iJRASET
International Journal For Research in Applied Science and Engineering Technology



# INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

**Volume:** 14 **Issue:** XI **Month of publication:** November 2026

**DOI:** https://doi.org/10.22214/ijraset.2026.85589

www.ijraset.com

Call: 08813907089 | E-mail ID: ijraset@gmail.com

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
*ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538*
*Volume 14 Issue XI Nov 2026- Available at www.ijraset.com*

# The Nocebo Effect Across Therapeutic Conditions: Implications for Pharmacy Counselling

Zahra Hakim[1], Anvi Joshi[2], Rajratan Thorat[3]
[1, 2]*B.Pharm Students,* [3]*Assistant Professor, Principal K. M. Kundnani College of Pharmacy, Mumbai-400005, India*

***Abstract:*** ***The nocebo effect describes adverse symptoms, treatment experiences, or treatment-related concerns that arise or become amplified through negative expectations, prior learning, contextual cues, anxiety, and interpretation of bodily sensations. Although the symptoms are experienced as real, their occurrence may not be explained solely by the pharmacological action of a medicine. This review integrates ten supplied references addressing the nocebo phenomenon across gastrointestinal disorders, inflammatory bowel disease, psychotropic treatment, statin therapy, pain, oncology, endometriosis, neurology, immunology, and broader healthcare communication. Evidence from randomized trials, clinical reviews, adverse-event reporting, and communication-focused literature indicates that nocebo responses can increase symptom reporting, treatment withdrawal, anxiety, pain amplification, and perceived treatment intolerance. In neuromodulator trials for disorders of gut–brain interaction, adverse events and withdrawals were also observed in placebo groups, while in other settings contextual factors and expectations influenced the pattern of symptoms reported. Proposed mechanisms include negative expectancy and conditioning, activation of cholecystokinin-related pathways, modulation of endogenous opioid and dopaminergic signalling, hypothalamic–pituitary–adrenal axis activation, cortisol responses, and autonomic changes. The clinical challenge is particularly important for pharmacy practice because counselling is a modifiable component of the treatment environment. Pharmacists must communicate risks sufficiently for informed decision-making while avoiding unnecessarily alarming or decontextualized descriptions that may intensify fear and symptom vigilance. A patient centred approach should therefore explore beliefs and previous experiences, explain expected benefits, distinguish common manageable effects from serious warning signs, validate symptoms without premature attribution, encourage appropriate reporting, and support shared decision-making. Future research should evaluate pharmacist-led communication strategies using standardized nocebo outcomes, adherence measures, and patient-reported experiences across therapeutic areas.***

***Keywords: Nocebo effect; negative expectations; adverse events; medication adherence; pharmacy counselling; patient-centred care; therapeutic communication; informed consent; symptom interpretation.***

## I. INTRODUCTION

The nocebo effect refers to unpleasant symptoms, adverse experiences, or perceived treatment-related harm that occur or become intensified because of negative expectations, prior learning, conditioning, contextual information, anxiety, or the way bodily sensations are interpreted. It is commonly discussed as the negative counterpart of the placebo effect, but the nocebo response should not be reduced to an idea that symptoms are imaginary. Patients can experience genuine and measurable physiological changes even when a symptom is not caused directly by the pharmacological action of the medicine.[1,2]

