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Integrated Multidisciplinary and Intelligent Decision Support for Complex Chronic Care: A Comparative Review of Allergic Rhinitis–Asthma Comorbidity and Contemporary Oncology Practice

Dr. Amelia Sørensen

Department of Clinical Health Systems, University of Copenhagen, Denmark

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Abstract: Background: Contemporary clinical care increasingly confronts diseases that are biologically complex, clinically heterogeneous, and operationally demanding. Two areas exemplify this challenge in particularly distinct yet conceptually related ways: allergic rhinitis with comorbid asthma, and cancer management through multidisciplinary tumor boards. The literature on allergic airway disease shows that rhinitis and asthma are strongly interconnected at epidemiological, immunological, symptomatic, and quality-of-life levels, requiring coordinated diagnostic and therapeutic approaches (Leynaert et al., 2000; Kalpaklioğlu & Baççioğlu, 2008; Bousquet et al., 2020; GINA, 2023). Meanwhile, oncology literature demonstrates that multidisciplinary decision-making has become central to patient-centered, precision-oriented management, with recent studies exploring the role of artificial intelligence and large language models as adjunctive tools in tumor boards and cancer care (Luchini et al., 2020; Benary et al., 2023; Sorin et al., 2023; Uprety et al., 2023).

Objective: This article develops an integrative review of how multidisciplinary practice, decision support, and patient-centered outcome assessment can improve management in two major clinical domains: allergic rhinitis–asthma comorbidity and oncology. It also critically evaluates the emerging role of artificial intelligence-based systems in complex clinical decision environments.

Methodology: A qualitative integrative review was conducted strictly on the basis of the references supplied. The study synthesized literature across epidemiology, pathophysiology, guideline-based care, quality of life, environmental and genetic risk, tumor board practice, Bayesian and AI-assisted decision systems, and large language model applications in healthcare.

Results: The review identifies four major findings. First, allergic rhinitis and asthma should be approached as linked airway disorders requiring coordinated evaluation. Second, disease burden extends beyond symptoms to productivity, function, psychosocial well-being, and treatment complexity. Third, multidisciplinary structures improve decision quality in oncology and provide a transferable model for other complex conditions. Fourth, artificial intelligence and large language models show promise as support tools, but their use remains constrained by concerns around reliability, contextual reasoning, bias, and governance.

Conclusion: The future of complex chronic care lies in combining evidence-based guidelines, multidisciplinary collaboration, nuanced phenotyping, and carefully governed intelligent decision support. The clinical promise of such integration is substantial, but it must remain grounded in human oversight, patient context, and rigorous validation.

Keywords: Allergic rhinitis, asthma comorbidity, multidisciplinary care, tumor board, artificial intelligence, decision support, quality of life.

Introduction: Complex disease management in modern medicine rarely depends on a single diagnosis, a single specialist, or a single decision point. Rather, it unfolds within layered clinical realities shaped by comorbid conditions, evolving evidence, environmental triggers, patient preferences, diagnostic uncertainty, and increasing therapeutic complexity. Two areas that make this especially visible are allergic rhinitis with comorbid asthma, and cancer care delivered through multidisciplinary teams and tumor boards. At first glance, these domains may appear unrelated. One concerns chronic inflammatory airway disease, while the other involves malignant conditions across multiple organ systems. Yet the reference base provided reveals an important conceptual convergence: both fields illustrate the need for integrated, patient-centered, evidence-sensitive, and increasingly intelligent models of care.

Allergic rhinitis has often been underestimated as a routine or minor condition, but the literature clearly suggests that such a view is clinically incomplete. Rhinitis is highly prevalent globally, imposes a substantial burden on quality of life and productivity, and often coexists with asthma in ways that magnify symptom severity, treatment needs, and functional impairment (Nathan et al., 2008; Savouré et al., 2022; Banjar et al., 2023). The “united airway” concept, although not always labeled identically across all studies, is reflected throughout the literature. Nasal and lower airway disease share inflammatory mechanisms, overlapping triggers, and interdependent effects on symptom control (Kalpaklioğlu & Baççioğlu, 2008; Elkholy et al., 2012; Bousquet et al., 2020). This means that fragmented care can lead to under-recognition of disease burden, incomplete treatment response, and persistent patient dissatisfaction.

The epidemiological significance of allergic airway disease is considerable. Rhinitis affects large populations worldwide, although prevalence estimates vary according to definitions, methods, and time trends (Savouré et al., 2022). Allergic nasal symptoms are common in the United States and elsewhere, highlighting the broad public health relevance of these disorders (Nathan et al., 2008). Asthma prevalence has also shown major global variation and notable temporal trends, as documented in international childhood symptom surveys and subsequent epidemiological discussions (Pearce et al., 2007). When rhinitis and asthma co-occur, the burden becomes more than additive. Studies consistently indicate worsened quality of life, greater symptom instability, and more extensive functional compromise when patients experience both conditions simultaneously (Leynaert et al., 2000; Kalpaklioğlu & Baççioğlu, 2008; Banjar et al., 2023).

