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# Phorids, Not Gnats: Ivermectin Treatment of Scuttle Fly Myiasis in a Tennessee Nursing Home Resident - A Case Report

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**Abstract**

**A well-cared-for, bedridden, and helpless 94-year-old female resident in a Tennessee nursing home experienced sudden, rapid weight loss, severe lethargy, and increasingly foul-smelling bed sores between late February and April 2022. By April 5, her modern, climate-controlled room became infested with small flies, initially identified as "gnats" by staff. Despite immediate pest control measures—removal of plants and food, spraying, sealing drains, and deploying insect traps—the infestation intensified, with hundreds of tiny flies spreading to other rooms by April 12. By April 13, the facility administration, out of options, considered isolating the patient. On April 14, her family identified the flies as parasitoid scuttle flies, *Megaselia scalaris* (Lowe, 1866) (Diptera: Phoridae), a species capable of human myiasis.**

**Following a literature review, a simple treatment protocol by Sayeed et al. (1) was administered on April 15 and 16, resulting in the complete elimination of *M. scalaris* within 3 days. The patient subsequently lived an additional 7 months with improved quality of life, awareness, appetite, and comfort, without further weight loss, progression of bedsores, or visible insect presence. Zevo insect traps remained in place for monitoring, and the patient received weekly ivermectin prophylaxis against further phorid myiasis and COVID-19, which was prevalent in the facility. Awareness of *M. scalaris* myiasis in vulnerable patients and effective treatment protocols remains limited among healthcare personnel across much of the United States.**

**Keywords**: Ivermectin, phorids, *Megaselia scalaris*, parasitoid, scuttle flies, gnats, elderly, incapacitated, fly larvae.

## Introduction

*Myiasis*

Myiasis is the infestation of living organisms by the parasitoid larvae of various species of flies (Diptera), which feed on or within the host, causing harm. (2) Most prevalent in tropical areas, myiasis can affect livestock, wild animals, pets, and occasionally, humans, (3) resulting in significant economic, agricultural, societal, and health impacts. This condition, caused by various fly species, is a growing problem, primarily in tropical and subtropical regions, including parts of Africa, Asia, South America, and some European countries, especially where sanitation is poor, or healthcare resources are limited. (4)

Reports of *M. scalaris* myiasis in humans are scattered but becoming increasingly recognized, with cases reported in Kuwait, (5) Trinidad, Egypt, Australia, India, Burma, (3) Saudi Arabia, (6) Iran, (7) and Thailand. (8) These case histories describe victims with open, often odorous wounds; those in traction from multiple fractures; with a strong smell of urine; in a comatose state; or elderly and frail. Adult flies may enter an orifice (mouth, nose, anus, urethra) or an open wound to lay their eggs. The hatching larvae consume parts of their host (**Figures 3-4**

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in Pallavi et al. [9]), then pupate and emerge as adult flies. Myiasis can affect both internal and external vulnerable areas of the body. (10)

In the United States, human myiasis remains underrecognized, with *M. scalaris* comprising as little as 2% of all reported myiasis cases compared to at least 17 other genera of myiasis-causing flies. (11) These minutes, fruit fly–sized phorid scuttle flies, as they are commonly known, can grow from a 0.5-mm egg to a 2- to 6-mm pale, voracious larva in as little as 72 hours. (12) The maturation time of the larvae appears to be influenced by whether they feed on living or dead matter. (13) *M. scalaris* requires an average of 25 days to develop from egg to adult, depending on temperature, food, and environmental conditions. (3,9,12,14) The adults are tiny, averaging 2-4 mm, with females being larger. (15) In their 3- to 4-week adult lifespan, females can lay between 42 and 749 eggs, with peak egg-laying occurring around day 17. (3)

Myiasis caused by *M. scalaris* is rarely reported in temperate regions. Although a few case histories of *M. scalaris* myiasis exist, (12,16) many healthcare facilities in the United States remain unaware of this threat to vulnerable patients.

For this case history, myiasis refers specifically to an infestation of a human by larvae of the *M. scalaris* phorid scuttle fly, occurring either externally or internally, and feeding on the host.

