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Delusional Infestation. A belief of being parasitized.

Introduction.

Delusional Infestation (DI) is an unshakable belief of being parasitized by insects and/or mites, or other organisms (1,2,3). It can arise as a primary (de novo) or a secondary delusion. Primary is psychiatric illness (schizophrenia or other major mental illness) while secondary has both somatic and a protective evolved psychiatric investment. The majority of patients experience secondary DI which is presented here.

Secondary DI often commences as the result of several causes which can include one or more of the following:

- an undiagnosed underlying medical condition,
- polypharmacy,
- stress,
- depression,
- predisposition to focused anxiety,
- shock which includes PTSD.

These causes are described as the “triggers.” If consulted physicians are unable or for any reason or are unwilling to perform thorough differential diagnoses or are themselves prone to Cognitive Dispositions to Respond (CDR) to diagnostic error, these patients are left to fill in the gaps and self-diagnose. Dissatisfied they start to doctor shop/hop and following each “failed” visit develop an ever-stronger emotional investment which evolves searches for a cure to searches for validation. These patients drift from

mainstream thinking to fringe thinking which is accelerated by easy access to the Internet and its attendant engineered search algorithms.

Time is a major little understood component in the evolution of chronic DI. Once patients cross the 6-month mark of suffering a combination of sunk cost fallacy and confirmation bias causes their beliefs to evolve into convictions which perversely becomes protective against efforts at differential diagnosis and corrective treatment. Secondary DI at this point has become bifurcated with an underlying undiagnosed medical condition that is protected by a “shroud” of psychiatric investment. Patients’ incessant descriptions about their persecutors along with high volumes of “evidence” (sample sign formerly known as “match box sign”), often misdirect physicians.

The symptoms of DI impact all aspects of a patient’s life including work, relationships, and quality of life (5). It carries a high disease burden and is a debilitating disorder that causes significant suffering to patients and those associated with them (6,7). Many patients with DI lose “insight” and challenge the lack of objective findings of infestation, therefore treatment compliance is variable, and suffering significantly protracted. With DI the longer the duration of untreated illness the poorer the outcome (4).

Although these patients may repeatedly seek

help from experts, they refuse to abandon their ideas for test results which contradict their invested beliefs (8). Those who are struggling with DI become antagonistic and relentless in their need to find someone to validate their self-diagnoses (9). Those with the obsession, often search the Internet finding websites, social groups, and influencers who validate their beliefs. Often under the falsehood of medical authority, some of these sites provide misguided advice and inaccurate information. Poorly informed misdiagnoses by medical professionals also contribute to the problem. DI requires dedication and time by trained professionals, preferably in an interdisciplinary team with emotional support from significant others such as family members and friends. Delusional Infestation is medically amorphous and can involve several medical and other disciplines. These may include physicians, dermatologists, psychodermatologists, emergency department personnel, psychiatrists, epidemiologists, pest management professionals, parasitologists, medical entomologists, university extension staff, and neurologists.

Naming the disorder.

There have been many attempts to define the condition. To date DI throughout its 400-year recorded history has had at least 40 different iterations ascribed to it (2). The most common used 20th century term was “Delusions of Parasitosis,” coined by Wilson and Miller (10). This dispelled earlier use of the term acarophobia (11), entomophobia, and parasitophobia. These earlier identifiers suggested a mental condition based on the concept of fear. Waldron (12) shortened the term to “delusory parasitosis” which Keh (13) supported. Other names used for DI are “sample sign” (2) formerly “matchbox sign” and “saran-wrap sign” (reflecting how specimens were delivered to analysts), paper

mites, sand fleas, cable mites, presenile dermatotoxic delusion (used widely in Europe), chronic tactile hallucinosis (14), and folie à deux, “a madness shared by two” (15). Ekbom syndrome also was popular in the 20th century (16-18) while Morgellons Disease was more recent (2,3).

Morgellons Disease was coined by Mary Leitao who believed fibers were extruding from her son’s skin. Physicians found nothing. In response, she founded the Morgellons Research Foundation and agitated the CDC with assistance from the then US Senator, Barbara Boxer from California, to support a study. Their research published in 2012 found nothing and concluded Morgellons was a euphemism for Delusional Infestation (19).

