

Topic	Evaluation of the 24-hour Pseudalert* test versus Standard Methods ¹ 9213F and 9213E for the detection of <i>Pseudomonas aeruginosa</i> in both public and private spa water samples
Title	Poster title: “Incidence of <i>Pseudomonas aeruginosa</i> in Private Spa Water”
Author(s)	Nancy Hall, Cathy Lord, John Kempf, Carrie Lueck, Cindy Rieflin, and Karen Owens; State Hygienic Laboratory, University of Iowa Research Park, Iowa City, IA 52242
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Highlights:

- Twelve public spas from the Scott County area were tested in parallel by both new and current methods; additionally, 65 private individuals submitted water samples from their private spas.
- Spa chemistry information (e.g. total chlorine/bromine, pH) was obtained at time of collection.
- For the public spa study there was only one positive *Pseudomonas aeruginosa* sample (1/12 or 8%) but for the private spa study there were significantly more positives (41/65 or 63%).
- The Pseudalert test was comparable to the *Standard Method* tests, demonstrating very low false positive and negative results with a sensitivity and specificity of 95.4% and 100%, respectively.
- 56% of samples with unacceptable chemistry levels and 4 % of samples with acceptable chemistry levels were positive for *Pseudomonas aeruginosa*. This has led the authors to both recommend public health intervention and develop strategies for spa waters.

1. *Standard Methods for the Examination of Water and Wastewater*, 21st Ed, 2005, APHA, AWWA & WEF, Washington, DC

* Pseudalert is a trademarks or registered trademark of IDEXX Laboratories, Inc. or its affiliates in the United States and/or other countries



Incidence of *Pseudomonas aeruginosa* in Private Spa Water

Nancy Hall, Cathy Lord, John Kempf, Carrie Lueck, Cindy Rieflin, and Karen Owens
State Hygienic Laboratory, University of Iowa Research Park, Iowa City, IA 52242

Abstract

Background: *Pseudomonas aeruginosa* spa testing is a good indicator of overall spa maintenance. If this organism is present in the water, there is a potential health risk for the bather including skin rash or other complications. Public spa facilities are required by state law to collect a monthly water sample but privately-owned spas/whirlpools are NOT required to test their water for this organism.

Purpose: The original purpose of this study was to validate a faster *Pseudomonas aeruginosa* method (24-hr versus the current 48 to 96-hr test) that recently became available. The results not only demonstrated that the two methods were comparable but revealed a larger public health problem; that many private spa waters are positive for *Pseudomonas aeruginosa* indicating poor maintenance procedures and potential health hazard. This poster will hopefully start the dialog among the public health community as to how we can successfully address this problem and offer possible solutions and educational opportunities to the private sector and spa dealerships.

Introduction

In 2010 the State Hygienic Laboratory (SHL) participated in a method validation study of a new 24-hr *Pseudomonas aeruginosa* test called Pseudalert™ (IDEXX Laboratories, Inc., Westbrook, ME). The overall objective of this trial was to compare the performance of the new method to the current Standard Methods for the detection and quantification of *P. aeruginosa* in spa water samples. Twelve public spas from the Scott County area were tested in parallel by both new and current methods. Since more spa samples were needed for this study, a mass email was sent to University of Iowa faculty and staff asking for their participation. Sixty-five private individuals submitted water samples from their private spas for *Pseudomonas* testing. Some spa chemistry information (e.g. total chlorine/bromine, pH) was obtained at time of collection.

Methods

The three *Pseudomonas aeruginosa* methods performed in this study were the following: current SHL presence/absence test (Standard Method 9213F) performed on the public spa samples, membrane filter (MF) test (Standard Method 9213E) performed on the private spa samples, and the new Pseudalert™ test performed on both sample sets.

Results

Method Comparison: The combined results of the new Pseudalert™ method and the two Standard Methods (both public and private spa sample set) are given in Table 1. The Pseudalert™ method was comparable to the Standard Method tests by demonstrating very low false positive and negative results with a sensitivity and specificity of 95.4% and 100%, respectively.

***Pseudomonas* and Spa Chemistry Results:** For the public spa study there was only one positive *Pseudomonas aeruginosa* sample (1/12 or 8%) but for the private spa study there were significantly more positives; 41/65 or 63% as shown in Table 2. Twelve private spa samples also had mold present on the MF plate (with or without *Pseudomonas*) which also indicated unsanitary conditions. A high percentage of private positive *Pseudomonas* samples (56%) had “not acceptable” chemistry levels while only 4 (9%) samples had acceptable chemistries (using the preferred operating pH and chlorine/bromine levels stated in the Iowa regulations (IAC 641-15) for public spas). When the spa chemistry was “not acceptable,” it was primarily the chlorine/bromine levels that were out of range (Figure 1). It is not clear from the information provided whether some spas were using additional or other disinfection technologies such as silver-copper ionization, ozone, or UV at the time of sample collection.