The mechanisms underlying this relationship are also well established at a conceptual level. Asthma is not a single disease entity but a syndrome with multiple inflammatory pathways, phenotypes, and environmental determinants (Fahy, 2009; Wenzel, 2005; Lambrecht & Hammad is not in the user's list and thus cannot be cited, so omitted). Eosinophilic and neutrophilic inflammation provide differing clinical implications, and eosinophilic asthma in particular has important overlap with allergic disease and targeted biologic treatment strategies (Fahy, 2009; Walford & Doherty, 2014). Genetic factors contribute meaningfully to asthma susceptibility, as shown by broad reviews and genomewide association work, while obesity, tobacco smoke exposure, indoor environmental conditions, and ambient air pollution further shape incidence, exacerbation patterns, and response to treatment (Chen et al., 2002; Jaakkola et al., 2003; Moffatt et al., 2010; Ober & Yao, 2011; Kanchongkittiphon et al., 2015; Ierodiakonou et al., 2016). In such a context, narrowing the clinical lens to a single symptom cluster or organ site is insufficient.

Guideline evolution reinforces this need for integration. The ARIA framework represents a major effort to align allergic rhinitis management with evidence grading and real-world practice, explicitly recognizing the close relationship between rhinitis and asthma (Bousquet et al., 2020). GINA has similarly transformed asthma management, including the important rejection of short-acting bronchodilator-only treatment for many patients and the emphasis on more preventive, risk-reducing strategies (Reddel et al., 2019; GINA, 2023). These developments reflect a broader shift in medicine: management is no longer judged merely by acute symptom suppression, but by comprehensive control, exacerbation prevention, functional preservation, and patient-reported outcomes.

The quality-of-life dimension is central here. Multiple studies in the provided literature examine how allergic rhinitis affects well-being, daily function, work productivity, and disease experience, especially when asthma is also present (Leynaert et al., 2000; Kalmarzi et al., 2017; Maoua et al., 2019; Moitra et al., 2023). The effect is not trivial. Rhinitis can disturb sleep, concentration, work efficiency, physical comfort, mood, and social functioning. It can also worsen asthma control, potentially increasing treatment requirements and perceived disease severity (Elkholy et al., 2012; Banjar et al., 2023). The economic impact of allergic rhinitis, as discussed by Meltzer and Bukstein (2011), adds another layer, showing that direct and indirect costs are significant. Thus, the disease burden

must be understood in broader human and system terms rather than only through symptom counts.

The second domain represented in the references, oncology, offers a useful model for understanding what integrated care can look like when complexity is embraced rather than minimized. Cancer care increasingly relies on multidisciplinary tumor boards, molecular tumor boards, and collaborative decision environments that bring together clinicians from different specialties to interpret evidence, reconcile competing priorities, and tailor treatment plans (Thenappan et al., 2016; Luchini et al., 2020; Berardi et al., 2020). This movement reflects the recognition that clinical complexity often exceeds the interpretive capacity of isolated decision-making. In oncology, histopathology, imaging, genomic data, comorbidity, performance status, treatment toxicity, and patient goals must often be considered together. The tumor board is therefore not merely a meeting format; it is an institutional response to complexity.

What makes the oncology literature especially relevant for this article is that it introduces an additional dimension: the rise of intelligent decision support. Studies on IBM Watson for Oncology, Bayesian network graphs, and, more recently, large language models such as ChatGPT demonstrate growing interest in computational tools that can assist human clinicians in synthesizing information or generating options (Zhou et al., 2018; Cypko et al., 2017; Cascella et al., 2023; Benary et al., 2023; Sorin et al., 2023). At the same time, these studies reveal caution. Concordance with clinical practice is variable, utility depends on context, and enthusiasm must be balanced against concerns related to reliability, hallucination, bias, transparency, and medico-legal responsibility (Zhou et al., 2018; Uprety et al., 2023; Temsah et al., 2023). The promise is real, but the limitations are equally important.

This raises the central problem addressed in the present article. The literature on allergic rhinitis and asthma strongly argues for integrated care, yet most discussions remain focused on guidelines, pathophysiology, and burden rather than on formalized multidisciplinary decision structures. The oncology literature, by contrast, has more extensively developed the organizational and computational aspects of collaborative decision support. There is therefore a gap in the broader healthcare literature: insufficient cross-domain theorization of how multidisciplinary models and emerging intelligent tools can support care in chronic inflammatory disease as well as cancer. In other words, medicine has advanced in recognizing complexity, but not all fields have institutionalized their response to complexity equally.

A second gap concerns the place of intelligent systems in chronic disease management. Most of the AI references in the list are tied to healthcare generally or oncology specifically, not to allergic airway disease. Yet the need for support in chronic respiratory-allergic care is substantial. Clinicians must interpret symptom profiles, comorbidities, exposure patterns, obesity status, lung function changes, inflammatory phenotypes, and treatment response trajectories while aligning practice with guideline recommendations (Monga et al., 2019; Bousquet et al., 2020; GINA, 2023). If carefully governed, decision support tools may help structure this complexity. However, this possibility remains conceptually underexplored in relation to rhinitis–asthma care.

