

Heat Exposure and Hydration Challenges in Home-Based Palliative Care: Patient Safety and Nursing Preparedness

Michael Osei^{1*}, Ingrid Larsen², Rajesh Menon³, Peter O'Connor⁴

¹*Department of Palliative Nursing and Hydration, University of Ghana Business School, Accra, Ghana.*

²*Department of Palliative Care and Heat Exposure, BI Norwegian Business School, Oslo, Norway.*

³*Department of Nursing and Patient Safety, Indian Institute of Management Ahmedabad, Ahmedabad, India.*

⁴*Department of Palliative Nursing and Home Care, University College Dublin, Dublin, Ireland.*

Abstract

Extreme heat creates a distinctive safety problem in home-based palliative care because environmental exposure occurs within a setting where physiological reserve, oral intake, cognition, mobility, medication effects, caregiver availability, housing conditions, and goals of care can all modify what constitutes an appropriate response. This conceptual article examines heat exposure and hydration challenges through a climate-health vulnerability and preparedness framework. The analysis integrates heat physiology, frailty, fluid-balance pathways, medication-related susceptibility, cognitive and communication limitations, indoor environmental conditions, caregiver capacity, patient preferences, home-nursing recognition, preparedness, and surveillance. The central contribution is a conditional account in which heat-related harm depends on the interaction of environmental exposure, physiological susceptibility, recognition of change, and the capacity to deliver timely and goal-concordant responses. Thirst, dry mouth, dehydration, heat strain, and deterioration are treated as clinically related but non-equivalent phenomena. Preparedness therefore involves more than routine contact or generic heat advice: it requires individualized anticipatory assessment, feasible environmental options, medication awareness, caregiver and service readiness, and predetermined routes for reassessment and escalation. The framework does not prescribe universal fluid, cooling, or emergency thresholds. Its implications depend on disease trajectory, contraindications, patient preferences, home conditions, caregiver resources, and the expected burden and benefit of intervention.

Keywords: Palliative home care, Extreme heat, Dehydration, Nursing preparedness, Climate-health vulnerability, Symptom surveillance

Introduction

Climate change is increasingly relevant to hospice and palliative medicine because heat, storms, wildfire, infrastructure disruption, and other climate-related hazards can affect symptom control, continuity of care, medication access, caregiver support, and the feasibility of remaining at home near the end of life [1]. Exposure, physiological vulnerability, adaptation, behavioral response, built environment, and health-system capacity interact to determine risk [2-4].

Home-based palliative care concentrates these interactions in a clinically complex setting. At the same time, interventions conventionally framed as protective—greater fluid intake, active cooling, hospital transfer, or repeated surveillance—may be inappropriate, burdensome, unavailable, or inconsistent with the patient's goals. This article therefore examines heat exposure and hydration challenges through a climate-health vulnerability and preparedness framework tailored to home-based palliative care. The resulting account is designed to clarify where

Corresponding author: Michael Osei

Address: Department of Palliative Nursing and Hydration, University of Ghana Business School, Accra, Ghana

E-mail: ✉ michael.osei@ug.edu.gh

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preventable risk may arise and where apparently reasonable heat-response measures require modification because of advanced illness, treatment burden, patient preference, or limited home and service capacity.

Conceptual approach

The framework treats heat-related safety as a configuration rather than as a direct temperature-to-harm sequence. Even within older home-care populations, extreme heat is associated with increased emergency hospital admission while the magnitude of vulnerability differs according to functional and clinical characteristics [5].

Preparedness operates across these levels. Heat-health action plans generally combine warning, risk communication, surveillance, planning, and institutional coordination, although implementation remains uneven and long-term preparedness is often less developed than short-term response [6]. In home-based palliative care, an additional condition is necessary: the available response must be compatible with the patient's treatment goals and burdens [7].

None is sufficient alone. A hot home may remain tolerable for one patient yet destabilizing for another; deterioration may be recognized but difficult to treat at home; and strong service availability may still require restraint where intervention would conflict with the person's priorities.