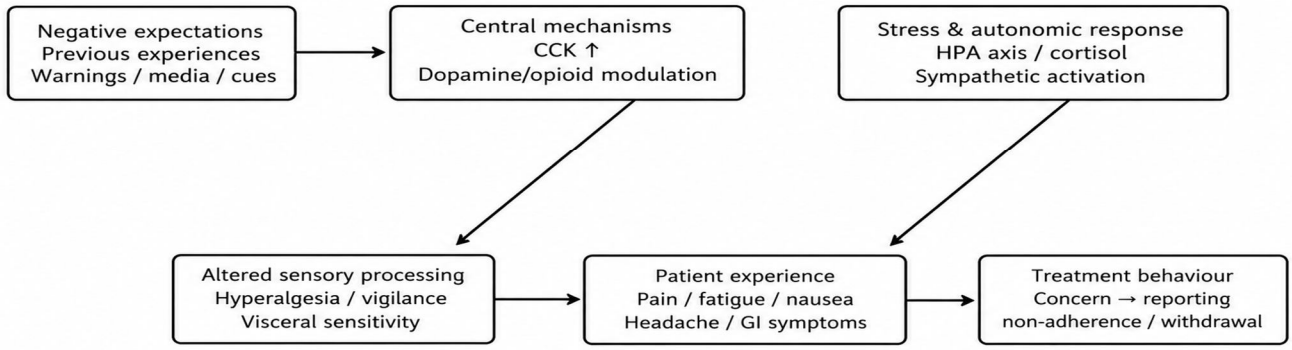
Expectations can be established before treatment begins. Previous adverse effects, stories from family or peers, media reports, online discussions, warning labels, the appearance of a medicine, and the verbal or non-verbal behaviour of healthcare professionals can all provide cues about what a patient should expect. Anxiety, catastrophising, depressed mood, heightened symptom attention, and previous treatment experiences may further shape the interpretation of normal or nonspecific bodily sensations.[2,3] The clinical importance of this phenomenon extends beyond symptom perception. Nocebo responses may increase adverse-event reporting, reduce confidence in treatment, encourage repeated reassurance-seeking, contribute to non-adherence, and lead to premature discontinuation. In clinical trials, adverse events reported by placebo recipients demonstrate that symptoms can arise in the absence of the active pharmacological exposure. However, placebo adverse events do not automatically prove that a symptom is entirely nocebo-related, because background disease symptoms, coincidental illness, and study participation can also contribute.[1,2]

Pharmacy counselling is particularly relevant because pharmacists routinely explain the purpose of medicines, expected benefits, adverse effects, precautions, monitoring requirements, and adherence. The counselling encounter can therefore modify treatment expectations. A communication style that is balanced, individualized, and empathetic may support realistic expectations, whereas excessive or poorly contextualized risk information may increase apprehension and symptom vigilance.[3,6]

©IJRASET: All Rights are Reserved 

This review examines the nocebo effect across diverse therapeutic conditions and clinical contexts, integrating the supplied evidence into a pharmacy-focused framework. Rather than treating each condition as an isolated example, the review considers the shared mechanisms of expectation, learning, context, communication, symptom attribution, and treatment behaviour, while retaining important differences between therapeutic settings.

**Figure 1. Conceptual pathway of the nocebo response**




## II. LITERATURE REVIEW

### *A. Conceptual and theoretical foundations*

Across the reviewed literature, nocebo responses arise from an interaction between what a patient expects and how the nervous system processes incoming information. Negative expectations can increase attention to bodily sensations and influence top-down interpretation. Conditioning provides another pathway: when a neutral context repeatedly becomes associated with an unpleasant treatment experience, the context itself may later trigger anticipatory symptoms.[2,6]

The biological literature describes several pathways through which negative expectancy can become physiologically expressed. The supplied communication-focused review describes activation of cholecystokinin (CCK)-related signalling, suppression or modulation of endogenous opioid and dopaminergic systems, activation of the hypothalamic–pituitary–adrenal axis, cortisol elevation, and autonomic changes. These mechanisms have been particularly discussed in relation to pain, anxiety, visceral symptoms, and stress-related treatment experiences.[6,8] In pain-related nocebo responses, negative information may increase anxiety and alter pain processing, contributing to hyperalgesia and allodynia. The practical implication is that risk communication is not merely an exchange of facts; the manner, sequence, and context in which information is delivered can influence the patient's subsequent experience of treatment.[5,8]

The distinction between nocebo-related symptoms and pharmacologically mediated adverse drug reactions remains clinically important. A symptom should not be dismissed as psychological simply because it could have an expectation-mediated component. Instead, clinicians should assess onset, timing, severity, dose relationship where relevant, alternative explanations, objective findings, and the patient's concerns. This approach protects patients from both under-recognition of genuine adverse reactions and unnecessary treatment discontinuation.