In 2010 Bewley, Lepping, and Freudenmann published the paper, “Delusional Parasitosis: Time to Call it Delusional Infestation” in the British Journal of Dermatology. They argued that renaming the disorder to DI was appropriate. By doing so, more variants of the disorder might be included. For example, patients who experience DI by Proxy (DIP) think that someone else including animals, children, vulnerable adults, or objects are infested, when they are not (20,21). This may lead to serious child safety issues (21,22). Fisher described a six-year-old boy whose mother insisted he had skin and scalp infestation. He was eventually removed from her custody, placed into care of grandparents while the mother underwent psychiatric treatment (23). With animals particularly pet dogs who often mirror their owners’ behaviors, it can lead to baseless demands to euthanize them (24). Additionally, the environment, buildings, vehicles, particular rooms, wild or other domesticated animals are covered.

Sensations that trigger Delusional Infestation beliefs.

Descriptions of dermal sensations include pricking, tingling, itching, crawling, stinging, sharp pain, burning, and burrowing (5,25). Descriptions of insects living inside body cavities and the alimentary canal are not uncommon. Those who describe feelings

of itchiness have a continuous need to scratch and often report seeing actual arthropod specimens. Nearly all DI sufferers use the pronouns, “they” or “them” to describe their perceived parasites because they can not specifically describe what is not there. Self-mutilation is common (8,15,26).



Fig. 1. Self-mutilation of the left arm and hand. Injury is often observed on the non-dominant side of the body. This woman is right-handed and picked at her left side. Image shows healing of dermal injuries and self inflicted Onycholysis of the nails. *Used with permission.*

Some conditions which may trigger Delusional Infestation.

There are at least four types of conditions which may trigger DI; environmental; medical, including psychological (26), drug side effects, and commonly encountered insects and arachnids (spiders and mites).

Environmental.

Static electricity. When there is low humidity, static electricity, especially associated with fabric-covered furniture and carpeting, is common. Static electricity is prevalent in hospitals, climate-controlled office buildings, college/university dorms, buildings with steam heat, and buildings with closed ventilation systems. Conditions caused by these environments can cause skin sensations interpreted as "crawling" or "biting" (15,27,28). Following is are two account describing the effects of static electricity on the skin.

"The staff in a hospital laundry folding room complained of being bitten. When I visited the laundry, I found a large industrial sized dehumidifier inside the room. The dehumidifier was designed for a 4,000+ sq ft space which was the entire laundry department floor. The smaller folding room had been added later and was built around the dehumidifier. Staff were experiencing static electricity because the dehumidifier was hyper-drying the much smaller space. It was removed and the "biting" sensations stopped."

Example two.

"In the 1970's a call center had a dress code of nylon stockings for female employees. Many took off their shoes to be more comfortable while at their workstations. The call center was carpeted, and humidity was low. Complaints of lower leg insect biting became prevalent. Following an

investigation, no arthropods were found. It was later determined that the abrasion of the nylon stockings on the carpet caused static electricity and sensations of biting. The nylon dress code was changed, and the apparent biting sensations stopped." -Ridge

Pollen. People who move from one region of the United States to another may experience allergies to local tree and grass pollens. This may manifest as unexplained irritation which is interpreted as apparent insect biting (29-31).

"A college student from Chicago, Illinois was working on a summer job as a highway surveyor for the Connecticut Department of Transportation. After two months he developed sensations of being bitten. Tests showed he had become very sensitive to the native New England grass pollen. When he returned to Chicago, the "biting" sensations stopped." -Ridge

Household or personal products. Detergents such as hand soaps, detergents (especially phosphate-based products), ammonia-based cleaners, cosmetics, hair products and household cleaners, some printer inks and clothing with fire retardant can cause dermatitis (15).

Mold. Since Hurricane Katrina, mold has become a more closely studied problem in homes. Damp or water-damaged buildings often have mold. There are many species of household mold. Some mold and mold spores can be medically significant and cause dermatitis. One of these is *Stachybotrys chartarum* (Atra), a black mold that thrives on water-damaged cellulose-rich materials, such as sheet rock, paper, ceiling tiles, insulation backing, and wallpaper (29,32).