Extreme heat as a home-palliative safety hazard

Home exposure may be prolonged and clinically meaningful even when patients are sedentary. Such findings matter for palliative home care because patients may spend most of the day indoors and may be unable to relocate, modify clothing independently, use cooling devices, or increase fluid intake without assistance [8].

Protective measures also depend on environmental conditions. Experimental work in older adults shows that electric-fan use during extreme indoor heat cannot be reduced to a universally beneficial or harmful rule because heat exchange depends on the combination of air temperature, humidity, evaporation, and individual physiology [9]. These values should not be converted into bedside emergency thresholds for palliative care, but they demonstrate why environmental intensity, duration, humidity, and available cooling need to be interpreted together [10].

A home-palliative heat hazard is therefore best understood as sustained environmental load acting within a setting whose protective options may be constrained. The dwelling, available cooling, mobility, caregiver presence, and clinical condition determine whether a period of hot weather remains manageable or becomes a patient-safety problem.

Table 1. Differentiating the heat-risk domains used in this article

Analytical element	Meaning in this article	Observable home manifestations	Must not be conflated with	Preparedness consequence
Environmental heat hazard	External thermal conditions capable of imposing physiological load	Hot indoor rooms, sustained daytime and night-time heat, limited cooling opportunity	Actual patient harm	Identify feasible environmental modifications and exposure duration
Home heat exposure	The patient's experienced thermal environment	Time spent indoors, room conditions, inability to relocate, dependence on others for cooling	Outdoor temperature alone	Assess the lived indoor environment rather than relying solely on weather alerts
Physiological susceptibility	Reduced ability to dissipate heat or maintain circulation and fluid balance	Frailty, chronic disease, limited mobility, reduced sweating, reduced intake	Exposure itself	Increase vigilance where reserve is limited
Recognition capacity	Ability to perceive, communicate and interpret heat-related change	Thirst reports, confusion, reduced responsiveness, functional change, caregiver observations	Objective hydration status	Use multiple information channels when self-report is unreliable
Preparedness capacity	Resources available to anticipate and respond to deterioration	Nursing plan, caregiver contacts, medication review, cooling options, service access	Routine contact frequency	Link observation to a feasible action pathway
Goal-concordant response	Intervention judged appropriate for the person's condition and priorities	Comfort measures, oral support, reassessment, clinical review, selective escalation	Maximum physiological correction	Balance expected benefit, burden, reversibility and patient preference

Physiological thermoregulation in advanced illness

Ageing and chronic disease can compromise several components of heat defense, including sweating, skin blood flow, cardiovascular compensation, thirst, renal conservation, and the ability to maintain fluid and electrolyte balance [11]. Advanced illness can plausibly magnify these constraints through cachexia, cardiovascular or renal

dysfunction, autonomic disturbance, infection, reduced mobility, sedation, and medication effects, although much mechanistic heat research has been conducted outside specialist palliative populations.

For this reason, physiological susceptibility should be treated as a reserve problem rather than as a diagnostic label. Conversely, symptoms appearing during hot weather may still arise from disease progression or another acute illness. Heat provides an additional physiological stressor; it does not establish the cause of deterioration by itself.

Age, frailty, and functional vulnerability

Frailty adds information beyond chronological age because it reflects diminished physiological reserve and reduced capacity to adapt to stress. The study did not include severely frail patients, making direct quantitative transfer to home palliative care inappropriate [12].

Functional dependence also changes the practical meaning of heat exposure. A patient who cannot independently obtain drinks, alter clothing, operate cooling equipment, move to another room, or communicate discomfort may face greater risk even if the physiological heat load is similar. Within home-care populations, functional and clinical characteristics contribute to heterogeneity in heat-associated emergency admissions [5].

Frailty in this framework therefore has two linked effects: it can reduce physiological reserve and simultaneously increase dependence on other people or services for protective action.

Dehydration and fluid-balance pathways

Older adults are vulnerable to dehydration during heat because thirst perception, renal concentrating capacity, total body water, mobility, and access to fluids may all be reduced, while fever, medications, gastrointestinal losses, or increased insensible losses may add further pressure [13]. Evidence from nursing-home populations shows substantial heterogeneity in dehydration estimates and repeatedly identifies cognitive impairment and acute illness among relevant risk factors [14].