### *B. Evidence across therapeutic conditions*

Disorders of gut–brain interaction provide one of the clearest quantitative examples in the supplied literature. A systematic review and meta-analysis of 30 randomized controlled trials involving 2,284 patients found withdrawals due to adverse events in 4% of placebo recipients and 9% of neuromodulator recipients. Among studies reporting at least one adverse event, pooled proportions were 18% for placebo and 43% for neuromodulators. The authors estimated that approximately 44% of withdrawals and 42% of reported adverse events in the active-treatment group could be attributed to nocebo effects within the relevant trial context. Dry mouth, fatigue, and constipation were more frequent with treatment, whereas dizziness, headache, and diarrhoea were reported at similar rates in placebo and active groups.[1]

Inflammatory bowel disease provides a further illustration of the importance of expectation and learning. In trials involving Crohn's disease and ulcerative colitis, placebo and nocebo responses vary with disease characteristics, trial design, and the number of study visits. These observations are relevant because gastrointestinal symptoms fluctuate naturally, making attribution to a newly initiated therapy particularly challenging.[2] The psychotropic literature demonstrates that placebo groups may report adverse effects resembling those associated with active treatment. Evidence discussed by Amanzio suggests that information, expectations, perceived treatment identity, and previous experiences can influence adverse-event patterns across psychotropic treatment contexts, including migraine, multiple sclerosis, Parkinson disease, and fibromyalgia.[3]

Statin therapy offers a different evidence context. Moon and colleagues examined adverse events reported to the United States Food and Drug Administration Adverse Event Reporting System and considered the nocebo effect as one possible explanation for the prominence of subjective symptoms in statin-related reports. The distinction between subjective complaints and more objective adverse-event reports emphasizes the importance of interpreting symptom timing and context rather than assuming that every reported symptom is necessarily caused by the medicine.[4] Pain represents a particularly sensitive therapeutic context because information about possible harm can directly alter expectations about discomfort. Excessive or negatively framed information may increase anxiety, pain amplification, hyperalgesia, allodynia, fear, and avoidance.[5]

The additional communication-focused sources broaden the clinical picture. In oncology, anticipatory nausea and vomiting can develop through repeated pairing of treatment environments with chemotherapy-related illness; environmental cues, treatment equipment, and prior experiences can become conditioned signals.[6,7] The supplied review describes anticipatory nausea and vomiting in a proportion of patients by later chemotherapy cycles, illustrating how symptoms may begin before the next pharmacological exposure.[6] Endometriosis and other chronic conditions demonstrate another pathway: misinformation, delayed diagnosis, and repeated exposure to threatening interpretations of bodily symptoms may contribute to symptom misattribution and heightened visceral sensitivity.[6,9] This does not mean that symptoms are unreal; rather, the context surrounding symptoms may influence their intensity and interpretation. In immunology and public health, expectation can operate at a population level. Vaccine trials provide an informative comparison because participants in control groups can report systemic symptoms despite receiving an inert intervention. Public communication, media emphasis, social transmission of risk, and heightened threat perception may increase attention to normal physiological sensations and influence attribution.[6,10]

Neurology-focused literature similarly emphasizes pragmatic reduction of nocebo responses through careful communication, recognition of psychological and contextual factors, and avoidance of unnecessarily alarming language.[8] Together, these clinical contexts show that the nocebo effect is not restricted to one drug class: its expression varies with disease characteristics, symptom burden, previous experiences, treatment setting, information environment, and the quality of therapeutic communication.