A third gap lies in the relationship between disease burden and decision systems. Clinical decision-making is too often evaluated only by whether it reaches a technically correct diagnostic or therapeutic recommendation. The provided literature suggests that this is insufficient. A high-quality decision is one that addresses symptom control, functional well-being, work productivity, psychosocial effects, and long-term risk, not only biological activity or guideline adherence (Kalmarzi et al., 2017; Maoua et al., 2019; Moitra et al., 2023). This applies in oncology as well, where multidisciplinary care is valued partly because it can accommodate broader patient context (Berardi et al., 2020). Thus, decision systems must be evaluated not only for precision, but for holistic clinical relevance.

The objective of this article is therefore to produce an integrative, publication-ready review based strictly on the supplied references, with four aims. First, it analyzes allergic rhinitis and asthma as interconnected disorders requiring coordinated assessment and management. Second, it evaluates the burden of these conditions across quality of life, function, productivity, and disease control. Third, it examines the oncology literature on multidisciplinary boards and computational decision support as a model for structured complexity management. Fourth, it develops a cross-domain interpretation of how multidisciplinary and intelligent support systems may contribute to future complex chronic care, while critically discussing their limitations.

The article argues that the future of healthcare for complex conditions lies neither in technology alone nor in traditional clinical intuition alone. Rather, it lies in carefully governed integration: evidence-based guidelines, multidisciplinary collaboration, nuanced disease phenotyping, and support tools that assist but do not replace human judgment. Allergic rhinitis with asthma comorbidity and modern oncology together illustrate this trajectory with unusual clarity. One shows

the burden of under-integrated chronic disease management, while the other shows the possibilities and constraints of formalized collaborative and computational support. Read together, these literatures suggest a path forward for medicine that is more coordinated, more reflective, and more responsive to complexity.

METHODOLOGY

This article adopts a qualitative integrative review methodology based strictly on the references provided in the prompt. The goal is not to conduct a quantitative meta-analysis or to generate new primary data, but to synthesize conceptually related themes from heterogeneous medical literature in order to build a coherent scholarly argument about integrated care, multidisciplinary decision-making, and intelligent clinical support. Because the reference list spans allergic rhinitis, asthma, environmental and genetic determinants, quality of life, multidisciplinary oncology practice, Bayesian decision modeling, and large language models in healthcare, an integrative rather than narrowly systematic approach is appropriate. Such a method allows for the construction of an analytical framework across adjacent but not identical clinical domains.

The first stage of the review involved thematic categorization of the references. One cluster comprised allergic rhinitis epidemiology, clinical burden, and therapeutic management, including work on prevalence, quality of life, occupational impact, treatment strategies, and ARIA guideline developments (Nathan et al., 2008; Small et al., 2018; Hossenbaccus et al., 2020; Bousquet et al., 2020; Savouré et al., 2022; Nur Husna et al., 2022; Moitra et al., 2023). A second cluster addressed asthma epidemiology, pathophysiology, severity, environmental and lifestyle risk factors, genetics, phenotype differentiation, and management changes, including global prevalence trends, inflammatory patterns, genomewide evidence, obesity, tobacco smoke, indoor exposures, air pollution, and GINA-related guidance (Chen et al., 2002; Jaakkola et al., 2003; Wenzel, 2005; Pearce et al., 2007; Fahy, 2009; Moffatt et al., 2010; Ober & Yao, 2011; Walford & Doherty, 2014; Kanchongkittiphon et al., 2015; Ierodiakonou et al., 2016; Reddel et al., 2019; GINA, 2023). A third cluster focused on the rhinitis–asthma relationship itself, including comorbidity, symptom control, pulmonary effects, and life-quality outcomes (Leynaert et al., 2000; Kalpaklioğlu & Baççioğlu, 2008; Elkholy et al., 2012; Monga et al., 2019; Banjar et al., 2023). A fourth cluster contained oncology and multidisciplinary-care literature, including global cancer burden, tumor boards, molecular tumor boards, and multidisciplinary benefits and limitations (Bray et al., 2018; Thenappan et al., 2016; Luchini et al., 2020; Berardi et al., 2020). A fifth cluster centered on computational or intelligent clinical support, including Bayesian graphs, IBM Watson, feasibility discussions around ChatGPT, large language model support for oncology and tumor boards, and broader medical-literature analyses (Cypko et al., 2017; Zhou et al., 2018; Cascella et al., 2023; Temsah et al., 2023; Sorin et al., 2023; Benary et al., 2023; Uprety et al., 2023; Hügle, 2023; Lukac et al. is not in the user's list, so omitted).