“A man bought his forever 1900th century home adjacent to the Connecticut River. Several months after he moved in, he began to experience “biting” sensations. Tests revealed he had developed a sensitivity to native molds found in the area. Following treatment and remediation of the home, the “biting” sensations abated.” -Ridge

Known irritants. Formaldehyde impregnated products, such as particle board, floor tiles and wall coverings; some papers, insulation fibers and some man-made fabrics, cigarette and cigar smoke, and fresh asphalt are known to cause dermatitis (33,34).

Medical conditions and disease.

Numerous medical conditions and diseases may promote DI (Table 1). Three of the most important causes are stress, depression, and aging (5).

Stress, including post-traumatic stress syndrome (PTSD), is seen in all socioeconomic and educational levels, and is a major cause for DI. Stress-related DI often starts with a tragic or unpleasant episode at a specific time. This may be divorce, separation, loss of employment, illness, a failure, death, or illness of a relative or pet, witness to an incident, or war trauma. Other longer-term stressors are unrewarding employment, multitasking career and family, incessant media focus on negative news, money concerns, lack of sleep, and loneliness (35).

Many sufferers of DI live alone and get into habits of fixating on their health. It becomes

comfort, and allows them to garner often needed attention from others unaware of the condition.

Self-grooming is a strong societal force in people. As primates, humans touch, scratch, and groom as forms of self-assurance and social interaction. It is reflective of social status, self-image, and psychological well-being (15). In situations of stress, including tension, worry, or anxiety, people often show “displacement activity” by scratching; they may for example, reach up and rub the neck, scratch the head or forearm after an unpleasant encounter. DI sufferers often take this further by continuing the behavior. They usually are unwilling to accept the suggestion that the symptoms they experience may be associated with stress (15).

Depression, is a second major contributor to DI (26). Anxiety, tension, tiredness, lack of interest in life, low self esteem and energy, a sense of displacement, feelings of guilt, worthlessness, and helplessness all may contribute to depression and DI onset. A DI sufferer with depression usually vehemently disagrees with the possibility of depression, so the problem often goes untreated. Schizophrenia also has been implicated as causative for DI (15).

Age. DI can appear at any time in adult life, but it is more common later in life. Men and women are equally affected in the younger years. In those older than 50, there is a preponderance of women affected over that of men. However, men tend to suffer from DI at a younger age than women (7).

Table 1. Some medical conditions associated with DI (23).

Aging	AIDS	Algorithms (Lacks critical thinking with potent power of suggestion)
Alcoholism	Allergies including food allergies	Anemia
Anxiety	Atopic dermatitis	Carbon monoxide
Carcinoma	Cholestasis	Cirrhosis of the liver
Congestive heart failure	Depression	Diabetes
Encephalitis	Endocrine abnormalities	Fibromyalgia
Fluoride poisoning	Folate deficiency	Grover's disease
Herpes zoster (Shingles)	Hemochromatosis	Hepatic disease
Hepatitis	Huntington's disease	Hyper awareness of normal nerve end firing
Hypertension	Hyperthyroidism	Hypoglycemia
Hypothyroidism	Hypovitaminosis inc. B12 deficiency (24)	Hysteria
Illegal drugs	Insect phobia	Kidney or liver damage
Lymphoma	Many cancers including Leukemia	Mast-cell-activation syndrome
Meningitis	Menopause	Mental retardation (26)
Munchausen (mental disorder of fake illness to garner attention)	Nasal MRSA carrier	Neoplasia
Neurology; including lack of pain receptors	Niacin overdose	Obsessive compulsive disorder (26)
Parkinson's disease	Polypharmacy	Poor nutrition
Psoriasis	Pulmonary disease	Prescription drugs
Prurigo nodularis	Reduced grey matter in the brain	Renal diseases
Rheumatoid arthritis	Several autoimmune diseases including multiple sclerosis and Lupus	Small fiber polyneuropathy (36)
Smoking tobacco	Somatoform dissociation with pruritus (functional itch disorder)	Statins
Stress	Stroke	Syphilis (26)
Trauma to the head	Traumatic brain injury	Thiamine deficiency
Trichotillomania disorder	Tropical diseases and/or parasites	Tuberculosis
Uremia	Urticaria	Wallenberg syndrome
Zinc deficiency		

Small fiber polyneuropathy (SFP) also called small fiber sensory neuropathy (SFSN), is when peripheral sensory nerves under the skin are affected and present with unexplained pain, burning, tingling, pricking, numbness, coldness, creepy-crawly feelings, or electric shock-like sensations. SFP is very prevalent in the DI patient population. Sufferers easily attribute the sensations to arthropod feeding activity, and some spend years searching fruitlessly for an answer. In these cases this condition often goes undiagnosed.