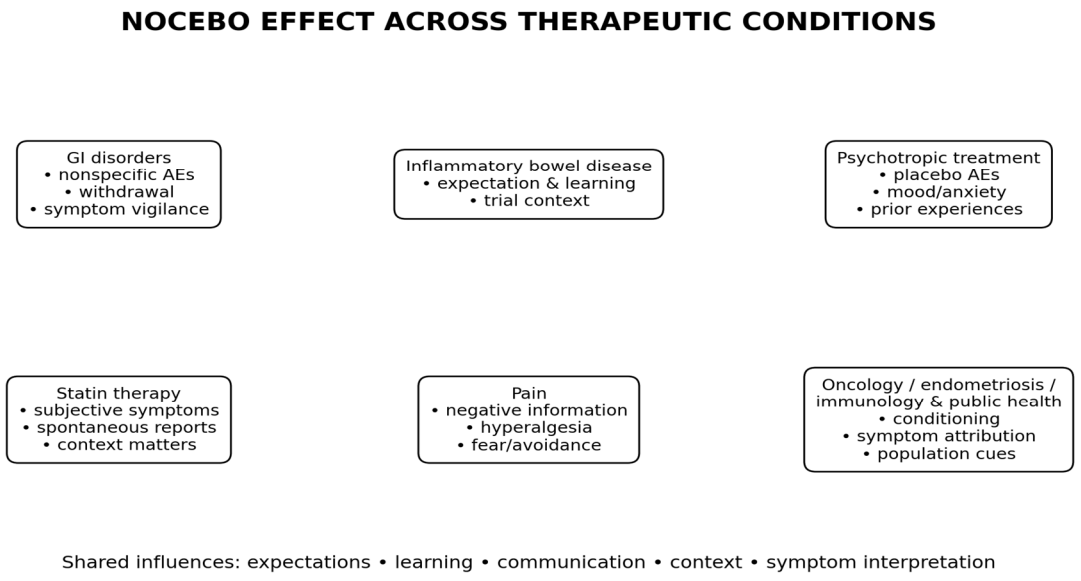



Figure No. 2. Nocebo manifestations across therapeutic conditions represented in the supplied literature. Original schematic.[1–10]

*ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538*
*Volume 14 Issue XI Nov 2026- Available at www.ijraset.com*

## III. METHODOLOGY

The present review was conducted as a narrative review of the literature concerning the nocebo effect and its relevance to therapeutic outcomes and patient care. Ten selected references were reviewed to examine evidence related to negative treatment expectations perception and reporting of adverse events symptom amplification treatment discontinuation and communication between patients and healthcare professionals. The selected literature covered a range of therapeutic areas including gastrointestinal disorders inflammatory bowel disease pain psychotropic medicines statin therapy and other clinical conditions. Relevant findings were identified and compared with particular focus on factors that may contribute to nocebo responses and their effects on patients' treatment experiences adherence and continuation of therapy. Reports of adverse events occurring in placebo or control groups were also considered when they helped differentiate potential nocebo-related effects from adverse effects attributable to the pharmacological action of a medicine. The findings were grouped thematically according to the mechanisms underlying the nocebo effect its clinical manifestations factors influencing patient responses and its implications for pharmacy counselling. Evidence concerning expectation-related adverse experiences the influence of communication and approaches to minimise avoidable negative expectations was considered across different therapeutic settings. A narrative synthesis was used because the selected studies differed in their designs patient populations therapeutic conditions and outcome measures. These differences limited the suitability of direct quantitative comparison and statistical pooling. so the purpose of the review was to provide an integrated discussion of findings from the selected literature rather than conduct a formal meta-analysis. Particular attention was also given to the challenges faced by healthcare professionals when discussing potential adverse effects while supporting informed decision-making and avoiding the creation of unnecessary negative expectations.[1-10]

## IV. RESULTS

The reviewed evidence demonstrates that nocebo responses may manifest through symptoms, adverse-event reporting, treatment decisions, and perceptions of medicine across multiple therapeutic settings. The main findings are summarized below.

| Therapeutic context | Reported manifestations | Important influencing factors | Counselling relevance |
|---|---|---|---|
| GI disorders | Placebo-group AEs and withdrawals; headache, dizziness, diarrhoea; greater treatment-associated dry mouth, fatigue and constipation | Expectations; symptom overlap; prior experiences | Explain common/serious effects separately; assess previous experiences.[1] |
| Inflammatory bowel disease | Variable placebo/nocebo responses | Disease characteristics; trial design; repeated visits; learning | Set realistic expectations for fluctuating symptoms.[2] |
| Psychotropic treatment | Placebo AEs may resemble active-drug AEs | Mood, anxiety, catastrophising, treatment identity, prior side effects | Use calm, non-stigmatizing language; explore concerns.[3] |
| Statin therapy | Subjective and objective AE reports may differ | Reporting behaviour; symptom context; interpretation | Validate symptoms; assess timing; encourage review rather than abrupt stopping.[4] |
| Pain | Anxiety, pain amplification, hyperalgesia, allodynia, fear and avoidance | Negative/excessive information; expectation | Use balanced risk communication and coping-oriented language.[5] |
| Oncology | Anticipatory nausea/vomiting and fatigue | Conditioning; treatment environment; fear; prior cycles | Prepare patients without making symptoms sound inevitable.[6],[7] |
| Endometriosis/chronic conditions | Symptom misattribution; heightened visceral sensitivity | Misinformation; diagnostic delay; symptom interpretation | Correct misconceptions empathetically; avoid invalidating symptoms.[6],[9] |
| Immunology/public health | Systemic symptoms in control arms; population-level symptom reporting | Media, social transmission, public anxiety | Use proportionate, contextualized safety communication.[6],[10] |