Clinically, “dehydration” also requires differentiation. Water-loss dehydration and extracellular volume depletion are not interchangeable, and physical signs alone can perform poorly in older adults. Serum or biochemical assessment may clarify some states, but interpretation depends on the underlying clinical context [15].

Heat-period assessment should therefore avoid using a single symptom as proof of a specific fluid state. Intake, losses, consciousness, functional change, renal or cardiovascular conditions, medications, symptom burden, disease trajectory, and treatment goals all affect what fluid-related response is appropriate.

Medication-related heat risk

Medication exposure can modify heat vulnerability through several mechanisms, including altered sweating, cardiovascular response, fluid balance, renal handling, cognition, or behavioral capacity. A systematic review and meta-analysis of medication use during heat stress found evidence that some drug classes can increase core temperature, including strong anticholinergic agents and nonselective beta-blockers, while several other classes showed little or no measurable effect in the available experimental literature [16]. Many included studies involved younger or healthier participants, limiting direct inference for frail patients with multimorbidity.

Real-world evidence adds a complementary perspective. During the 2021 British Columbia heat dome, linked health and medication data identified associations between selected medication exposures and heat-related community deaths [17]. Such associations remain vulnerable to confounding by the diseases for which drugs are prescribed.

Medication review before and during hot weather should consequently focus on patient-specific interaction risk rather than a universal list of medications to stop. Indication, dose, renal function, cardiovascular status, anticholinergic burden, sedative effects, fluid losses, feasibility of monitoring, and the consequences of altering treatment all require consideration.

Cognitive and communication limitations

Cognitive impairment can affect both physiological vulnerability and the ability to recognize or communicate deterioration. Longitudinal evidence from older adults in the United States also suggests that hotter conditions can be associated with poorer performance in some cognitive domains, especially fluid cognitive functions, with social and behavioral modifiers influencing the association [18, 19].

The relationship is nevertheless heterogeneous. In the REGARDS cohort, long-term exposure to extreme heat was not associated with overall cognitive decline across the full study population, although subgroup patterns were observed [20, 21].

This uncertainty becomes clinically important when communication is already impaired. Nurses working in specialist palliative home care describe difficulty distinguishing thirst, dry mouth, discomfort, and other needs when dying patients cannot clearly communicate [22].

Housing and indoor environmental conditions

The home is both the site of exposure and the main platform for adaptation. Perceived comfort, however, cannot be assumed to indicate physiological safety in a frail patient with reduced heat-defense capacity [23].

Environmental resources influence what adaptation is possible. For home-based palliative patients, the analogous issue is practical feasibility: whether the patient can move within the dwelling, obtain shade or ventilation, use a cooling device safely, or receive assistance with environmental adjustment [24].

Housing therefore enters the framework as an active modifier of exposure. Advice has limited value when a dwelling cannot be cooled, the patient is confined to one room, energy costs restrict equipment use, or no caregiver is present to implement adjustments.

Social isolation and caregiver capacity

Social isolation can magnify heat vulnerability by reducing observation, assistance, information, and access to timely help. Although ecological findings cannot establish an individual causal pathway, they support treating social connection as part of heat-response capacity [25].

Caregiver presence also does not guarantee preparedness. Intervention evidence is similarly cautionary: a randomized trial of web-based psychoeducation in specialist palliative home care did not demonstrate a significant comparative improvement in caregiver preparedness, even though preparedness increased over time in both study groups [26, 27].

The relevant distinction is therefore between caregiver availability and caregiver capacity. Heat preparedness may depend on whether a caregiver can recognize change, offer appropriate comfort or fluid support, manage environmental measures, contact clinicians, and understand when the current plan no longer appears adequate.

Patient preferences and fluid-management complexity

Fluid management near the end of life carries relational and ethical meanings that extend beyond physiological correction. Nurses similarly report ethical challenges when thirst, reduced intake, artificial fluids, family expectations, and the aim of a peaceful dying process become difficult to reconcile [28, 29].

Thirst and dry mouth should also be distinguished from systemic dehydration. A randomized crossover trial in palliative care found that simple ice-based interventions, including flavored ice, could reduce perceived thirst and dry-mouth symptoms [30].