The second stage involved identification of recurring conceptual categories across the clusters. These categories included disease complexity, comorbidity, symptom heterogeneity, patient-centered outcomes, multidisciplinary integration, clinical decision burden, evidence translation, diagnostic uncertainty, precision care, and the role of intelligent tools in supporting rather than supplanting clinical judgment. These categories were chosen because they recur in both allergic airway literature and oncology decision literature, even where the disease contexts differ. For instance, both domains confront the problem of heterogeneity: asthma varies by phenotype and trigger profile, while cancer varies by tumor biology, stage, molecular features, and patient context (Wenzel, 2005; Luchini et al., 2020). Both also require movement beyond single-specialist reasoning when management becomes complex.

The third stage involved comparative interpretation. The article does not claim that allergic rhinitis–asthma care and oncology are equivalent in severity, urgency, or decision architecture. They are not. However, they can be compared in terms of how healthcare systems manage complexity. Oncology has developed more visible multidisciplinary structures, while allergic airway disease has developed more explicit evidence-based integration between disease entities through guideline systems such as ARIA and GINA (Bousquet et al., 2020; GINA, 2023). By comparing these approaches, the article explores whether principles of multidisciplinary and intelligent support may transfer conceptually from oncology to chronic inflammatory airway care.

The fourth stage consisted of narrative synthesis. Findings were organized into a structured argument moving from disease burden to decision architecture. Rather than summarizing each study in isolation, the method sought to interpret the supplied literature collectively and to derive cross-cutting implications. This included paying attention to quality-of-life measures, productivity impacts, environmental and genetic contributors, treatment evolution, and the opportunities and limitations associated with artificial

intelligence in clinical settings.

Because the review is restricted to the supplied references, several methodological limitations must be acknowledged. First, the review does not incorporate external sources that might strengthen or complicate the analysis. This is particularly relevant because some well-known references in asthma immunology or AI governance are not included in the list. Second, the literature is heterogeneous in purpose and design. Some sources are population studies, some are guideline documents, some are clinical reviews, and some are proof-of-concept or feasibility studies about AI tools. This diversity enriches conceptual synthesis but limits direct comparability. Third, many of the AI-related studies are recent and exploratory, which means their long-term implications remain unsettled. The present article therefore interprets them with caution and avoids claiming mature readiness where the literature only supports emerging promise.

Despite these limitations, the methodology is appropriate to the article's purpose. The central question is not whether one intervention outperforms another in a narrowly measurable way. It is how modern medicine can better organize knowledge, collaboration, and support tools around complex conditions. A text-based integrative review is well suited to this problem because it enables the construction of a higher-order framework from multiple strands of evidence. The findings below emerge from this methodological process.

RESULTS

The literature synthesis yielded four principal findings. First, allergic rhinitis and asthma are best understood as linked disorders whose combined burden requires coordinated clinical management. Second, disease burden in allergic airway conditions is multidimensional, extending beyond symptoms into quality of life, work productivity, psychosocial well-being, and broader functioning. Third, multidisciplinary structures in oncology demonstrate an important model for handling complexity, uncertainty, and individualized care. Fourth, artificial intelligence and large language models show meaningful but still limited promise as support systems in complex decision environments.

The first major finding is that allergic rhinitis and asthma are deeply interconnected at epidemiological, pathophysiological, and experiential levels. This is one of the most consistent themes in the literature. Leynaert et al. (2000) showed that allergic rhinitis and asthma are linked in terms of quality-of-life impairment in a population-based study of young adults. Kalpaklioğlu and Baççioğlu (2008) similarly demonstrated that allergic rhinitis has an important impact on asthma-related quality of life. Elkholy et al. (2012) found that rhinitis adversely affects life quality among patients with bronchial asthma. More recently, Banjar et al. (2023) reported that allergic rhinitis influences asthma and meaningfully affects the quality of life of asthmatic patients. These findings are not isolated observations; they converge on the idea that rhinitis is not merely a nuisance comorbidity but an integral component of airway disease burden.

This relationship is reinforced by guideline and overview literature. Bousquet et al. (2020), through the next-generation ARIA guidelines, explicitly frame allergic rhinitis in relation to asthma and emphasize evidence-based integrated management. Small et al. (2018) and Nur Husna et al. (2022) provide broader clinical overviews of allergic rhinitis, highlighting its inflammatory basis and practical management implications. Hossenbaccus et al. (2020) discuss optimal use of established and newer therapies, again underscoring that definitive management requires more than symptomatic short-term relief. The literature therefore supports a clinically integrated view of upper and lower airway disease.

A second aspect of this first finding involves the prevalence and public health scope of disease. Nathan et al. (2008) documented the prevalence of nasal symptoms attributed to allergies in the United States, illustrating the broad reach of rhinitis. Savouré et al. (2022) reviewed the worldwide prevalence of rhinitis in adults and showed that definitions and time trends matter greatly for estimating burden. Pearce et al. (2007), examining worldwide trends in asthma symptoms, similarly demonstrated that asthma remains a globally significant condition with major geographic variation. Taken together, these references show that allergic airway disease should be treated as a large-scale public health issue rather than a narrow specialty concern.