©IJRASET: All Rights are Reserved | SJ Impact Factor 7.538 | ISRA Journal Impact Factor 7.894 |

### A. *Symptoms and patient experiences*

Across the conditions, commonly described experiences include headache, dizziness, fatigue, gastrointestinal discomfort, nausea, pain, and other nonspecific symptoms. Their interpretation is influenced by baseline disease symptoms and expectations. The neuromodulator evidence is particularly informative because some symptoms occurred at comparable frequencies in placebo and active groups, while other adverse effects were more frequent with active treatment.[1] The results therefore support a symptom-assessment model that neither automatically attributes symptoms to a drug nor automatically labels them as nocebo. Patient reports should be taken seriously, followed by structured assessment of onset, severity, duration, temporal relationship to treatment, and relevant alternative causes.

### B. *Treatment behaviour and adherence*

Nocebo responses can alter behaviour even when symptoms are relatively mild. Fear of adverse effects may increase monitoring, reassurance-seeking, reluctance to start a medicine, missed doses, or premature discontinuation. In clinical trials, adverse events and withdrawals can also influence estimates of tolerability and apparent treatment effectiveness.[1],[3],[6]

For pharmacists, this means that adherence counselling should include expectation assessment rather than focusing only on instructions. Asking what the patient has heard about the medicine, what they are most worried about, and whether they have previously stopped a medicine because of side effects can reveal modifiable concerns before they become treatment-limiting.

### C. *Counselling strategies associated with expectation management*

- Ask the patient what they already believe about the medicine and what adverse effect they are most concerned about.
- Identify previous medicine experiences, including symptoms that led to discontinuation or loss of confidence.
- Explain the purpose of treatment and the expected benefit before discussing adverse effects.
- Present risks accurately but in context; distinguish common, usually manageable effects from rare or urgent warning signs.
- Avoid language that makes adverse effects sound inevitable, severe, or personally predictive when that is not supported.
- Validate symptoms without prematurely attributing them either to the medicine or to the nocebo effect.
- Encourage patients to report significant symptoms and seek review before making unsupervised treatment changes.
- Use shared decision-making and confirm understanding, particularly when the treatment has a prominent adverse-effect profile.

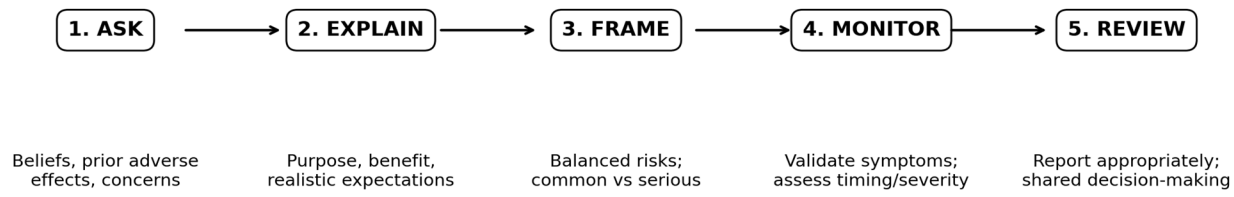



Figure 3. Pharmacy counselling pathway for expectation management. Original schematic based on the reviewed evidence.[3],[6],[8]

## V. DISCUSSION: IMPLICATIONS FOR PHARMACY COUNSELLING PRACTICE

The integrated findings suggest that pharmacy counselling should be considered part of the therapeutic context rather than a neutral transfer of information. Patients interpret the words, emphasis, sequencing, and emotional tone used when discussing medicines. Because negative expectations can influence symptom perception and treatment behaviour, communication has the potential either to reduce or to unintentionally reinforce nocebo responses. A central practical issue is how to discuss adverse effects. Complete avoidance of risk information is inappropriate because patients need enough information to make informed decisions, recognize serious reactions, and know when to seek help. At the same time, exhaustive lists of possible symptoms without context may increase fear and attention to normal bodily sensations.[6],[8] A balanced approach is therefore preferable: explain what the medicine is intended to achieve, describe the adverse effects most relevant to the individual patient, give clear action points, and distinguish urgent warning signs from transient or manageable effects.