Drug side effects and polypharmacy.

Numerous over-the-counter (OTC's) and prescription medications can cause paresthesia (tingling, pricking, creeping sensations), urticaria (stinging, burning itch), erythema (redness of skin), hives (watery bumps), or pruritus (itching) (5). The chances of having these side effects are increased with drug interactions (37, 38). Recreational drug use of methamphetamine, cocaine, amphetamine and/or alcohol may

cause sensations of crawling or burrowing in the skin. The misuse of medications or tolerance reduction by continuous use of some drugs over extended periods of time can also trigger DI (5).

Most of the elderly need drugs for conditions such as glaucoma, pain, impotence, diabetes, arthritis, osteoporosis, heart disease, and hypertension etc. Drugs for these conditions can include beta blockers, monoamine oxidase inhibitors, estrogen, insulin, statins, antidepressants, and pain medications. All of these come with side effects of dermal reaction. One in five Americans over 65 take some form of prescription medication, and of those, 25% experience drug side effects or interactions caused by multiple drug use (37,39). Some commonly prescribed drugs (also drug types), which can cause skin irritation as a side effect are listed in Table 2. Herbal remedies and nutritional supplements may also be problematic, especially if other prescribed or over the counter medications are taken with them.

Table 2. Some of the top prescribed drugs in the United States which may cause dermal reaction (40).

Antibiotic	Antidepressant	Hypertension	Analgesic	Anti-GERD	Antianxiety
Amoxicillin	Sertraline	Amlodipine Besylate	Acetaminophen Hydrocodone	Omeprazole	Alprazolam
	Fluoxetine	Metoprolol	Acetaminophen	Pantoprazole	
	Citalopram	Hydrochlorothiazide	Tramadol		
	Trazodone	Losartan	Ibuprofen		
	Bupropion	Furosemide	Meloxicam		
	Escitalopram	Atenolol	Cyclobenzaprine		
	Duloxetine	Carvedilol			
	Venlafaxine	Hydrochlorothiazide & Lisinopril			
		Lisinopril			

Commonly encountered insects/ arachnids which can cause dermatitis.

Some insects and arachnids, which include mites, are of dermatological medical importance. These are listed below with brief explanations.

Scabies mites, *Sarcoptes scabiei* var. *hominis* (DeGeer). These mites burrow through the outer layer of the skin in specific locations on the body; between fingers, wrist skin folds, elbows, knees, penis, breast, or shoulder blades. Scabies is transmitted only by direct prolonged contact with an infested person such as a sex partner or immediate family member. Hugs or handshakes do not usually spread scabies. Scabies is not common, and many DI itching complaints are regularly misdiagnosed as scabies. Scabies mites must be collected from their burrows and identified at a medical or entomological diagnostic laboratory to confirm an infestation. A visual skin examination is not enough and should never be used as a differential diagnosis. Animals and pets do not spread human scabies. They have their own scabies mites, which don't infest humans.

Straw itch mite, *Pyemotes tritici* (La Grèze-Fossat & Montane). These hay or grain itch mites are insect predators often hunting grain, bean, or pea pests. They are considered somewhat beneficial and have been used to treat fire ants. People who work with grain or hay can encounter these mites. In the Northeast, they are often found in deliveries of hay (also straw) as horse feed and become a nuisance to the animals and their owners by causing uncomfortable rashes. Horses often refuse to eat contaminated hay.

Bird mites, Northern fowl mite, *Ornithonyssus sylviarum* (Canestrini &

Fanzago) and Tropical fowl mite, *Ornithonyssus bursa* (Berlese). These are mites of wild birds. In attempting to rid themselves of mites, birds are often seen take dust baths using the abrasiveness of dry dust to kill the mites. These mites are host specific and feed only on birds and no other animals. Their mouthparts are extremely short and adapted to penetrate the very thin skin of birds. It is impossible for them to feed on any other animal, including humans. Yet they can become a problem to home or business owners during mid to late spring when birds abandon their nests. Mites left behind may start to wander in search of their hosts and attempt to probe people's skin which feels like a prick. It is impossible for these mites to live on humans and are dead within three weeks following separation from their host birds. There are several notorious websites online that advocate bird mite infestations are possible on humans. These should be ignored.