The second major finding is that allergic airway disease burden is broader and deeper than symptom counts alone can capture. Quality of life appears repeatedly as a core outcome across the literature. Kalmarzi et al. (2017) examined the impact of allergic rhinitis on quality of life and found significant impairment. Maoua et al. (2019) extended this to occupational settings, showing that allergic occupational rhinitis affects both quality of life and work productivity. Moitra et al. (2023) studied symptom control and health-related quality of life in allergic rhinitis with and without asthma and found that comorbidity matters importantly for patient experience. The literature suggests that sleep disturbance, concentration difficulty, fatigue, embarrassment, irritability, reduced

social participation, and work inefficiency are all part of the disease burden landscape.

Economic implications align with this broader burden perspective. Meltzer and Bukstein (2011) specifically addressed the economic impact of allergic rhinitis, noting the significance of treatment costs, indirect losses, and guideline-informed care. This is important because it shifts allergic rhinitis from being perceived as a common but low-consequence condition to being recognized as a disorder with meaningful economic and social implications. When rhinitis worsens asthma control, the burden likely intensifies through additional medication needs, physician visits, functional limitation, and exacerbation risk, even when not all studies measure each of these outcomes directly.

Pulmonary effects further expand the burden profile. Monga et al. (2019) reported deranged pulmonary function tests in allergic rhinitis patients, suggesting that even in settings where asthma is not yet clearly identified, lower airway involvement may be clinically relevant. This supports the idea that allergic rhinitis can be a marker of broader airway vulnerability. The implication is not that every patient with rhinitis has or will develop asthma, but that clinicians should be attentive to respiratory overlap, early functional changes, and symptom evolution.

The third major finding concerns the multi-causal nature of asthma and the relevance of this complexity to integrated care. Asthma is shaped by immune phenotype, disease severity, environmental exposure, body composition, genetics, and treatment history. Fahy (2009) distinguished eosinophilic and neutrophilic inflammation in asthma, making clear that inflammatory heterogeneity has clinical consequences. Walford and Doherty (2014) focused on eosinophilic asthma diagnosis and management from a United States perspective, reflecting the growing importance of phenotype-guided care. Wenzel (2005) discussed severe asthma in adults, highlighting that the upper end of disease severity poses particularly difficult management challenges.

Environmental and host factors add further complexity. Jaakkola et al. (2003) demonstrated an association between environmental tobacco smoke and adult-onset asthma. Kanchongkittiphon et al. (2015) reviewed indoor environmental exposures and asthma exacerbation, while Ierodiakonou et al. (2016) linked ambient air pollution with lung function and airway responsiveness in asthmatic children. Chen et al. (2002) suggested that obesity may increase asthma incidence in women. The NIH obesity evidence review (2013) strengthens the broader background linking weight-related health burden to chronic disease complexity. Ober and Yao (2011) reviewed the genetics of asthma and allergic disease, while Moffatt et al. (2010) provided large-scale consortium-based genomewide association evidence. The combined result is a picture of asthma as a multifactorial syndrome requiring individualized assessment rather than generic treatment sequences.

This matters because integrated care must be responsive to complexity rather than merely comprehensive in name. A patient with allergic rhinitis and asthma may also have obesity, indoor allergen exposure, air pollution exposure, tobacco smoke exposure, a distinct inflammatory phenotype, differing lung function patterns, and variable adherence. Such a patient cannot be optimally managed through fragmented symptom-by-symptom care. The literature indicates that guidelines are increasingly sensitive to this reality. Reddel et al. (2019) and GINA (2023) reflect the move toward risk-aware, controller-focused asthma management. Vignola et al. (2004) showed the efficacy and tolerability of omalizumab in patients with concomitant allergic asthma and persistent allergic rhinitis, illustrating how therapeutic advances can directly target overlapping allergic disease processes.

The fourth major finding centers on oncology as a field in which complexity management has been more formally operationalized through multidisciplinary structures. Bray et al. (2018) provide the global burden context for cancer, underscoring why organized decision systems matter. Berardi et al. (2020) discuss the benefits and limitations of a multidisciplinary approach in cancer patient management, making clear that while such approaches improve comprehensiveness, they are not without logistical and organizational constraints. Thenappan et al. (2016) showed that review at a multidisciplinary tumor board can affect critical management decisions in pediatric oncology. Luchini et al. (2020) further examined molecular tumor boards in clinical practice, a development driven by the increasing relevance of genomic and molecular profiling.

These studies reveal that multidisciplinary boards are not simply ceremonial consensus gatherings. They are practical mechanisms for integrating diverse expertise where disease complexity exceeds the boundaries of any single specialty. They can improve decision quality, reveal overlooked options, reconcile conflicting interpretations, and align treatment with evolving evidence. Yet they also require coordination, time, infrastructure, and high-quality data flow, and may be limited by resource availability, participation patterns, or uneven implementation (Berardi et al., 2020; Luchini et al., 2020).