Positive framing can be incorporated without deception. For example, when the evidence supports it, a pharmacist can describe how most patients tolerate a medicine while still explaining important risks. The purpose is not to conceal adverse effects but to prevent the patient from interpreting every possible symptom as expected or inevitable. Contextualized consent and individualized counselling may therefore preserve autonomy while reducing unnecessary threat cues.[6] Empathy is equally important. When a patient reports a symptom, saying that the symptom is 'just nocebo' may invalidate the experience and damage trust. A more appropriate approach is to acknowledge the symptom, explore when it began, assess severity and timing, consider other explanations, and determine whether clinical review is required. This is particularly important in chronic conditions in which disease-related symptoms overlap with medicine-related adverse effects.

The ethical tension between autonomy and nonmaleficence should be understood as a communication-design problem rather than a reason to provide less information. The pharmacist's task is to make information understandable, proportionate, and actionable. Patients should know which symptoms require urgent attention, which can be monitored, and how to obtain professional advice. This supports informed choice while limiting unnecessary anxiety. The reviewed literature also suggests that counselling should be longitudinal. Expectations formed during the first dispensing encounter may change after a patient experiences a symptom or reads new information online. Follow-up questions during refills or medication reviews can identify emerging concerns. Consistent terminology across pharmacists and other healthcare professionals may also reduce conflicting messages. Finally, pharmacists can contribute to better adverse-event interpretation by documenting the patient's baseline symptoms, the timing of new complaints, relevant counselling provided, and any recommendation for review. Such documentation does not diagnose a nocebo response; rather, it creates a clearer clinical record for distinguishing treatment-related toxicity from background symptoms and expectation-mediated experiences.

## VI. CHALLENGES AND LIMITATIONS

The evidence base is heterogeneous. The reviewed articles include randomized clinical trials, systematic or narrative reviews, spontaneous adverse-event reporting, and communication-focused discussions. Differences in diseases, medicines, populations, definitions of adverse events, and methods of measuring expectations limit direct comparison across studies.

Placebo adverse events should not be interpreted as proof that every symptom is caused by a nocebo response. Background symptoms, natural disease fluctuations, coincidental illness, and study participation can contribute. Similarly, an individual patient can experience both a genuine pharmacological adverse reaction and an expectation-mediated amplification of symptoms.[1,2]

The statin evidence is based on spontaneous reporting data, which are influenced by reporting behaviour, publicity, missing clinical detail, and the inability to establish causality from an individual report alone.[4] Mechanistic evidence also has translational limitations. Some detailed neurobiological findings derive from experimental pain models or controlled settings and cannot automatically be generalized to chronic disease, complex polypharmacy, or long-term treatment.[6,8] In oncology and immunology, overlapping disease effects, concomitant treatments, and baseline physiological variation further complicate attribution.

A major evidence gap concerns pharmacist-led interventions. The supplied literature supports communication principles and provides a strong rationale for expectation-sensitive counselling, but direct trials testing pharmacist communication strategies across multiple therapeutic conditions remain limited. Accordingly, the counselling recommendations in this review should be interpreted as evidence-informed practice implications rather than as proof that every listed strategy independently reduces nocebo symptoms.

## VII. FUTURE PERSPECTIVES AND RECOMMENDATIONS

Future research should move from describing nocebo responses toward testing practical communication interventions. Pharmacy-led studies should evaluate whether structured counselling changes adherence, treatment persistence, anxiety, symptom interpretation, adverse-event reporting, patient satisfaction, and appropriate healthcare utilization.

- Develop standardized tools for identifying negative treatment expectations before medicine initiation.
- Compare different ways of communicating adverse-event probabilities, including contextualized and positively framed explanations.
- Measure both subjective symptoms and objective clinical outcomes so that nocebo-related symptom amplification can be distinguished from pharmacological toxicity.
- Record the timing and wording of risk communication in clinical trials and real-world studies.
- Evaluate pharmacist-led interventions in oncology, pain, psychotropic treatment, gastrointestinal disorders, statin therapy, and immunology.
- Incorporate nocebo-aware communication into undergraduate and continuing professional pharmacy education.