House dust mites, American house dust mite, *Dermatophagoides farinae* Hughes and European house dust mite, *Dermatophagoides pteronyssinus* (Trouessart). These mites are very common and are scavengers of shed human skin. They do not feed on people, but there is evidence the mites can cause contact dermatitis in some individuals through exposure to their feces and cast skin (41). They can cause allergic reactions for some people if inhaled.

Ectoparasites, Fleas, mites, or ticks from dogs, cats, bats, rodents, or other animals can be problematic to people. They have distinct biologies, and behaviors and are treatable.

Lice. Pediculosis can be caused by the head louse *Pediculus humanus capitis*, body louse *Pediculus humanus corporis* or the crab

louse, *Pthirus pubis*. These lice move from person to person through direct physical contact or use of shared clothing. These may be common in situations where people congregate, such as schools, temporary housing, military housing, or shelters.

Garden thrips. In periods of summer drought, thrips can probe the skin seeking water. Sometimes they come into homes on plant material. They do not live on people.

Delusional Infestation Characterization.

DI is often a bewildering condition for clinicians, entomologists, or pest management professionals as well as other professionals who see patients. It is also bewildering to the patients themselves, their family's, significant others, or close associates. Manifestations are as varied as the personality and experiences of each patient. Nevertheless, there are some common attributes. Patients usually exhibit several behaviors which suggest DI and are listed in Table 3.

Table 3. Some characterizations of Delusional Infestation.

Allergies.
Complaining of being bitten or parasitized by insects or other organisms. Shared DI with children, vulnerable adults, significant others, domestic animals, or objects.
Defensive insistence on cleanliness having faced a history of judgement.
Depression.
Doctor shopping/hopping.
Eagerness to provide specimens.
Elaborate biological and behavior descriptions of unidentified “parasites” that show levels of intelligence and resourcefulness.
Expression of desperation. Some express suicidal ideations which must be taken seriously.
Highly intuitive.
History of emotional trauma.
Internet research to self-validate through confirmation bias.
Obesity and physical inactivity.
OCD particularly with ritual cleaning.
Polypharmacy (may include history of illegal drug use).
Poor diet.
Rejection of psychological cause or as a contributing factor.
Repeated use of the pronouns “they” or “them” because parasites are not present.
Sample sign (formerly match box sign). High volume of samples.
Self-treatment and medication including pesticides and veterinary products.
Self-mutilation through scratching and/or use of implements such as razors.
Sleep deprivation. Can abandon sleeping areas for sleeping in bizarre locations such as vehicles.
Social isolation initiated by the patient or abandonment by significant others.
Stress.



Fig. 2. Sample sign is common with DI. *Used with permission.*

Manifestations of Delusional Infestation: some illustrative case histories.

Many DI patients can experience the condition for years. The longer they struggle with the condition, the harder it is to resolve. Those who have had DI for less than 6-months have a better chance of resolution because DI has not become a habit, emotional “addiction,” or way of life. If they experience DI for greater than 6-months, it is habituated, and clinicians report patients are much harder to help.

These chronic patients often respond to medical results which they do not agree with, with denial and anger. They experience the 5-stages of grief (25). Many feel frustrated that,

“No one listens to them!”

They refuse psychological and other medical support preferring to remain with their beliefs which have provided some level of comfort and control. In these patients there is little hope for a cure (personal communication with Dr. Ted Lawlor, Department of Psychiatry, School of Medicine, University of Connecticut).

Following are some examples of DI incidents encountered in the insect inquiry diagnostic laboratory at The Connecticut Agricultural Experiment Station which may provide some insight. Cases are time consuming. It often takes a great deal of time to gain the trust of clients which is difficult before any meaningful work can be started. Many clients have often experienced numerous earlier encounters with other professionals resulting in misinformation, misdiagnoses, and often dismissive humiliation. Clients often become hostile and aggressively defensive until their trust is gained. Entomological support is limited to

determining if there is actual arthropod involvement. Nevertheless, other factors may become apparent in the interview(s) that provide a basis for an investigation into other causes with prompt referral to other professionals such as pest management professionals and physicians.