Clinically assisted hydration introduces a different decision. Feasibility research has shown that assisted hydration in the last days of life can be studied systematically while monitoring clinical outcomes and burdens, but such work does not establish a universal efficacy rule [31]. More broadly, the evidence base for thirst and xerostomia interventions in palliative and end-of-life care remains limited and includes substantial transfer from non-palliative settings [32, 33].

Table 2. Interpretive and responsibility states in heat-related hydration decisions at home

Clinical or care situation	Interpretive problem	Primary information sources	Response responsibility	Boundary requiring explicit consideration
Patient reports thirst and can communicate clearly	Thirst may reflect dry mouth, heat discomfort, fluid deficit, medication effects, or several processes together	Patient report, oral examination, intake/loss history, clinical trajectory	Patient, caregiver and nurse jointly	Symptom relief should not automatically be equated with systemic rehydration
Patient has dry mouth with little reported thirst	Reduced reporting may reflect cognition, consciousness, disease progression or altered sensation	Oral findings, behavior, caregiver observations, medication review	Nurse interprets multiple signals rather than relying on self-report alone	Dry mouth is not sufficient evidence of dehydration
Patient cannot reliably communicate	Internal state is only partially observable	Behavior, responsiveness, function, intake, caregiver knowledge, longitudinal comparison	Nurse and caregiver share recognition while clinician reviews unexplained deterioration	Proxy interpretation must remain open to uncertainty
Family strongly requests fluids	Caregiving responsibility and fear of suffering may shape preferences	Family concerns, known patient wishes, clinical findings	Team explains aims, benefits, burdens and alternatives	Family distress does not replace the patient's known values
Clinically assisted hydration is being considered	Potential physiological benefit may coexist with treatment burden or limited relevance to comfort	Disease trajectory, symptoms, contraindications, goals and feasible monitoring	Prescriber/team decision with patient or appropriate surrogate involvement	Technical feasibility does not determine appropriateness
Heat, medication burden and	Cause of deterioration may be multifactorial	Medication history, heat exposure, fluid balance,	Nursing recognition linked to medical review	Avoid assigning causality to heat or

cognitive change coexist	cognition, vital/clinical change	medication without adequate assessment
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Home-nursing risk recognition

Home nursing occupies a critical position between environmental observation and clinical interpretation. The Integrated Palliative care Outcome Scale has been used longitudinally in patients receiving palliative care at home [34], while electronic symptom-monitoring studies suggest that remote systems can increase the visibility of symptoms and support communication between home and clinical services [35]. IPOS itself has established validity, reliability, and responsiveness across advanced-illness populations [36]. These tools should support rather than replace heat-specific clinical reasoning. During hot weather, structured assessment can instead provide a baseline against which new weakness, confusion, reduced intake, distress, functional deterioration, nausea, dizziness, somnolence, or changes in symptom burden can be interpreted. Where patient communication is limited, risk recognition becomes distributed across patient behavior, caregiver observations, nursing assessment, medication context, environmental conditions, and change from the person's usual state.

Preparedness before heat events

Preparedness should be established before temperatures become hazardous because some protective actions are difficult to arrange once the patient is already deteriorating. Useful preparatory domains include identifying the hottest rooms and feasible cooling options, clarifying who will check on a patient who lives alone, reviewing medicines and conditions that may affect heat or fluid tolerance, ensuring access to clinically appropriate drinks or oral-care measures, documenting how caregivers should contact the service, and clarifying when same-day assessment may be required. Preparedness cannot be equated with simply increasing routine contact. In a cohort of 597,388 older adults dually enrolled in Medicare and Medicaid, regular Medicaid home visits did not attenuate the increase in emergency-department use associated with extreme heat [37]. For home-based palliative care, preparedness is therefore a configured capability: relevant risks have been anticipated, feasible responses are available, roles are understood, and the response plan reflects the patient's clinical limits and goals.