*Nosocomial*

A nosocomial condition is a medical issue acquired within a hospital or healthcare setting. While bacteria, fungi, or viruses are common causes, myiasis can also cause a nosocomial or home health issue. (5)

**Treatment**

On the night of April 14, 2022, the family conducted an urgent literature search to quickly identify the most effective treatment (1) for the patient's rapidly advancing myiasis. After the crisis was resolved, they discovered that, for many years, treatment options primarily consisted of only lavage with mixtures of turpentine, chloroform, iodine, xylocaine, chlorhexidine, along with occasional use of antibiotics and forceps removal of visible larvae. (2,12,17,18) The use of ivermectin as an effective treatment for human myiasis was first documented in the 1990s. (19,20) More recently, ivermectin, in combination with several other medications, has been used with significant success when managing myiasis in cases recognized outside of the United States. (1,7,10,21)

This report describes the case of an extremely frail, bedridden 94-year-old patient in Tennessee who, despite attentive family support, a full-time private caregiver, and residence in a modern, well-staffed nursing facility, fell victim to myiasis caused by *M. scalaris.* This account highlights the family's successful intervention in eliminating the infestation.

**Methods**

On April 5, 2022, the patient's family alerted the care facility staff to the growing problem of small flies in the patient's normally pristine room. By April 6, all plants and food were removed. Professional pest control treated the room on April 7 and again on April 12. On April 8, the drains were sprayed and taped shut to help control the infestation.

Zevo flying insect trap plug-ins (Procter & Gamble), which use UV light and sticky film to capture airborne insects, were placed by the patient's bed and on the opposite wall starting April 12. The traps were left on continuously to sample the flying insects in the room (**Figure 1**). Honey pots, fly strips, and sticky tape were also initially placed. After myiasis treatment concluded on April 16, the traps were monitored for further presence of *M. scalaris* over the next 6.5 months, until October 8, 2022 (**Figure 2**). Five *M. scalaris* vouchers were deposited at the Natural History Museum of Los Angeles County in California.

The ivermectin protocol was used to treat the patient for suspected *M. scalaris* myiasis: 6 mg of ivermectin for 2 days. (1) The pills were crushed and administered with ice cream on April 15 and April 16, 2022.

**Results**

Despite the immediate measures of pest control, spraying and taping drains, and removing all plants, waste, and food, the "gnats" only increased. Before the patient's treatment, the first Zevo trap filled entirely with *M. scalaris* within 48 hours (April 12-14); however, the room remained heavily infested with flying "gnats" (**Figure 1**). Following the placement of additional Zevo traps in mid-April, less effective, older-style fly traps were removed. Two days after completing the patient's treatment on April 16, *M. scalaris* adults were no longer visible. Two Zevo traps were replaced and subsequently checked 7 times, capturing 11 additional *M. scalaris* between May 1 and October 8, 2022, indicating a near-continuous, albeit very low, presence in the climate-controlled skilled nursing facility (**Figure 2**). The number of flies caught is shown in parentheses by date: April 12-16 (54, during infestation), May 27 (2), July 8 (2), August 30 (4), and October 8 (3).

The measured *M. scalaris* adults ranged in body length from 2 to 3 mm (n=20).
The ivermectin protocol (1) worked quickly, with the number of adult flying *M. scalaris* dropping sharply within 24 to 48 hours and disappearing entirely by the fourth day.

**Case history**

*Rapid decline*

Despite receiving excellent care in a high-end skilled nursing facility and support from a loving family, a frail, bedridden, diapered 94-year-old female nursing home resident experienced a sudden, extreme weight loss, dropping 20 pounds from 100 to 80 lb in February and March 2022. This occurred despite providing high-calorie supplements and soft foods, which family members or a private caregiver spoon-fed. From March to April 2022, there was a marked increase in the odor, number, and severity of the patient's pressure sores (**Figure 3**). The most severe pressure sore grew significantly in size, depth, and odor, measuring 5.2 x 3.4 x 2.7 cm (**Figure 3**). Over 4 days, it changed from odorless and pink to black and foul-smelling, with the odor detectable from the hallway. The patient was started on morphine that same week.
Staff and wound care specialists were alarmed at the dramatic decline of their patient, who had been stable, though gradually declining, over 4 years at the same facility. In addition to trained staff, the patient received daily specialized wound care for minor pressure sores, and a personal sitter spent hours each day hand-feeding her and ensuring strict cleanliness. The patient, who had been in diapers for several years, had moderate to advanced dementia with occasional moments of lucidity, yet recognized her family and beloved sitter. Two people were required to turn her over or change her diapers. She was unable to use her hands or swat away the scuttle flies and often slept with her mouth open (**Figure 1**). The patient's frailty during this infestation seemed to shield her from awareness of the phorids swarming her bed.