Power of suggestion. Situations of high stress or environments that are closed with no fresh air circulation can be difficult. In one call center, a female employee started complaining of being “bitten”, which was soon followed by similar complaints from co-workers. This was picked up by other staff until the entire department of sixty employees was involved. No evidence of arthropod involvement was found. The woman (the inducer) was then transferred to another department and in her absence, complaints of insect “biting” stopped. The power of suggestion known as Bells’ syndrome (5) has high psychological contagiousness and in these kinds of settings where people are working in close proximity with each other, it can be disruptive.

Delusory parasitosis by proxy caused by depression. The projection of DI onto objects is rare. A woman became convinced her kitchen cabinets were infested with insects that would “fly out” and attack her. No other family member was affected. To appease her, her husband replaced the cabinets and the problem temporarily ceased, only to return. Interviews revealed she had lost her mother two years before the onset of symptoms, and she was subsequently diagnosed with depression (personal contact). Once treated, the apparent insect activity stopped.

Stress. Immediately following the beginning of the great recession (2008/09), the owner of a small manufacturing business began suffering from insect bites. It also affected

family members and the employees, threatening the business. No causative insect activity was detected. A medical examination found no medical issues with the business owner. Following several interviews, he admitted he was very depressed. He was faced with the prospect of firing his colleagues, friends and associates who had been with him for years building the business because sales had stopped. It was suggested he should ask his employees for advice on what to do. They responded by initiating severe pay cuts to protect the family the business. It survived the recession and returned to full production after 18 months. The business owners biting sensations soon stopped and following supportive talk therapy he returned to a successful career and the quality of life he once enjoyed.

Medical conditions. A woman in her late 40's complained of being bitten by insects. There was no history of emotional trauma, but there was self-mutilation, compulsive cleaning, and self-medication. No causative insect activity was detected. A physician subsequently diagnosed hypothyroidism. Following corrective treatment, the apparent insect biting sensations stopped.

How to work with DI patients.

Physicians, particularly dermatologists, entomologists, and pest management professionals (PMP's) are specialists that most often encounter DI patients. The following suggestions may be helpful in interacting with and assisting patients.

- **Be welcoming.** Be quiet and maintain a professional distance, yet balance this with empathy and compassion. Slowly gain confidence and trust of the patient by providing generous time for interviews. Allow 45 minutes for the first meeting and

30 minutes for ensuing appointments. Do not disagree with patients but join and partner with them. To them their reality is real. Allow them to talk but maintain a strict time limit. At the beginning of an appointment be clear about the allotted time and stick by it. This helps patients focus on the most important issues that concern them the most. Physicians should not speculate or be caught in CDR diagnoses. Additionally, iatrogenic disorders are common with this group of patients since many have been seen by busy indifferent providers.

- **Support humans.** Entomologists and PMP's should have a second person with them while either working "at an account" or interviewing. It conveys to the patient they are being taken seriously while diffusing anxiety driven tensions. It also allows either staff member to step out of the situation for a break without leaving the patient alone. The patients should also be encouraged to have a supportive significant other person with them on these visits, the "support human." They can function as a memory repository for patients who often forget (or chose to ignore) instructions and hold patients accountable to instructions at home. They also can assist in memory recall of facts patients may have forgotten which often helps expedite medical differential diagnoses. Their involvement is often critical in the success of care.

- **Threshold technique.** Use the "threshold technique" to take a break if patients become difficult by stepping outside the interview or examination room space. Make an excuse to check on the progress of a test or a prearranged phone call. It also gives patients time to reconsider their thoughts.

- **Take notes.** Verify biological behaviors and descriptions of patient's claimed parasites with an entomologist or parasitologist. In most cases patients described parasites should not be taken literally but seen as a voiceless symptom, a red flag. Yet, remain diligent if patients say they have travelled or ate raw food particularly fish. It might indicate a real infestation. Patients are misunderstanding their symptoms or situations because they lack resources to come to reasonable conclusions.
- **Avoid using inflammatory language.** Do not use language such as "bite, biting, attacking" because it validates patient beliefs. Use terms such as "pinching sensations" or "Concern for Infestation (CI)" (Norton chapter VII, 25), as substituting euphemisms. Many DI patients have been dealing with the condition for a long time and will filter or latch onto unguarded words. For example, avoid using words such as "book lice." Instead use technical language such as "psocids". Though these insects are not lice the common name may be misconstrued as actual lice by anxious patients looking for answers.
- **Travel and food.** Verify if patients have travelled overseas during the previous year. If they had, check for human parasites in the region they had visited. Include checking for blackfly endemic areas as well as species of human feeding mosquitoes. Ask about food and water consumption, particularly raw food, and fresh water. Filarial worms and other parasite species may become part of the considerations.
- **Follow up.** It is extremely important for physicians to practice follow up care with DI patients. Though a somatic cause may

