Beyond the Usual Suspects in Invasive Mold Infections: Public Health Surveillance Identifies Clinical Diversity

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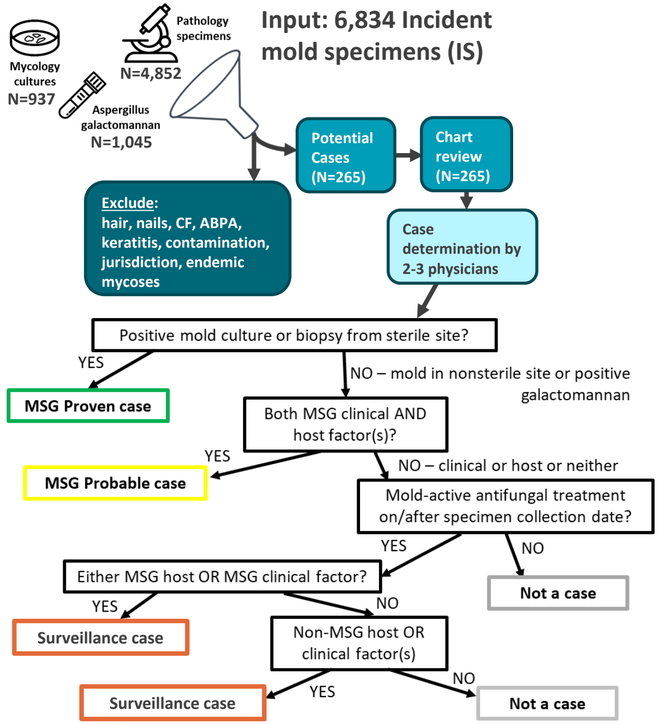
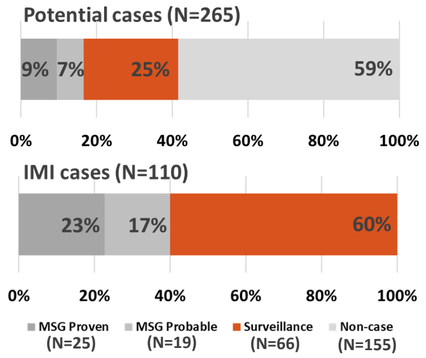
Invasive mold infections (IMI) are often fatal, and cause outbreaks: Good surveillance is critical

The established case definition, Mycoses Study Group (MSG/EORTC) criteria, lacks sensitivity. We describe cases identified during February 2017–August 2019 through a pilot IMI surveillance system in Atlanta, comparing the MSG criteria with a novel, more sensitive surveillance case definition.



Majority of cases were classified as surveillance, not MSG



Surveillance cases include infections with a diversity of presentation, and patients treated with antifungals but less clearly invasive disease

- 4 had invasive burn wound infections
- 52 (79%) had no cancer or transplant in the prior year
- 31 (47%) had case determinations of invasive pulmonary aspergillosis, without meeting MSG criteria
- 7 (11%) lacked classically invasive diagnoses (aspergilloma, allergic sinusitis, colonization), but met the surveillance case definition
- 37 (56%) had a fungal ICD-10 diagnosis code
- 2 represented possible influenza-associated pulmonary aspergillosis (IAPA)

			MSG Proven (N=25)	MSG Probable (N=19)	Surveillance (N=66)	Non-case (N=155)	Total (N=265)
Demographics		Female	32%	21%	38%	41%	38%
		Age >60	32%	37%	58%	54%	51%
		White	24%	32%	42%	45%	41%
		Black	64%	53%	52%	44%	48%
Laboratory	Incident specimen site	Pulmonary	36%	47%	58%	57%	54%
		Other (e.g. blood, serum, fluids)	24%	42%	20%	10%	16%
		Sinus	24%	11%	9%	15%	14%
		Cutaneous	4%	0%	9%	17%	12%
		CNS	12%	0%	5%	1%	3%
	Positive diagnostic	Fungal culture	76%	32%	70%	83%	75%
		Galactomannan (serum or BAL)	16%	68%	45%	10%	24%
		Histopathology	60%	16%	14%	10%	16%
Fungal ID		Other Aspergillus sp.*	28%	63%	44%	26%	34%
		Aspergillus fumigatus	24%	16%	29%	29%	28%
		Other mold	32%	11%	8%	18%	16%
		Fusarium sp.	4%	0%	6%	4%	4%
		Paecilomyces sp.	0%	0%	5%	5%	4%
		Penicillium sp.	4%	0%	0%	5%	3%
		Mucormycete mold	8%	5%	3%	1%	3%
Clinical course		Any radiologic abnormality	84%	100%	76%	61%	69%
		Hospitalized in 60d after IS**	88%	95%	80%	46%	62%
		Pulmonary signs/symptoms	44%	47%	58%	55%	54%
		Any fungal ICD code	68%	79%	56%	4%	28%
		Sinonasal or facial signs/symptoms	24%	11%	9%	15%	14%
		Skin lesion or abnormality	8%	0%	8%	17%	12%
		Visual or ocular signs/symptoms	4%	0%	5%	1%	2%
Clinical history		Pulmonary disease	28%	47%	36%	41%	39%
		Recent surgery	28%	0%	12%	11%	12%
		Solid organ transplant	20%	11%	9%	3%	6%
		Hematologic cancer	12%	42%	5%	1%	6%
		Burn or tissue injury	12%	0%	8%	4%	5%
		Solid organ cancer	0%	0%	3%	6%	5%
		Stem cell transplant	4%	16%	6%	1%	3%
Treatment/ outcome		Antifungal treatment on or after IS	88%	100%	100%	8%	45%
		Corticosteroids in 90d before IS	60%	79%	56%	23%	39%
		Other Immunosuppressants in 90d before IS	40%	79%	41%	14%	28%
		Died <60d after IS, inpatients only	18%	16%	24%	5%	11%

*Other Aspergillus sp. Includes 47 (53%) potential cases with positive galactomannan and no culture;
**IS, incident specimen

So what?

- Of 110 IMI cases, most met the surveillance but not MSG/EORTC case definition
- Among hospitalized patients, mortality was greater among surveillance than MSG cases
- The surveillance definition captured diverse invasive disease presentations in patients lacking MSG host factors
- The surveillance definition also captured non-invasive cases treated with antifungals
- A less specific surveillance case definition that incorporates antifungal treatment may improve the sensitivity and utility of IMI public health surveillance

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