Surveillance during heat events

Surveillance during a heat event should focus on change from the patient's baseline and on relationships among environmental exposure, symptoms, cognition, function, intake, medications, caregiver observations, and response to simple measures. A rising indoor heat burden accompanied by new confusion, reduced responsiveness, functional decline, persistent distress, or reduced intake carries a different significance from stable symptoms in a patient who remains comfortable and clinically unchanged. Electronic or structured symptom monitoring may support this process, but surveillance remains useful only when abnormal signals reach someone able to interpret and act on them. The null association between regular home visits and reduced heat-related emergency use [37] reinforces the difference between being observed and having an effective response available. Heat-period surveillance becomes clinically meaningful when signals from the patient, caregiver, nurse, home environment, and service are linked to an actionable and goal-concordant response pathway (Figure 1).

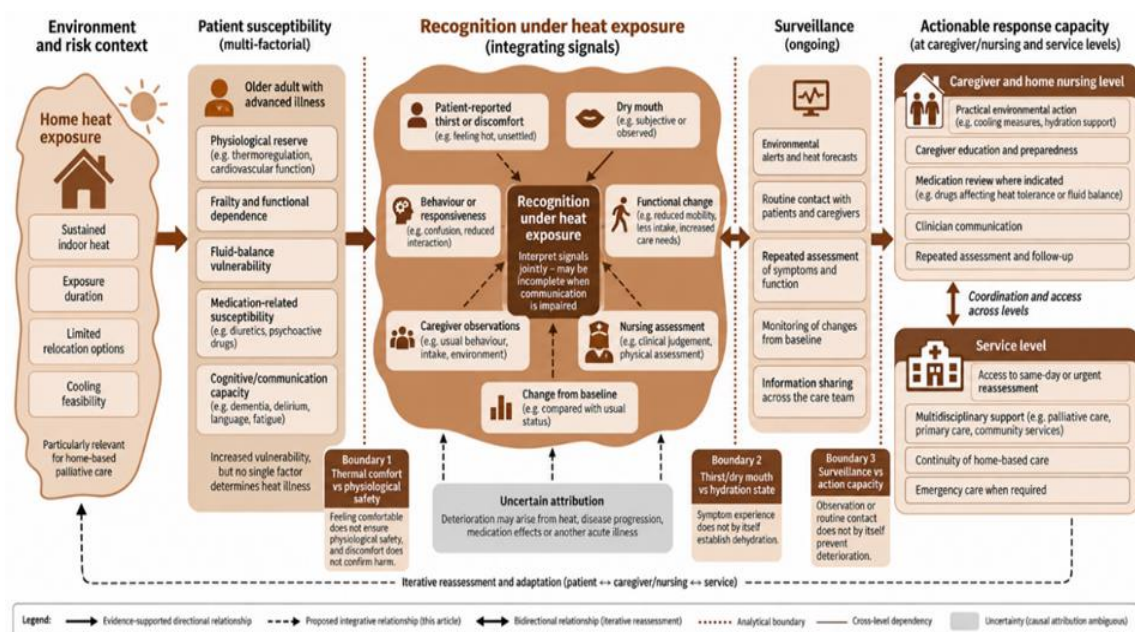


Figure 1. Heat-period recognition and surveillance architecture in home-based palliative care

Hydration and symptom-management strategies

Heat-period fluid management should begin by identifying the clinical objective. Palliative-care trial evidence indicates that simple oral cooling can reduce thirst and xerostomia [30]. This symptomatic benefit should remain distinct from correction of a fluid deficit.

Where systemic hydration is being considered, the underlying fluid state, renal and cardiovascular function, swallowing ability, medication effects, prognosis, expected benefit, and treatment burden become relevant. Expert guidance on clinically assisted hydration in advanced cancer supports individualized assessment rather than a fixed fluid prescription [32]. The limited direct evidence for thirst interventions in specialist palliative populations further supports cautious transfer of findings from other settings [31, 33].

Heat management should therefore allow several legitimate responses: environmental modification, oral comfort measures, clinically appropriate oral fluids, medication or illness reassessment, selective clinically assisted hydration, or no escalation of fluid treatment when burdens exceed anticipated benefit.

