

Examining Credentialing Criteria and Poor Performance Indicators for IROC Houston's Anthropomorphic Head and Neck Phantom

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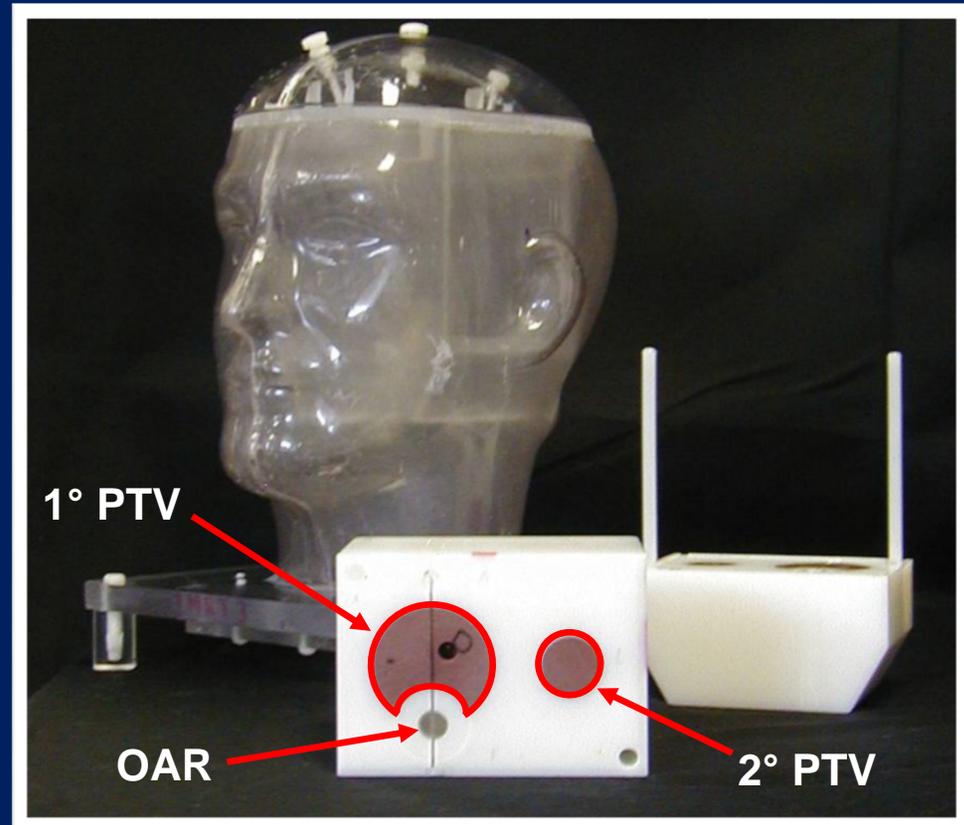
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Graduate School of Biomedical Sciences

Outline

- Background
- Methods
- New Results
- Summary



IMRT H&N Phantom

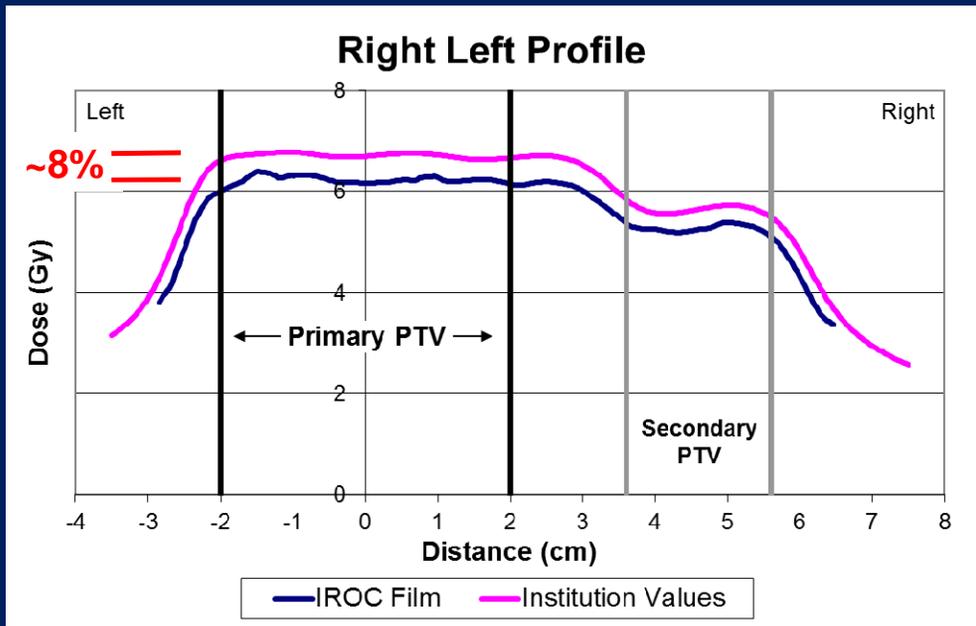
Background

- IMRT H&N phantom used in credentialing for NCI-sponsored clinical trials since 2001
- Pass rate climbed from initial 66% in 2001 to 88.5% in 2012*
- Phantom failures still occur (even with current 7% criteria)
- We were interested in delineating the types of errors experienced and determining the feasibility of tightening criteria