*Hospice*

By mid-March 2022, the patient was placed in hospice care, though she remained in her familiar room. By April, all parties acknowledged that death was imminent. Medical staff notified her out-of-town family members for a final visit, and the primary family member who visited daily was advised to begin writing an obituary and not to leave town, as death was expected.

*Gnats*

The number of gnats became noticeable in the patient's pristine room on April 5, 2022, and exploded into enormous numbers the following week (**Figure 2**). The spotless and airy modern facility was fully climate-controlled with double-foyer entry doors (acting as airlocks during COVID-19 for some hallways). The windows always stayed closed, and the patient's room was kept at 21°C (70°F.) Staff removed biohazard materials and waste from 2 cans twice daily, and any food, served on covered plates, was promptly removed after each meal.
The facility assured the family they would address the "gnat situation" promptly. Initially, the administration attributed the gnats to "mulch gnats" from newly spread mulch around the outside landscaping. As a precaution, the family removed all plants and food from the patient's room, suspecting "plant gnats." Pest control thoroughly treated the room on April 7 and 12. The bathroom drains were resprayed and sealed to prevent potential "drain gnats." Despite these measures, the number of gnats increased dramatically. Staff then suggested the gnats might be fruit flies from the kitchen located at the far end of the large building. At this point, the family began to lose confidence that the professionals could resolve the problem. Facility administrators and staff, baffled by the situation, hinted at possibly isolating the patient, as the gnats had now spread to other rooms in the hallway.
Because the patient was immobile and helpless, unable to wave the gnats away, they swarmed around her. We stood over her bed, attempting to disperse them with our hands and fly swatters. There were hundreds; the scene was ghastly, reminiscent of a horror film.

*Zevo flying insect traps*

The patient's full-time private sitter recalled a home product, Zevo flying insect traps, advertised on television. A trap was purchased and placed in the patient's room. Each trap is designed to last approximately 2 weeks before the sticky film becomes too saturated to capture additional insects. Within 2 days (April 12-14), the first trap was completely covered by tiny "gnats" (**Figure 1**).

*Megaselia scalaris phorids*

The author, who has over 30 years of experience working with fireflies and other insects, used a net to capture 5 small flying gnats in the patient's room on April 14 and removed the first clogged Zevo trap for a closer look under a microscope. What she ob-

served was alarming (**Figures 1,2**). These were not ordinary "mulch," "plant," "drain," or "fruit fly" gnats, as initially suspected by staff. Instead, they were phorid flies, specifically *M. scalaris*, commonly called scuttle flies. Having worked with phorids in the lab and published research on two related phorid species, (22-24) the author understood how dangerous these flies could be, especially if they begin reproducing on a host. The larvae of these closely related species are known to be lethal to hosts if they multiply internally.

On the morning of April 14, 2022, the author was unaware of any documented cases of phorid infestation in living humans. Later that day, she reached out to entomology colleagues Brian Brown of the Los Angeles Museum of Natural History (25) and Steve Marshall of the University of Guelph to verify *M. scalaris*.

On the evening of April 14, after identifying the adult flies, we conducted a literature search and found two papers outlining clear treatment protocols for phorid *M. scalaris* myiasis in immobilized human patients in foreign countries. (1,7) The papers provided clear instructions for treating phorid myiasis from *M. scalaris* in humans, offering two options: ivermectin and mebendazole. The team chose the ivermectin protocol, reserving the mebendazole option as an alternative should the initial treatment prove ineffective. (7)

On April 15, the family approached the facility administration and medical staff with the *M. scalaris* myiasis treatment protocol, (1) requesting its use. They offered to provide the supporting papers and protocol for the staff to consider and administer. However, both the administration and staff declined.

Since the wound care team was treating the patient daily with potent applied medications, infestation of the wounds seemed unlikely, though possible, given the small size of the pale larvae (1-6 mm depending on instar) and their notable resilience to toxins. (3) The wound care team reported no visible larvae on the sores or dressings. (**Figure 3**). Diapers, changed every 2 hours, were not closely inspected and were promptly placed in biohazard containers. The nursing and wound care teams expressed interest but chose not to be involved, declining the offer of documents detailing the treatment protocols.