Escalation and emergency thresholds

No single temperature, fluid volume, symptom, or physiological value can serve as a universal escalation threshold for home-based palliative care. Heat-associated emergency admissions differ across home-care populations [5], while dehydration may coexist with renal or cardiovascular vulnerability that changes the safety of replacement strategies [13].

Escalation is better understood as a change in the balance between current deterioration, reversibility, available home response, and the patient's goals. The significance of each signal depends on baseline status and the intended direction of care.

Clinically assisted hydration may be appropriate in selected circumstances [32], while evidence from the last days of life remains insufficient to justify routine use [31]. Likewise, increased professional contact cannot itself be assumed to prevent emergency utilization during extreme heat [37].

Proposed heat-hydration-preparedness framework

The synthesis developed here proposes that heat-related safety in home-based palliative care depends on five interacting conditions: environmental exposure, physiological susceptibility, recognition capacity, response capacity, and goal concordance.

Environmental exposure establishes the thermal load. Recognition capacity determines whether emerging change becomes visible through the patient, caregiver, nurse, or monitoring system. Goal concordance determines whether the available response is appropriate for the person's preferences, disease trajectory, and expected burden. These conditions can compensate for or amplify one another. High exposure may remain manageable when reserve, recognition, cooling, caregiving, and responsive services remain strong. Preparedness changes risk only when the resources it identifies can be mobilized.

This formulation is a proposed synthesis of the reviewed evidence rather than a validated prediction model. It does not assign numerical weights or assume that every deterioration occurring during hot weather is heat-caused.

Table 3. Decision states within the proposed heat–hydration–preparedness framework

Observed configuration	Immediate interpretive task	Potential response zone	Factors that can redirect the decision	Boundary that must not be crossed
Heat exposure with stable comfort, cognition and function	Determine whether exposure is increasing and whether current adaptation remains feasible	Continue observation and feasible environmental protection	Frailty, medication changes, caregiver availability, overnight heat	Stable appearance must not be treated as proof of unlimited physiological reserve
Heat exposure with thirst or dry mouth but no other clear deterioration	Distinguish symptom burden from inferred systemic fluid deficit	Oral comfort measures, appropriate drinks, reassessment	Swallowing, fluid restrictions, oral condition, patient preference	Thirst or dry mouth alone must not be treated as diagnostic dehydration
Heat exposure with declining intake or function	Assess fluid balance, illness progression, medication contribution and reversibility	Nursing/clinical reassessment with individualized supportive measures	Renal/cardiovascular disease, prognosis, treatment goals	No universal fluid volume should be prescribed from the framework
Heat exposure with new confusion or reduced communication	Determine whether heat, dehydration, medication, disease progression or another acute process may be contributing	Increased observation and prompt clinical review	Baseline cognition, medication exposure, caregiver observations, service access	Heat must not be assigned causal responsibility without assessment
Persistent deterioration despite feasible home measures	Assess whether the home plan can still meet clinical and comfort goals	Same-day or urgent escalation according to agreed goals	Expected reversibility, transfer burden, patient preference, available services	Escalation must not automatically mean hospital transfer
Dying trajectory with limited expected benefit from physiological correction	Clarify whether intervention primarily improves comfort or adds burden	Goal-concordant comfort care with selective intervention where beneficial	Patient wishes, family concerns, symptom response, burdens	Technical ability to provide fluids or cooling does not create an obligation to maximize correction

Ethical and goal-of-care boundary conditions

Heat preparedness does not suspend ordinary palliative-care ethics. Relatives may experience offering drinks as an expression of care and responsibility [28], while nurses may encounter uncertainty when reduced intake, thirst, artificial fluids, family expectations, and peaceful dying intersect [29].

The principal ethical boundary is therefore between preventable suffering or reversible deterioration and intervention whose burden is no longer justified by the likely benefit or the patient's goals. Conversely, preparedness does not require maximal physiological correction [38, 39].

Patient preference, decision-making capacity, previously expressed wishes, surrogate understanding, symptom burden, contraindications, prognosis, and the feasibility of home care should remain visible whenever the framework is applied.

Service and community resilience

Individual preparedness cannot compensate indefinitely for weak service capacity. Realist evaluation evidence shows that time for caring communication and responsive specialist input can shape how patients and families experience end-of-life care at home [40].