be addressed, the psychiatric/emotional element requires further long-term managed care. Recidivism is common with DI patients when follow up care is lacking. Monitor patients for up to 5 years post treatment.

Sampling.

Involve patients with diagnoses. This develops relationships and trust. It helps patients feel they are actively doing something about their condition rather than "sitting around" as passive victims. Limit sample volume. Explain a high volume of samples takes time away from other parts of an investigation.

Scotch tape sampling. When a patient feels what they describe as active 'biting,' instruct them tap a piece of scotch tape on to the site. Then mount it onto glass and label location, time of day, and date. Insist on only 5 samples.

Vacuum sampling. Instruct patients to cover the open end of a vacuum cleaner hose with a coffee filter holding firmly in place with a hand. Vacuum suspicious locations and once satisfied enough material has been trapped by the filter, turn off machine and put filter into a Ziplock bag. Label location, time of day, and date. Insist on only 5 samples.

Once samples have been collected, they should be submitted to an entomology and/or parasitology laboratory for examination.

Further observations. Physicians can inquire about medical history (allergies, medications, age, and medical conditions), trauma, and/or specific date problem started. Many patients are high-functioning and articulate. It is prevalent in this population. Physicians need to be aware of accidental iatrogenic or CDR diagnostic errors. These may have occurred with previous encounters

with other medical professionals. An example of physician error which could have been avoided is as follows.

A woman who had simultaneous pricking sensations on both sides of her body had been told by her physician she had “bed bugs.” Once bed bugs were ruled out, the diagnosis was changed to mites, then “a form of dermatitis.” It was later discovered she was pre-diabetic and with appropriate medical care she was cured.

Also note, in warm weather, there may be a genuine insect biting activity, which evolved into DI. Entomologists and PMP’s are not physicians, so do not volunteer any medical diagnoses or speculation, but suggest patients see their physicians.

Many patients self-treat using veterinary medications, medications bought online, over-the-counter-medications such as pesticide-laced lotions and shampoos, and pesticides. Advise against self-prescribed treatments explaining this behavior may mask real issues.

PMP’s should avoid the “Pray and Spray” approach by treating building spaces if there is no evidence of a pest infestation, even though there may be extreme pressure to do so by the client. Pesticides used in these spaces can exacerbate the problem (5). Additionally, if a PMP chooses to treat using inert materials such as water, though symptoms may subside for a while (the placebo effect), they inevitably return. This may lock the PMP into a revolving cycle of treatments for a non-existent pest and in the long run, do more harm than good (15).

Terminating relationships. If a patient continues to have a problem over a long period without resolution and they refuse

medical or supportive psychological assistance, it may be necessary to politely end the relationship. Simply say, “I can not help you anymore.”

Treatment

To quote Reid and Lio (42), “Treatment of patients with delusional parasitosis (Delusional Infestation), is notoriously difficult.” In most cases a psychological belief system and a somatic condition in DI patients are concurrent. They need to be addressed simultaneously (25). Many DI patient brains when examined are often normal (43). Predisposition to anxiety and OCD often promotes a tendency towards focused conviction which evolves to become protective of any underlying undiagnosed medical conditions. Patients become locked in a cycle of fight or flight. Treating patients with a brief course of low dose second-generation antipsychotics (SGA’s) calms worry and provides relief to the unpleasant sensations patients experience. These drugs lessen symptoms (44). Being more comfortable, patients and their physicians are then able to find and address the underlying causes of the condition.