Less than 20 hours elapsed from when the family identified the "gnats" as *M. scalaris* phorids, found a treatment protocol, approached 3 teams of healthcare staff, and initiated treatment. Scientifically, we should have collected diapers and wound dressings from the restricted biohazard bins for microscopic analysis, closely examined the pressure sores, and inspected her mouth and nose for larvae. In hindsight, we realized we had hundreds of adults but no larvae.

Although the patient was nearing the end of her life, independent of the myiasis, the prospect of her suffering a "death by phorids" was unacceptable to her family. They promptly decided to proceed with the ivermectin protocol.

*Ivermectin treatment*

The family initiated ivermectin treatment on April 15, 2022, administering a 2-day oral course of 6 mg daily. (1) The patient was closely observed throughout the treatment, appearing completely normal. Within 24 hours, there was a marked decline in the number of flying phorids in the room and traps. By 72 hours, no flies were observed in the room. At 84 hours, a nurse, unaware of the ivermectin treatment, informed the family, "Amazingly, the gnats are leaving all the rooms!" By day 5, no evidence of *M. scalaris* appeared in the patient's room, hallways, or surrounding areas. The patient's health rapidly stabilized, with a noticeable reversal from near death.

*Rapid wound improvement and quality of life*

Following treatment for *M. scalaris* phorids, the severe pressure sore's foul odor rapidly diminished, and the deep, wide sore began filling in, turning pink, and showing signs of healing (**Figure 3**). Smaller sores also improved, and no new sores developed. Although the patient remained extremely weak and in hospice care, her condition stabilized, and she appeared more comfortable and alert. Weight loss ceased.

The Zevo traps remained in the patient's room to monitor for any ongoing presence of phorids within this well-maintained facility. After the infestation ended, the Zevo traps were replaced less frequently, as they stayed relatively clean. Over the next 6.5 months, low numbers of *M. scalaris* continued to be detected, with 11 caught in total, though they were not visibly noticeable. It is possible that *M. scalaris* are opportunistic but rarely find the appropriate combination of a vulnerable host, setting, and temperature.

The patient received weekly ivermectin prophylaxis in her ice cream until the end of her life, with no observed adverse effects. She lived an additional 7 months, passing peacefully in her sleep in October 2022, just two weeks before her 95th birthday.

**Conclusion**

This report presents a case of myiasis by *M. scalaris* in a 94-year-old woman residing in a Tennessee nursing home.

She may represent the oldest reported case of *M. scalaris* myiasis and one of the few well-documented occurrences during late winter/early spring in a temperate region of the United States. Despite receiving attentive care, the patient experienced a rapid health decline, with the sudden appearance of hundreds of adult *M. scalaris* flies marking the initial signs of infestation—contrary to typical reports where larvae are often the first indication. Following treatment, no further visible flies were observed, though insect traps continued to capture low numbers of *M. scalaris* over the subsequent 6.5 months. This case highlights the need for healthcare providers, including nursing home and wound care staff, to be aware of the risk of phorid myiasis, even in modern, clean facilities within temperate regions. Myiasis can lead to significant suffering and rapid health decline in vulnerable patients. Fortunately, safe and effective treatment protocols using readily available medications, such as ivermectin, can mitigate these effects when applied promptly.

The implications of these observations extend beyond this one unfortunate elderly patient. With a rapidly aging population—many spending their final years bedridden or in care facilities—myiasis may be more prevalent than currently recognized. In this case, myiasis brought the patient dangerously close to death in a short time.

The sudden appearance of "gnats" in an otherwise clean room—especially when caring for a helpless, injured, or diapered individual—along with rapid, unexplained weight loss; an increase in the number and severity of pressure sores; sleeping with an open mouth; or an inability to swat insects, could all be "red flags" for myiasis worth investigating. Zevo traps (or similar devices) should be considered in all the rooms of patients with severe physical limitations, at a minimum as a monitoring tool.

Family members and caregivers of individuals who are too weak, disabled, or injured to care for themselves—whether at home, in a hospital, or a nursing facility—should be informed of the possibility of myiasis, however remote. This report seeks to raise awareness among family caregivers, healthcare providers, and wound care specialists, especially in temperate regions where the risk may be overlooked. It emphasizes effective treatment protocols, discusses recent options for myiasis recognition and management, and highlights advancements in treatment approaches from current literature.