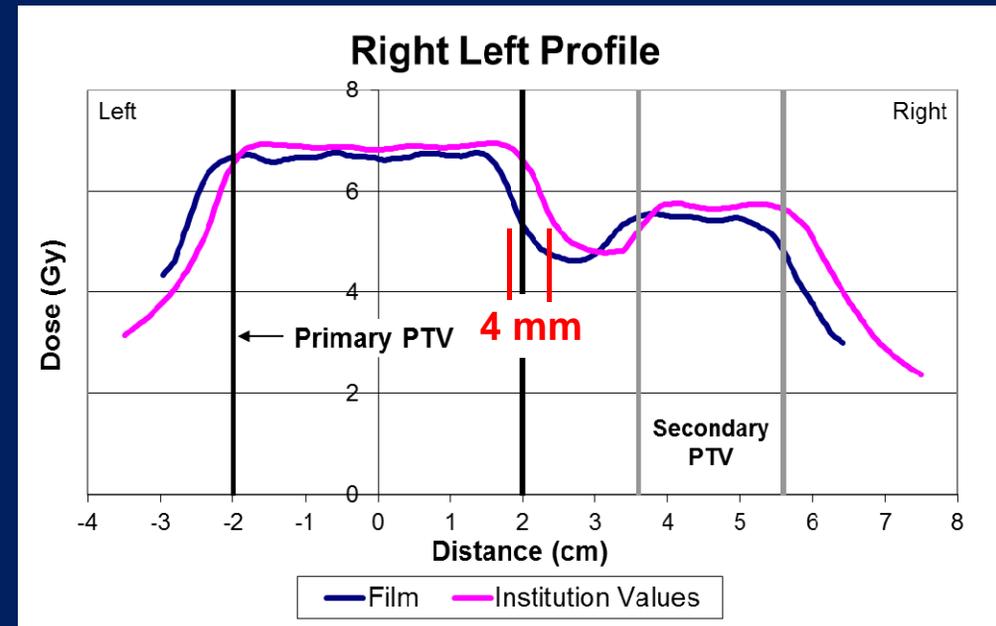
Methods

- 156 phantom irradiations (Nov. 2014 – Oct. 2015) were evaluated using the following criteria:
 - 7% TLD and 7%/4 mm (Current)
 - 5% TLD and 5%/4 mm
 - 5% TLD and 5%/3 mm
 - 4% TLD and 4%/4 mm
 - 3% TLD and 3%/3 mm
- Phantom failures were categorized qualitatively as:
 - Systematic errors
 - Setup errors
 - Global (nonsystematic) errors
 - Local (single-point) errors.