Many patients are cured by using this technique. Yet relapses can happen following cessation of therapy. It is strongly suggested physicians follow up with their patients for between 2 to 5 years to avoid recidivism (25,45). To help support against this, it is suggested patients consider organizations such as Alcoholics Anonymous (AA). This is a worldwide fellowship of men and women who address alcoholism and addiction. Much of DI possesses addictive elements. Groups such as AA reprogram thinking in a supportive culture and restores normal healthy thinking, behavior, and habits without the use of drug intervention. Additionally, self isolation

should be addressed with partnerships, family, and friends. Patients should be encouraged to reestablish social bonds. Emotional support from significant others who can monitor care at home on behalf of the physician leads to successful outcomes for patients.

The Internet. During the care period, patients should be discouraged in using the Internet and social media. It is a highly destructive toxic medium for these vulnerable patients who have lost selective judgement. Internet algorithms are currently engineered to keep users engaged and addicted. Modeled on gambling, they provide material that gratifies and stimulates endorphins in users. The 2020 Emmy award winning documentary “The Social Dilemma” explores this. Additionally, more sophisticated programming such as Chat GBT which lacks critical thinking, is also problematic.

Diet. Diet should also be monitored since many patients eat poorly. The intestinal tract is known as the “second brain.” It is directly connected to the brain via the Vagas nerve in the Brain-Gut axis. If gut flora and fauna are in poor condition it will directly influence emotional well being (46,47).

Unconscious grooming. It is very common for patients to unconsciously self groom. Using occlusive dressings, gloves particularly for nighttime unconscious grooming and nail cutting are methods that provide relief against dermal harm caused by compulsive picking.

Closing thoughts.

DI is an under-reported complex problem because it is a condition that needs multiple disciplines working together. Unfortunately, there is a tendency for DI sufferers to consult many specialists (doctor shop/hop) or be passed off without resolution. They become lost to care as they travel from discipline to discipline. There is a need for a centralized multi-disciplinary diagnostic system where professionals from medicine, the pest management industry, and entomology, etc., might network to help sufferers obtain the care they need. An inter-disciplinary approach has been shown to have an elevated success rate in Europe. The European model of DI care works. They have shown it takes a village of professionals and supportive individuals to heal DI patients so that they might return to the quality of life they once enjoyed.

Contact information for Dermatologic Support Groups.

National Psoriasis Foundation
1800 Diagonal Rd., #360
Alexandria, VA 22314
Ph: 503-244-7404 or 800-723-9166
Web: www.psoriasis.org

Global Vitiligo Foundation
1932 S. Halsted St., Suite 413
Chicago, IL 60608
Ph: 630-578-3991
Mail to: info@globalvitiligofoundation.org

National Alopecia Areata Foundation
65 Mitchell Blvd., Suite 200-B,
San Rafael, CA 94903
Ph: 415-472-3780
Web: www.alopeciaareata.com

National Eczema Association
505 San Martin Dr., #B300,
Novato, CA 94945
Ph: 415-499-3474
Web: www.nationaleczema.org

International OCD Foundation
PO Box 961029, Boston, MA 02196.
Ph: 617-973-5801. EIN: 22-2894564
Web: <https://iocdf.org/>

USA Emergency Hotlines and Support Groups

1. National Suicide Prevention Hotline	(800) 273-8255
National Suicide Prevention Hotline for Hearing Impaired	(800) 799-4889
2. Suicide and mental health crisis hotline	988
3. Substance Abuse and Mental Health Services Admin.	(800) 662-HELP (4357)
 Online: samhsa.gov/find-help/national-helpline	
4. The Samaritans Crisis Hotline:	116 123
5. National Domestic Violence Hotline English	(800) 799-7233
National Domestic Violence Hotline Spanish	(800) 942-6908
6. Veterans Crisis hotline	(800) 273-8255
7. National Grad Crisis Line	(877) 472-3457
8. Childhelp National Child Abuse Hotline	(800) 422-4453
9. National Alliance on Mental Illness (NAMI)	(800) 950-NAMI (6264)
10. Alcoholics Anonymous	Online: aa.org
11. Narcotics Anonymous	Online: na.org
12. Crisis Text:	Online: Text HOME to 741741
13. United States elder abuse hotline	(866) 363-4276
14. Families Anonymous (addiction)	(800) 736-9805
15. Well Spouse Foundation	(800) 838-0879
16. Deaf hotline	(800) 799-4889
17. Griefshare (coping with grief)	(800) 395-5755
18. National Eating Disorders Association: phone and text	(800) 931-2237

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