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**Figure 1**. Patient with a Zevo trap plugged in beside her bed. Note that her mouth is open when sleeping. Phorids *M. scalaris* caught in the traps. Zevo traps are valuable monitoring tools.

**Figure 2**. *M. scalaris* were not visible after the April 16 treatment, yet they were continuously present in low numbers. Exhibit (A) Live *M. scalaris* specimens netted on April 14, 2022, for initial identification under a microscope. Exhibits (B), (C), and (D) show *M. scalaris* specimens captured in Zevo traps from May 1 to October 8, 2022, representing a sampling of the 11 total phorids documented in traps during this period.

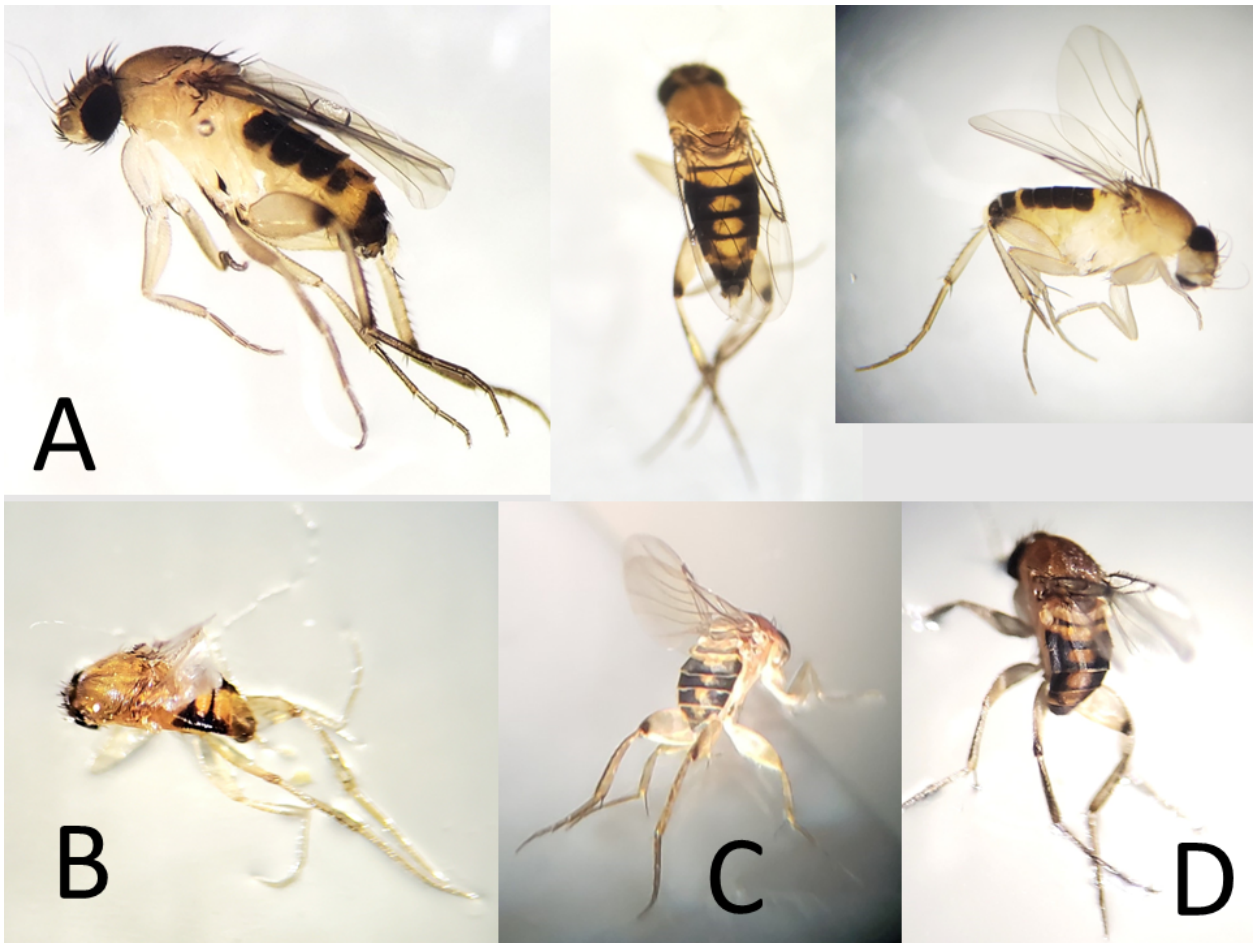