Failing phantom categorizations

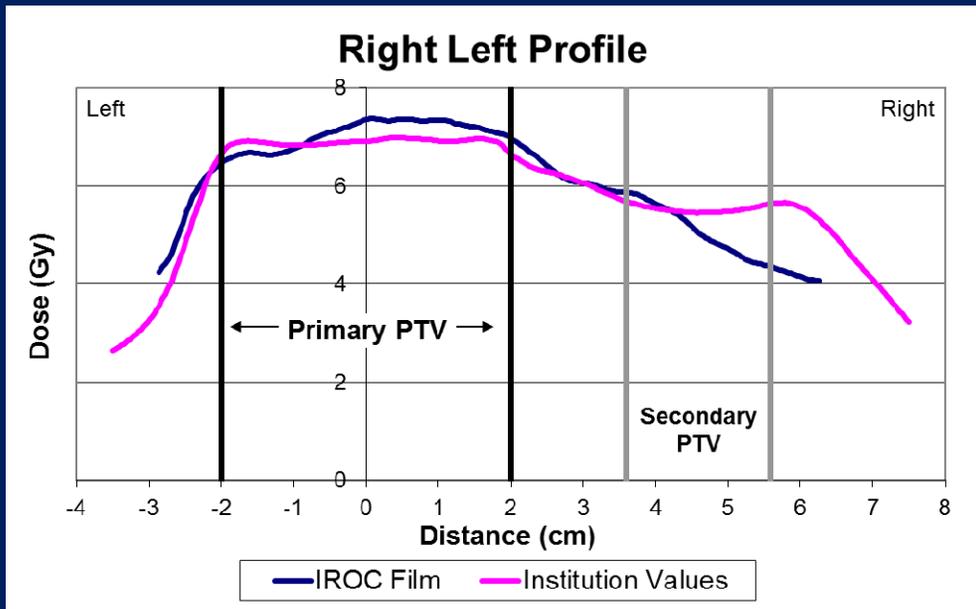


Systematic under-dose

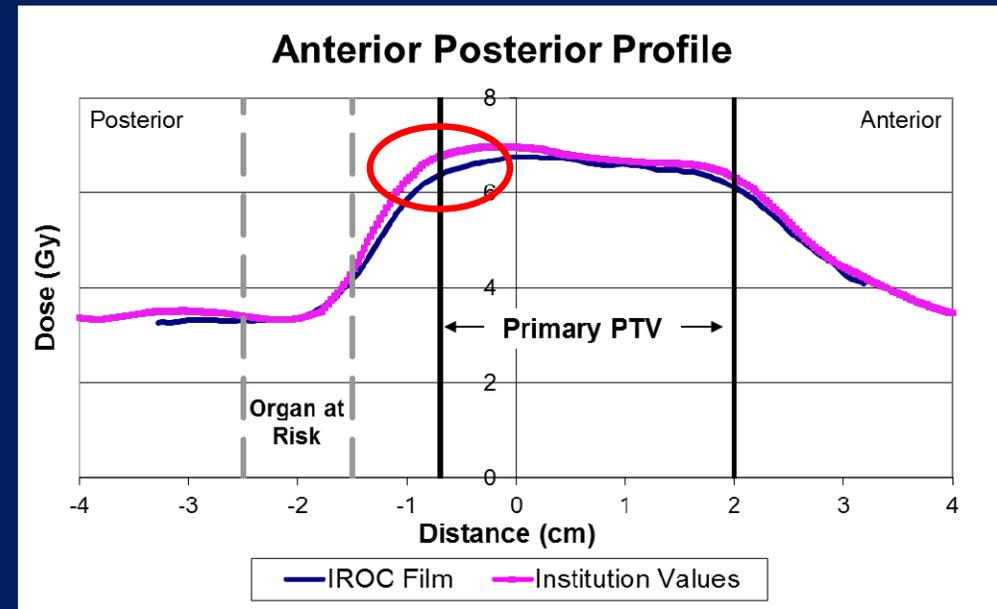


Setup error

Failing phantom categorizations



Global error



Local error

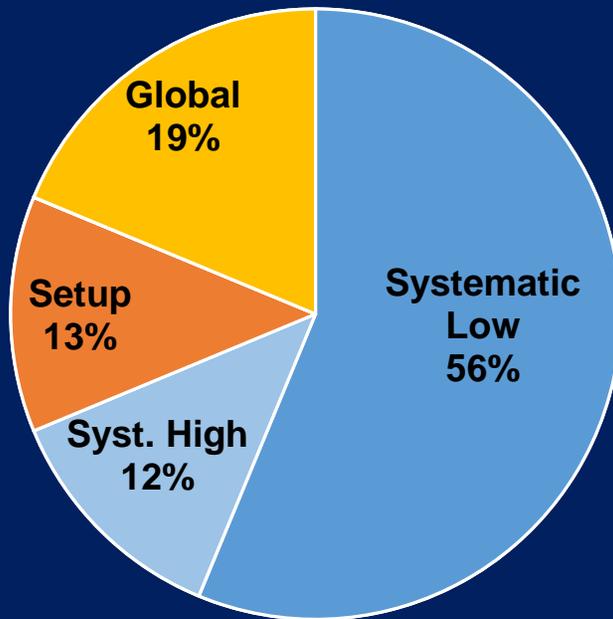
Results

Table 1: Institutional percentage pass rates for overall and individual criteria

Criteria	Overall pass	TLD pass	Gamma pass
7% TLD, 7%/4 mm	90	93	92
5% TLD, 5%/4 mm	77	80	86
5% TLD, 5%/3 mm	70	80	75
4% TLD, 4%/4 mm	63	67	79
3% TLD, 3%/3 mm	37	49	48

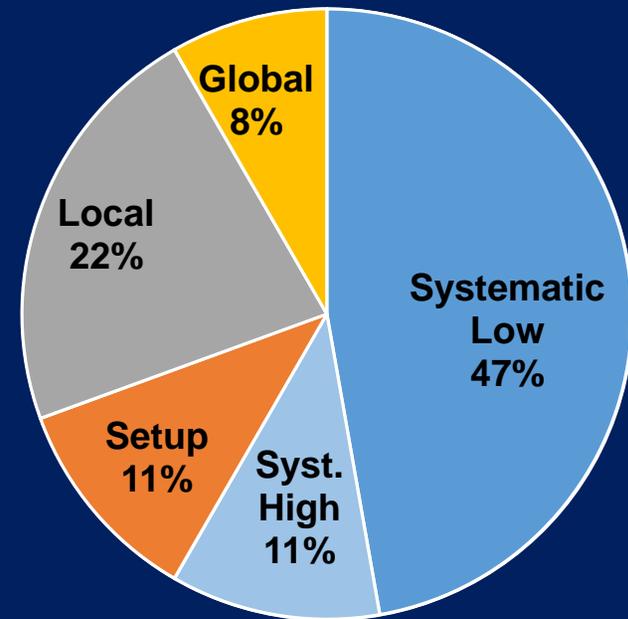
Results – Causes of Failure

7%/4mm Criteria



N = 16

5%/4mm Criteria



N = 36

Summary

- Most detectable errors are systematic and dosimetric (~60%)
 - Systematically low (~50% of all phantom failures)
- 5%/4 mm criteria are theoretically and practically achievable (77%)
 - 0.5% chance of failure caused by TLD uncertainty at 5% threshold
- Further work is warranted to better determine the cause of continuing errors in phantom credentialing

Thank you!



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