The fifth major finding concerns computational and intelligent decision support. Cypko et al. (2017) proposed Bayesian network graphs for cancer treatment decisions, representing an earlier effort to formalize clinical reasoning structures. Zhou et al. (2018) evaluated concordance between IBM Watson for Oncology and clinical practice in China, indicating both the appeal and the limits of algorithmically supported oncology recommendations. More recent studies have shifted attention to large language models. Cascella et al. (2023) evaluated the feasibility of ChatGPT across healthcare scenarios. Temsah et al. (2023) reviewed early ChatGPT presence in medical literature. Sorin et al. (2023) examined ChatGPT as a support tool for breast tumor board settings. Benary et al. (2023) assessed large language models for decision support in personalized oncology. Uprety et al. (2023) discussed ChatGPT as a promising generative AI tool and reflected on implications for cancer care. Hügle (2023) broadened the conversation by discussing opportunities for large language models in rheumatology.

The overall result from these sources is cautiously optimistic. Large language models may improve information synthesis, support question formulation, summarize evidence, and assist in structuring multidisciplinary conversations. They may be especially useful in environments where clinicians must rapidly navigate extensive information. However, the literature also implies substantial limitations. Feasibility does not equal readiness for autonomous clinical decision-making. AI tools may produce plausible but inaccurate output, lack grounded reasoning, reflect training-data bias, or fail to incorporate critical context such as local protocols, patient priorities, nuanced contraindications, or subtle disease trajectory information (Cascella et al., 2023; Uprety et al., 2023; Temsah et al., 2023). The studies therefore support an adjunctive, not substitutive, role.

A further result emerges when these two domains are read together: allergic rhinitis–asthma care may benefit from more formalized collaborative and intelligent support structures, although the oncology model cannot simply be copied. The evidence from rhinitis and asthma shows complexity, comorbidity, phenotypic variation, environmental influence, and significant quality-of-life burden. The oncology literature shows that complex decisions improve when multiple forms of expertise and structured deliberation are brought together. The AI literature suggests that intelligent tools may support such deliberation when carefully constrained. The integrative implication is that chronic airway disease management may be strengthened by adopting more explicit models of structured collaboration and support, particularly for difficult, comorbid, or refractory cases.

Finally, the literature indicates that patient-centered outcomes must remain at the heart of any future system. Whether discussing tumor boards, asthma guidelines, rhinitis burden, or AI support, the ultimate concern is not merely technical correctness. It is whether patients experience better control, improved functioning, reduced uncertainty, and more coherent care. This is perhaps the most important result of the synthesis.

DISCUSSION

The findings of this review suggest that modern healthcare is moving toward a model in which complexity is not treated as an exception but as a routine characteristic of serious and persistent illness. Allergic rhinitis with comorbid asthma and contemporary oncology practice illuminate this transition from different directions. The former shows how common conditions can be clinically underestimated when managed in fragmented ways. The latter shows how high-complexity medicine has begun to institutionalize coordination and decision support. When read together, these literatures point toward a broader transformation in clinical care: integrated management, multidisciplinary reasoning, and carefully governed intelligent support are becoming central to high-quality practice.

The first interpretive conclusion concerns the clinical status of allergic rhinitis. The literature makes it increasingly difficult to justify treating allergic rhinitis as a minor or largely cosmetic condition. The burden described across studies is persistent, wide-ranging, and magnified by asthma comorbidity (Leynaert et al., 2000; Kalmarzi et al., 2017; Banjar et al., 2023). Rhinitis affects sleep, concentration, productivity, and life satisfaction, and may also interact with lower airway disease in ways that worsen asthma outcomes (Kalpaklioğlu & Baççioğlu, 2008; Elkholy et al., 2012). From a public health standpoint, the high prevalence of rhinitis and asthma means that even modest impairments can translate into major societal impact (Nathan et al., 2008; Savouré et al., 2022; Pearce et al., 2007).

This has practical implications for care organization. Many patients with rhinitis may be managed in primary care or even self-managed through over-the-counter medication. While this is appropriate for some, the literature suggests that clinicians should maintain a lower threshold for integrated airway assessment in patients with persistent symptoms, sleep disturbance, poor function, suspected asthma, or diminished response to standard therapy. ARIA and GINA together

create a framework for this broader vigilance (Bousquet et al., 2020; GINA, 2023). The message is not that every patient requires specialist referral, but that every patient deserves evaluation informed by the rhinitis–asthma connection.

The second major interpretive conclusion is that complexity in allergic airway disease is not only biological but organizational. The literature on asthma risk factors and phenotypes shows that management can be confounded by obesity, tobacco exposure, indoor irritants, ambient pollution, genetic susceptibility, inflammatory subtype, and disease severity (Chen et al., 2002; Jaakkola et al., 2003; Wenzel, 2005; Fahy, 2009; Moffatt et al., 2010; Ober & Yao, 2011; Kanchongkittiphon et al., 2015; Ierodiakonou et al., 2016). A patient's symptoms may reflect not one cause but a layered interaction of host biology and environment. This complexity poses a decision burden on clinicians, especially where time, specialty access, or continuity is limited.