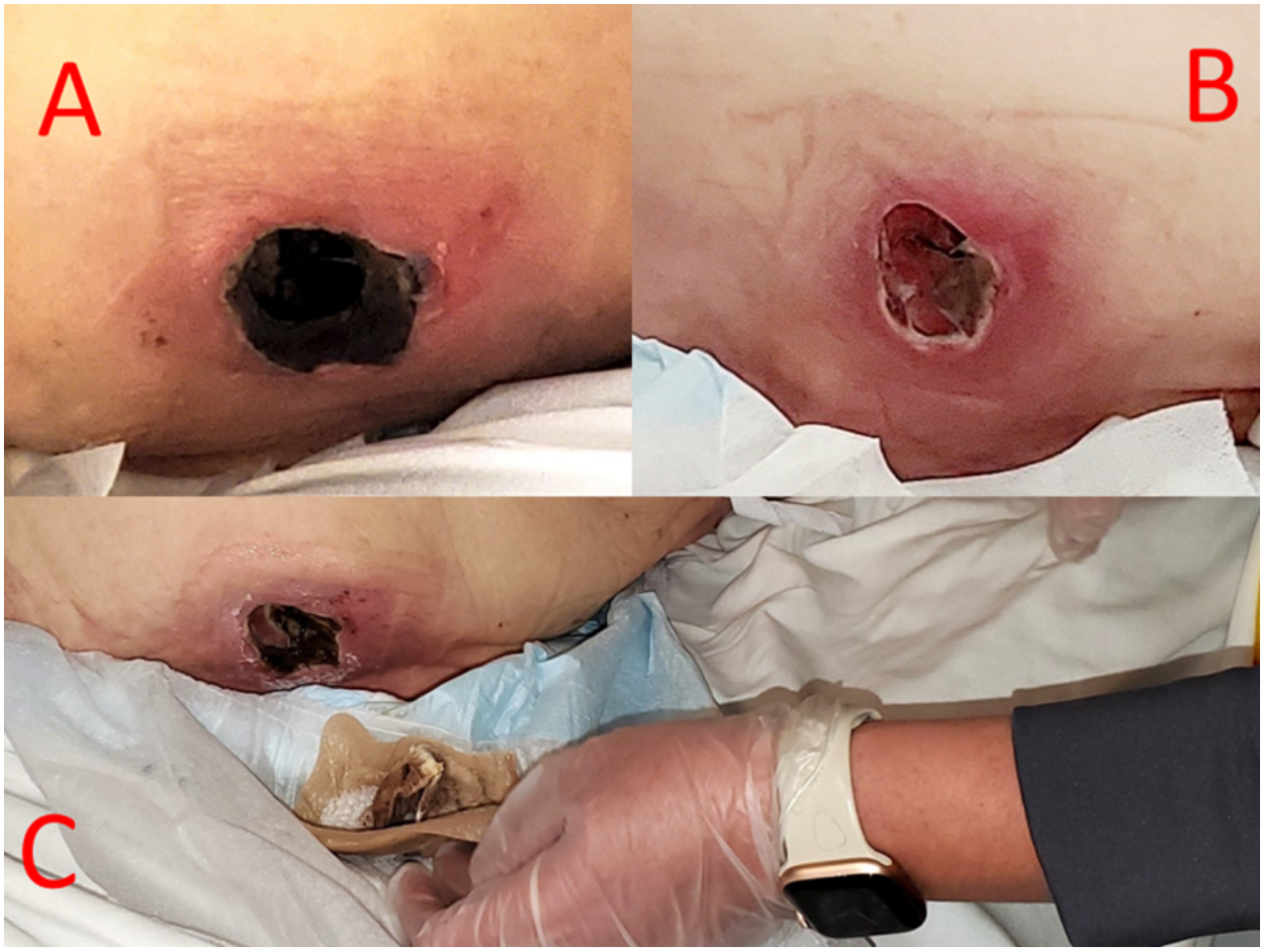


**Figure 3**. The pressure sore rapidly progressed from a small pink stage 1 to a deep, wide, foul-smelling black stage 3-4 within days—by April 6 (A), before treatment. By April 17 (B), the wound had already begun losing its odor and black coloration 72 hours after initiating the oral ivermectin protocol. The wound, shown in exhibit (C) on April 11, received daily treatment with wound care protocols, but its severity continued to worsen until the myiasis protocol was implemented.



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