Service resilience also depends on maintaining recognizable quality functions during disruption. Comparative home-care data indicate that palliative-care quality indicators can be monitored across periods of major system stress, although statistical differences should not automatically be interpreted as clinically important deterioration [41].

Caregiver capacity forms part of this resilience layer. A heat-response plan that relies heavily on family observation or intervention must therefore consider whether the caregiver can realistically perform the expected role [42].

Figure 2 represents the resulting decision architecture: environmental and clinical risk may call for intervention, but the pathway remains bounded by goals of care, caregiver capacity, and service capability.

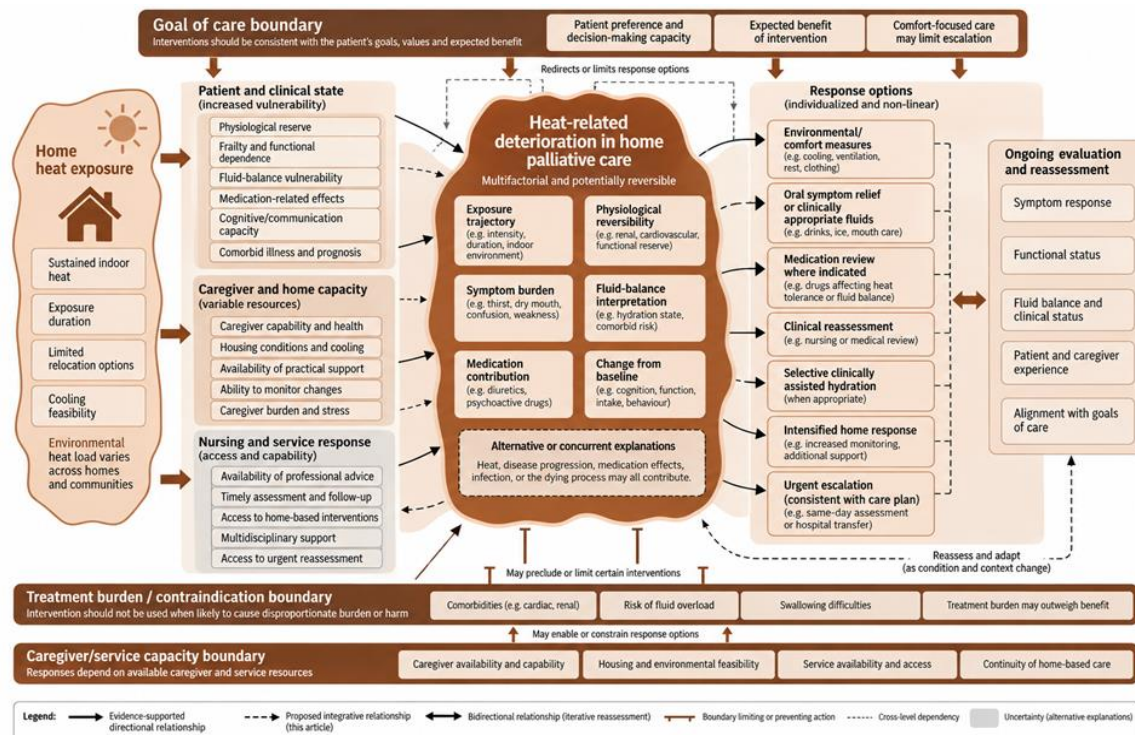


Figure 2. Goal-concordant heat response under unequal home, caregiver, and service capacity

Nursing practice implications

Nursing practice should connect environmental assessment with clinical trajectory. Structured symptom assessment can support longitudinal comparison, while caregiver observations become particularly important when the patient cannot reliably self-report [22].

The practical emphasis is anticipatory and interpretive rather than protocol-driven. Electronic monitoring may improve visibility [35], but it should augment rather than replace clinical assessment or service responsiveness.

Research agenda

Future research should determine whether heat-response mechanisms identified in healthier older populations remain valid in people with advanced disease, severe frailty, multimorbidity, or limited mobility [16].

Palliative studies should test whether transient confusion, communication difficulty, thirst reporting, and functional decline provide clinically useful signals during heat exposure [20, 21].

