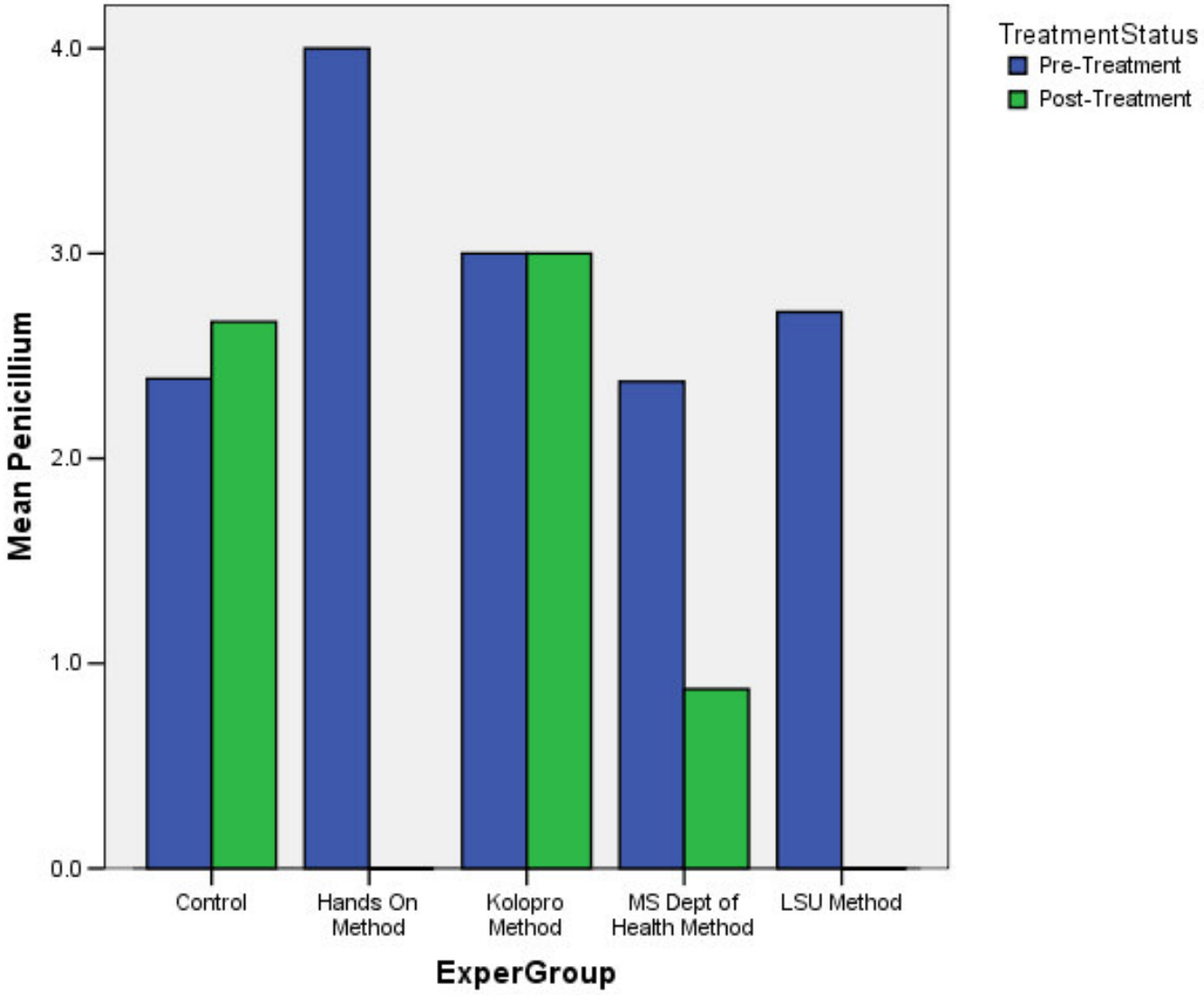
1+ → Light Growth

2+ → Moderate Growth

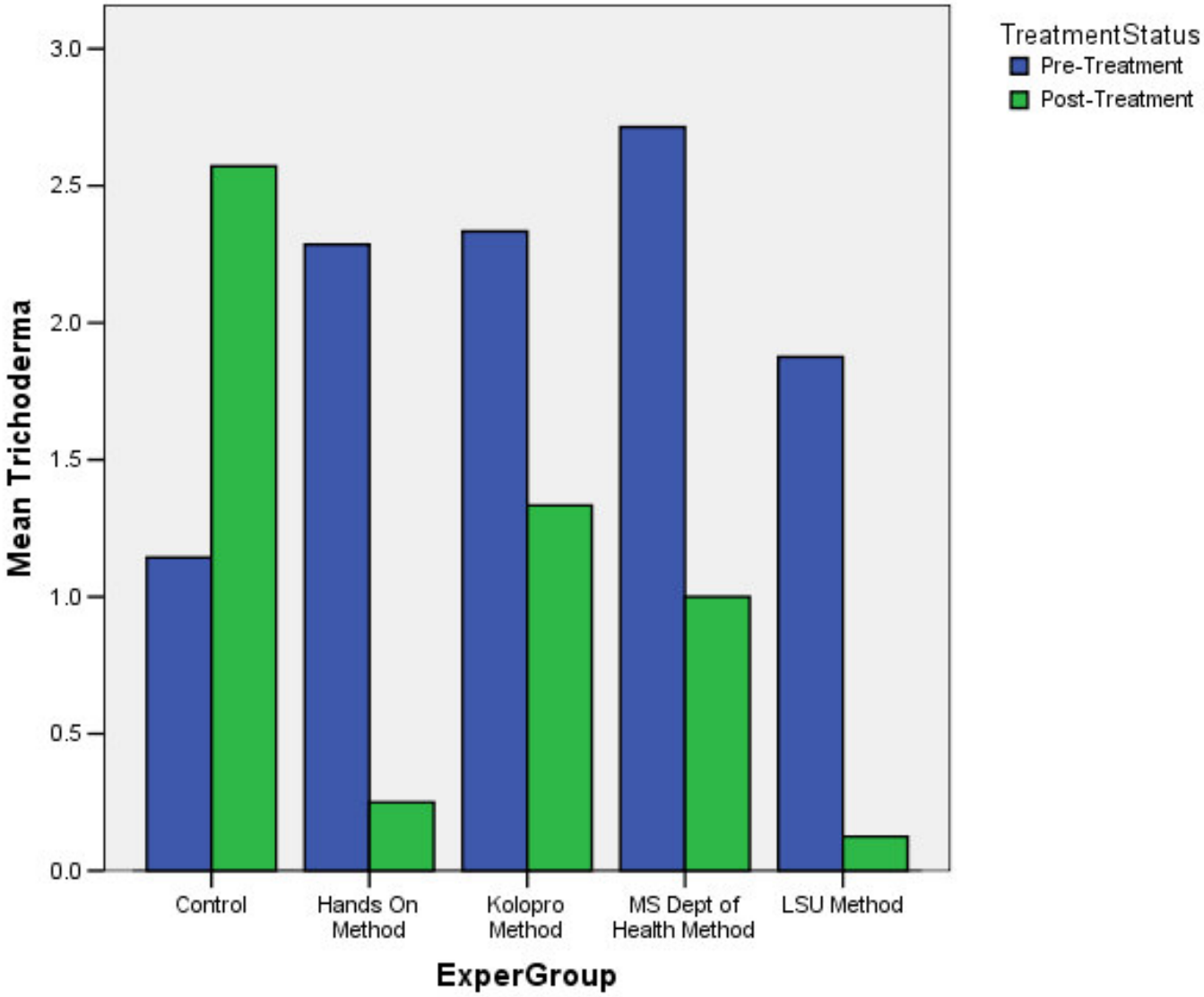
3+ → Heavy Growth

4+ → Very Heavy Growth

Mean Visibility Scoring of Penicillium



Mean Visibility Scoring of Trichoderma



Conclusions

- Bleach and Fog proved erratic in their effectiveness; some houses hugely successful, most huge failures
- Much more successful were wire-brushing and non-ammonia sanitization, followed by either Kilz or Boracare
- Boracare's advantages:
  - Three times as effective at viable CFU reduction as Kilz
  - Is highly soluble, penetrates wood to eradicate internal fungal rot that Kilz can't reach
  - As a sealant, Kilz can incubate moisture in wood, accelerating rot issues and leading to structural failure
- Boracare's disadvantages:
  - Varied state-by-state pesticide application laws create additional step for relief groups desiring to apply Boracare with Moldcare
  - Cost and accessibility…

Cost/Benefit Analysis

- Costs of process are <u>equivalent</u> for Hands On method and LSU method **<u>up to sealant application.</u>**
- Cost Comparison for Sealant:

Product	Retail Cost per Gallon	Cost for 4,000 sq. ft.
Kilz 2 Latex Paint Primer	$39.46	$157.84
Boracare Pesticide Application	$83.75	$418.75

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Conclusions

- In the situation of immediate disaster response, **Boracare** with **Moldcare** is the most effective long-term solution for mold abatement
- However, given cost constraints and attainability of product, **Hands On**'s process using a latex paint sealant is a viable alternative for remediation
- In either case, the **MS Department of Health** and **Kolopro** methods of mold remediation are not effective alternatives.
- If there are any additional inquiries, please direct to Guillermo Olivos, Primary Investigator.

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