- Develop interprofessional communication standards so patients receive consistent and non-alarming information from pharmacists, physicians, nurses, and other healthcare professionals.
- Study digital communication environments, including online health information and social media, as contributors to treatment expectations and symptom attribution.

For day-to-day pharmacy practice, the practical priorities are simple but clinically meaningful: ask, explain, contextualize, validate, monitor, and review. These steps allow pharmacists to preserve informed consent while reducing avoidable fear and uncertainty.

## VIII. CONCLUSION

The nocebo effect is a clinically relevant influence on symptoms, adverse-event reporting, treatment withdrawal, and patient perceptions of medicines across diverse therapeutic conditions. The integrated evidence shows that negative expectations, learning, prior experiences, symptom attention, anxiety, and contextual communication can interact with biological pathways to shape treatment experiences. Evidence from gastrointestinal disorders, inflammatory bowel disease, psychotropic treatment, statin therapy, pain, oncology, endometriosis, neurology, and immunology demonstrates that the phenomenon is broad but context-dependent.[1–10]

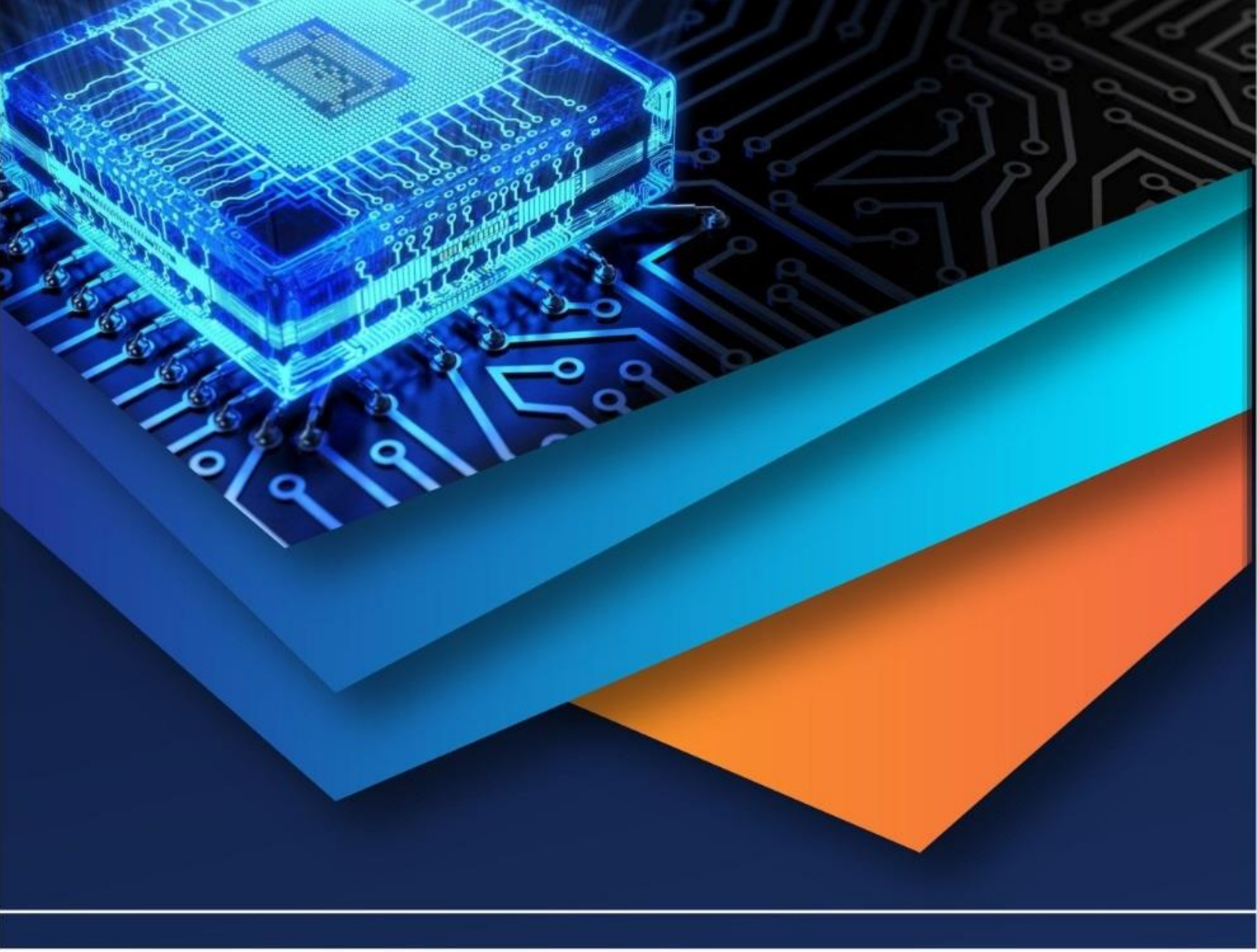
For pharmacy practice, the central implication is that counselling is not merely informational; it forms part of the treatment environment. Pharmacists can reduce avoidable negative expectations by exploring patient beliefs, communicating benefits and risks in context, distinguishing common manageable effects from urgent warning signs, validating symptoms, encouraging appropriate reporting, and supporting shared decision-making. The goal is not to withhold risk information, but to communicate it accurately, proportionately, and empathetically.