Oncology offers a revealing comparison because it has more visibly developed institutional structures to handle such burden. Multidisciplinary tumor boards, molecular tumor boards, and related collaborative systems are essentially organizational solutions to the problem of complexity (Thenappan et al., 2016; Berardi et al., 2020; Luchini et al., 2020). They acknowledge that no single clinician, however expert, can fully encompass all relevant domains of interpretation in every case. This principle has obvious relevance beyond cancer. Severe asthma, eosinophilic phenotypes, recalcitrant rhinitis, occupational triggers, and multiple comorbidities may likewise benefit from more structured collaborative review, especially in tertiary settings. The review therefore supports the idea that multidisciplinary thinking should become more explicit in complex allergic airway care.

At the same time, such transfer must be careful rather than literal. Tumor boards emerged partly because cancer care often involves urgent high-stakes choices among surgery, systemic therapy, radiation, pathology interpretation, and genomic findings. Allergic rhinitis and asthma do not typically require the same meeting architecture for every patient. However, the conceptual lesson remains valid: when disease is heterogeneous, comorbid, environmentally entangled, and burdened by uncertain response, structured collaborative reasoning can improve care. This might take the form of difficult-airway case conferences, integrated allergy-pulmonology clinics, environmental exposure consultation, or digitally supported multidisciplinary review for selected patients. The oncology experience shows the potential value of such structures, while also reminding us that they require resources and coordination.

A third major discussion point concerns patient-centered outcomes. One of the strongest features of the allergic rhinitis literature is its consistent attention to quality of life. This focus is critically important because it resists a reductionist view of success. A patient may have partial symptom reduction yet still experience poor sleep, poor work performance, irritability, or functional embarrassment. Maoua et al. (2019) and Moitra et al. (2023) help make clear that disease control cannot be fully understood without considering productivity and health-related quality of life. Likewise, oncology multidisciplinary care is valued in part because it can incorporate broader context into management decisions (Berardi et al., 2020). The implication is that any future intelligent or collaborative support system must include outcomes that matter to patients, not only disease markers or protocol alignment.

This leads directly to the role of artificial intelligence. The recent surge in interest around large language models has created both anticipation and concern. The studies in the reference list collectively show that these tools may help with summarization, decision support, option generation, communication assistance, and information handling in clinical settings (Cascella et al., 2023; Sorin et al., 2023; Benary et al., 2023; Hügle, 2023). In oncology, where decision spaces can become data-heavy, such support appears especially attractive. The Watson literature, Bayesian decision work, and LLM-based studies all reflect the same deeper aspiration: to improve human decision-making under conditions of information overload (Cypko et al., 2017; Zhou et al., 2018; Benary et al., 2023).

However, the literature also supports a sober perspective. Feasibility studies and early reviews do not justify uncritical clinical deployment. Large language models may generate fluent but incorrect recommendations, fail to cite evidence appropriately, ignore local context, or convey false confidence (Cascella et al., 2023; Temsah et al., 2023; Uprety et al., 2023). Even when they perform well in structured settings, such performance may not generalize. Tumor board support experiments show promise, but promise should not be confused with autonomous clinical competence (Sorin et al., 2023). The safest interpretation is that these systems may assist clinicians with information processing and communication tasks, while responsibility for reasoning, prioritization, and ethical accountability remains firmly human.

A particularly important issue is contextuality. Medical decisions are never made from abstract data alone. A

therapy that is guideline-concordant may still be inappropriate for a given patient because of adherence barriers, occupational exposure, cost, cultural preferences, concurrent illness, or prior treatment experience. In allergic rhinitis and asthma, the environmental context is especially important. Indoor exposures, tobacco smoke, pollution, obesity, and occupational factors all shape disease expression and treatment success (Chen et al., 2002; Jaakkola et al., 2003; Kanchongkittiphon et al., 2015; Ierodiakonou et al., 2016). An AI system that does not adequately capture these dimensions could easily oversimplify care. This is one reason why multidisciplinary human oversight remains indispensable.

There is also a counter-argument worth considering: some may say that drawing lessons from oncology to allergic airway disease risks over-medicalizing chronic conditions that are already manageable through existing guidelines. This concern has merit. Not every case of rhinitis or asthma requires extensive multidisciplinary infrastructure, and unnecessary complexity could burden healthcare systems and patients alike. Yet the literature reviewed here does not imply universal escalation. Rather, it supports selective intensification where disease is uncontrolled, comorbid, severe, phenotypically complex, or functionally burdensome. In such contexts, structured collaboration may reduce rather than increase inefficiency by preventing repeated fragmented care and poorly coordinated treatment changes.

Another counterpoint is that AI discussions may currently be driven more by novelty than by clinical necessity. Again, this caution is justified. Some healthcare enthusiasm around generative AI may outpace evidence, and early tools may perform inconsistently. But rejecting the entire field would also be premature. The more defensible position, supported by the literature, is conditional exploration under strict clinical governance. Intelligent systems should be tested where they solve real problems, such as evidence synthesis, meeting preparation, structured summarization, or support for complex multidisciplinary deliberation. They should not be treated as replacements for specialist reasoning or patient dialogue.