Table 1. Pseudalert™ and Both Standard Methods Result Summary

	Pseudalert POSITIVE	Pseudalert NEGATIVE	Totals
Standard Methods POSITIVE	42	0	42
Standard Methods NEGATIVE	2*	33	35
Totals	44	33	77

*Two samples SM 9213E only

Sensitivity = 42/44 = 95.4%
Specificity = 33/33 = 100%

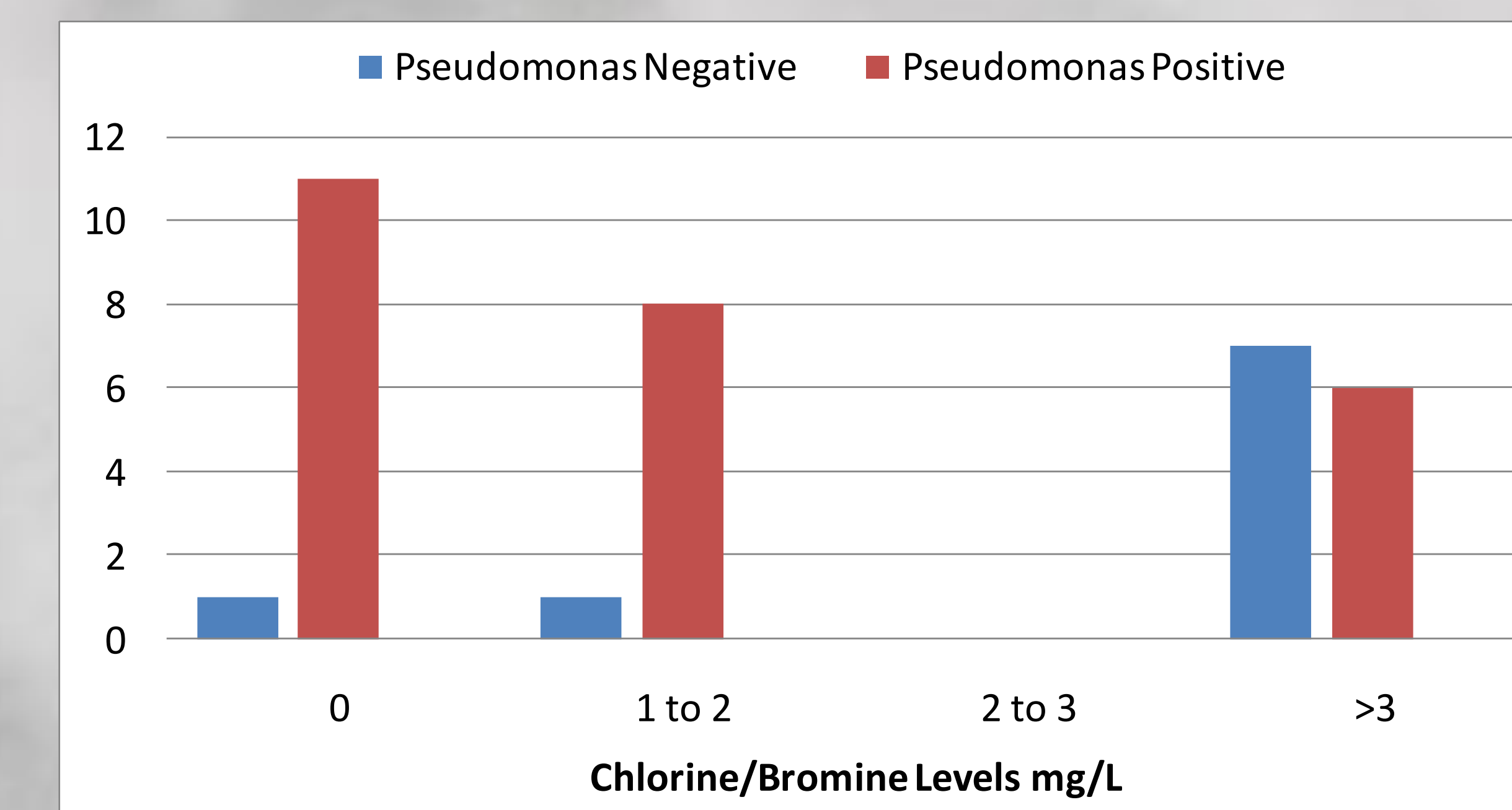
PPV = 42/42 = 100%
NPV = 33/35 = 94.3%

Table 2. Private Spa *Pseudomonas* and Chemistry Results

<i>Pseudomonas</i> Results	Total	Acceptable Chemistries	Not Acceptable Chemistries*	No Chemistry information provided
Positive	41 (63%)	4	23 (56%)	14
Negative	24 (37%)	4	5	15

*Not Acceptable Spa Chemistries: either chlorine/bromine <2 mg/L OR pH <7.2.

Figure 1: Private Spa Chlorine/Bromine Levels for *Pseudomonas* Positive and Negative Samples



Discussion

- The public health community needs to address this public health problem and develop strategies to reduce the high incidence of *Pseudomonas* in private spa water.
- Possible public health strategies include the following:
 - Recommend routine *Pseudomonas aeruginosa* monitoring for private spas
 - Recommend testing should be done within the first month of operation and at least quarterly thereafter (or more frequently as necessary) to check effectiveness of spa sanitation practices
 - Develop educational brochures and seminars for private individuals AND spa dealers regarding proper spa maintenance

Conclusions

- The new Pseudalert™ test by IDEXX Laboratories was comparable to current Standard Methods for *Pseudomonas aeruginosa* testing in both public and private spa samples.
- This study demonstrated a high percentage (63%) of positive *Pseudomonas aeruginosa* private spa samples that may pose a health risk to bathers.
- Based on the high incidence of *Pseudomonas aeruginosa* in private spa water, a public health intervention is needed and strategies should be developed.

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