Future work should establish standardized nocebo measures and test pharmacist-led communication strategies using patient-centred outcomes. Strengthening nocebo-aware counselling education may help pharmacists recognize expectation-mediated treatment difficulties without dismissing genuine adverse reactions, thereby supporting safer and more sustainable medicine use.

## REFERENCES

[1] Glissen Brown JR, Sanayei A, Proctor S, Flanagan R, Ballou S, Bain PA, et al. Examining the nocebo effect in trials of neuromodulators for use in disorders of gut-brain interaction. Am J Gastroenterol. 2023;118(4):692-701. doi:10.14309/ajg.0000000000002108.
[2] Enck P, Klosterhalfen S. The placebo and nocebo responses in clinical trials in inflammatory bowel diseases. Front Pharmacol. 2021;12:641436. doi:10.3389/fphar.2021.641436.
[3] Amanzio M. Nocebo effects and psychotropic drug action. Expert Rev Clin Pharmacol. 2015;8(2):159-161. doi:10.1586/17512433.2015.992877.
[4] Moon J, Sedgh R, Jackevicius CA. Examining the nocebo effect of statins through statin adverse events reported in the Food and Drug Administration Adverse Event Reporting System. Circ Cardiovasc Qual Outcomes. 2021;14(1). doi:10.1161/CIRCOUTCOMES.120.007480.
[5] Fagundes FR, Reis FJJ, Cabral CMN. Nocebo and pain: the adverse effects of information overload. Rev Dor. 2016;17(3):157-158. doi:10.5935/1806-0013.20160062.
[6] Thiel P, Burke MJ, Bridge-Cook P, Leonardi M. Nocebo effects in the treatment of endometriosis. Reprod Fertil. 2021;2(4):C35-C38. doi:10.1530/RAF-21-0040.
[7] Colloca L. The nocebo effect. Annu Rev Pharmacol Toxicol. 2024;64:171-190. doi:10.1146/annurev-pharmtox-022723-112425.
[8] Fujii R, Matsuda Y, Okada M, Ishikura H, Imai Y, Muraoka R, et al. Effect of enhanced support for coping with side effects during medication counselling on the nocebo effect in patients with advanced lung cancer receiving initial chemotherapy: protocol for a multicentre exploratory open-label randomised controlled trial. BMJ Open. 2026;16(2):e103580. doi:10.1136/bmjopen-2025-103580.
[9] Chamsi-Pasha M, Albar MA, Chamsi-Pasha H. Minimizing nocebo effect: pragmatic approach. Avicenna J Med. 2017;7(4):139-143. doi:10.4103/ajm.AJM_59_17.
[10] Pouillon L, Socha M, Demore B, Thilly N, Abitbol V, Danese S, et al. The nocebo effect: a clinical challenge in the era of biosimilars. Expert Rev Clin Immunol. 2018;14(9):739-749. doi:10.1080/1744666X.2018.1512406.

©IJRASET: All Rights are Reserved | SJ Impact Factor 7.538 | ISRA Journal Impact Factor 7.894 |



10.22214/IJRASET

45.98

IMPACT FACTOR: 7.129

IMPACT FACTOR: 7.429

# INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Call : 08813907089 (24*7 Support on Whatsapp)