Preparedness research should move beyond counting contacts or educational encounters. One caregiver intervention did not demonstrate a significant comparative preparedness effect [27], and regular home visits did not attenuate heat-associated emergency-department use [35, 37].

Table 4. Research propositions and discriminating tests for the heat-hydration-preparedness framework

Research proposition	Competing explanation that must be tested	Preferred discriminating observation	Priority population or setting	Finding that would challenge the proposed synthesis
Frailty modifies heat tolerance beyond chronological age	Observed deterioration is explained mainly by disease severity	Repeated physiological and functional response under naturally occurring heat exposure	Frail home-palliative patients	No meaningful modification by frailty/function after disease severity is considered
Communication impairment increases delayed recognition	Clinical deterioration is recognized equally well through routine monitoring	Compare detection timing across differing communication capacity and caregiver support	Cognitively impaired or minimally communicative patients	Recognition timing is unrelated to communication/caregiver conditions
Medication effects depend on drug class and clinical context	Underlying disease explains apparent medication-heat associations	Medication-specific analyses with disease severity and renal/cardiovascular status	Multimorbid older palliative patients	Associations disappear consistently after appropriate confounding control

Thirst relief and hydration correction are distinct outcomes	Improvement in thirst reliably indicates correction of fluid deficit	Parallel symptom and objective fluid-balance assessment	Patients reporting thirst/dry mouth during heat	Symptom change consistently tracks validated hydration change
Preparedness requires actionable response capacity	More professional contact alone is sufficient	Compare contact frequency with access to timely clinical/environmental action	Home nursing and palliative services	Contact frequency alone consistently prevents clinically important deterioration
Caregiver capacity modifies home heat resilience	Presence of any caregiver is sufficient	Measure preparedness, burden, training and ability to implement care plans	Family-supported home palliative care	Outcomes do not vary with caregiver capability once presence is established
Goal concordance changes the meaning of escalation	Physiological correction should dominate decision-making	Compare clinical decisions and patient-centered outcomes across care-goal states	Advanced illness with differing goals of care	Goal state does not alter preferred or experienced consequences of intervention

Results and Discussion

The principal contribution of this synthesis is to treat heat exposure and hydration challenges as a conditional home-care safety problem rather than as a universal temperature or fluid-management problem.

The evidence also resists a single causal narrative. A caregiver education intervention did not demonstrate a comparative improvement in preparedness [27], while routine home visits did not reduce the heat-associated increase in emergency use [37].

Its most important boundaries are clinically familiar but especially consequential during extreme heat: comfort is not identical to physiological safety; thirst is not identical to dehydration; monitoring is not identical to protection; and technical feasibility is not identical to goal-concordant care.

The strongest rival explanation for deterioration remains the patient's underlying illness and dying trajectory. The framework therefore supports heightened interpretation during hot weather without assigning heat causal primacy merely because exposure occurred.

Limitations

Direct research simultaneously examining extreme heat, hydration, and specialist palliative home care remains sparse. Observational heat studies are vulnerable to exposure misclassification and residual confounding.

Several clinically important components—including thirst, caregiver responsibility, ethical uncertainty, and home communication—are supported mainly by qualitative research. Consequently, the proposed cross-level relationships should be regarded as a testable conceptual synthesis rather than a validated prediction or intervention model.

Conclusion

Extreme heat can create substantial safety challenges in home-based palliative care, but exposure alone does not determine outcome. Risk emerges when environmental heat interacts with limited physiological reserve, frailty, fluid-balance vulnerability, medication effects, impaired recognition or communication, constrained housing, insufficient caregiver capacity, or delayed service response.

Preparedness is therefore most useful when it converts anticipated vulnerability into feasible, individualized and goal-concordant action. Thirst relief, hydration support, cooling, surveillance and escalation may all be appropriate, but their meaning changes with the patient's condition, contraindications, preferences, home circumstances and expected burden of intervention. A defensible heat-response strategy for palliative home care is consequently conditional rather than universal: it protects against avoidable heat-related harm while preserving the clinical and ethical priorities that define palliative care.

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