The article's comparative approach also suggests a broader insight about the future of medicine: the distinction between chronic disease care and high-complexity specialty care may become less absolute over time. Chronic diseases such as asthma are increasingly phenotype-informed, environment-sensitive, and guideline-intensive. Cancer care is increasingly data-rich, personalized, and computationally supported. In both fields, the central challenge is managing complexity without losing human judgment. This may be the defining tension of next-generation healthcare.

From a systems perspective, the review points toward several practical implications. First, rhinitis and asthma services should strengthen integration, particularly through shared assessment pathways and attention to quality-of-life outcomes. Second, clinicians should more routinely consider the environmental, functional, and comorbid context of allergic airway disease rather than treating symptoms in isolation. Third, complex chronic cases may benefit from more formal collaborative review models inspired by multidisciplinary practice in oncology. Fourth, AI tools should be introduced only as tightly supervised aids, with transparent awareness of limitations and strong emphasis on validation. Fifth, future research should evaluate not only clinical accuracy but also the effects of collaborative and intelligent support on patient experience, workflow, safety, and equity.

This last point about equity is crucial. Technological support systems often enter healthcare through high-resource settings. Oncology, molecular boards, and AI pilot studies may be more feasible in well-resourced centers than in community or low-resource environments. If intelligent support becomes another layer available only to already advantaged systems, disparities may deepen. A similar issue exists in allergic airway disease, where exposure burden and care fragmentation may disproportionately affect vulnerable populations. Although the supplied references do not directly focus on inequality as a primary theme, the implications are present. Future implementation must therefore consider who benefits, who is left out, and whether new tools genuinely improve access to high-quality reasoning or merely centralize it.

Several limitations of the present article should be explicitly stated. The first is that the review integrates two clinical domains that are not usually discussed together, which may invite criticism regarding conceptual breadth. That breadth is intentional because the article seeks higher-order insights about complexity management rather than disease-specific intervention ranking. The second limitation is that the review is strictly bounded by the supplied references, which means some relevant literature on integrated respiratory care, AI governance, or implementation science is necessarily absent. The third is that many AI studies cited are early-stage and should not be taken as definitive evidence of mature clinical readiness. The fourth is that the article is interpretive and theoretical rather than empirical in the primary-data sense.

Even with these limitations, the review contributes meaningfully by framing allergic rhinitis–asthma care and oncology decision practice within a shared conceptual architecture of integration, collaboration, and support. It argues that medicine's future may depend less on choosing between human expertise and intelligent tools, and more on learning how to organize them responsibly around patient complexity. This is not a technical problem alone. It is an epistemic, organizational, and ethical one.

CONCLUSION

The literature reviewed in this article supports a clear and significant conclusion: integrated, multidisciplinary, and carefully supported clinical reasoning is increasingly necessary for the management of complex disease. Allergic rhinitis with comorbid asthma and contemporary oncology may differ in pathology, urgency, and traditional care settings, but they reveal convergent truths about the demands of modern medicine. Disease burden is rarely confined to one organ system, one symptom cluster, or one professional perspective. It often extends into quality of life, productivity, psychosocial function, therapeutic uncertainty, and long-term risk.

In allergic airway disease, the evidence strongly indicates that rhinitis and asthma should be approached as interrelated conditions. Their overlap affects symptom control, pulmonary status, life quality, and treatment needs, while environmental factors, obesity, genetic susceptibility, inflammatory phenotype, and disease severity add further complexity (Leynaert et al., 2000; Chen et al., 2002; Fahy, 2009; Moffatt et al., 2010; Bousquet et al., 2020; GINA, 2023). These findings support care models that are more coordinated than conventional symptom-specific management.

In oncology, multidisciplinary boards and molecular tumor boards illustrate how healthcare systems can respond institutionally to complexity. They create structured environments for combining expertise, reconciling evidence, and individualizing care (Thenappan et al., 2016; Berardi et al., 2020; Luchini et al., 2020). This model offers transferable lessons for other complex conditions, especially where comorbidity, heterogeneity, and therapeutic escalation challenge traditional siloed practice.

The emerging literature on artificial intelligence and large language models adds a new dimension. These tools may enhance information management, discussion preparation, and decision support, particularly in data-heavy fields such as oncology. However, the evidence also makes clear that they remain adjunctive instruments, not substitutes for clinical judgment, multidisciplinary reasoning, or patient-centered deliberation (Cascella et al., 2023; Benary et al., 2023; Sorin et al., 2023; Uprety et al., 2023). Their future value will depend on rigorous validation, contextual awareness, transparency, and ethical governance.

The overarching conclusion of this review is that the future of complex chronic care lies in integration without oversimplification. High-quality medicine must unify guidelines with judgment, symptom control with life quality, phenotype with environment, and technology with accountability. In this future, intelligent systems may help clinicians think more clearly, but only if they are embedded within collaborative structures and human oversight. Allergic rhinitis–asthma care and oncology both show that the real challenge is not merely having more information. It is organizing that information into decisions that are clinically sound, contextually grounded, and genuinely beneficial for patients.

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