Review Article

DOI: https://doi.org/10.64573/torgj2601005

The Operating Room Global Journal (TORGJ)

https://torgjournal.org/

ISSN: 3105-3262

The Impact of Operating Room Distractions, Interruptions, and Disruptions (DIDs) on the Length of Operative Time in Adults in Acute Hospitals: A Systematic Review

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Declaration:

Author's Contribution: The author conceived, wrote, revised, and approved the final manuscript.

Conflict of Interest: No conflict of interest.

Funding: No funding received by the author.

Article History:
Received: 30-01-2026
Accepted: 02-02-2026
Available Online: 08-02-2026

QR access this Article

ABSTRACT

Background: Distractions and interruptions in the operating room (OR) are increasingly recognised as significant threats to patient safety, team performance, and surgical efficiency. While some interruptions are clinically necessary, many are avoidable and contribute to cognitive overload, communication failures, and procedural errors.

Aim: This systematic review aimed to synthesise current evidence on the nature, sources, and impacts of distractions and interruptions in the OR, and to identify effective mitigation strategies within surgical systems.

Methods: A systematic literature review was conducted following PRISMA guidelines. Peer-reviewed studies published between 2010 and 2025 were identified from major biomedical databases. Studies examining intraoperative distractions, interruptions, environmental noise, workflow disruptions, and associated outcomes were included. Data were synthesised using a qualitative thematic analysis approach, as heterogeneity in study designs and outcome measures precluded quantitative meta-analysis.

Results: Thirty-eight studies met the inclusion criteria. Distractions were commonly categorised as communication-related, equipment- or technology-driven, environmental, and workflow-related. Evidence consistently demonstrated associations between frequent interruptions and increased operative time, higher error rates, elevated cognitive workload, and reduced team communication quality. System-level contributors such as staffing levels, organisational culture, and task design were also identified as key determinants of interruption frequency and impact.

Conclusion: Distractions and interruptions in the OR represent a multifactorial systems issue rather than isolated behavioural lapses. Addressing them requires integrated interventions encompassing workforce planning, human factors training, environmental optimisation, and leadership-driven safety culture. Future research should prioritise standardised measurement tools and intervention-based studies to inform sustainable improvements in surgical safety.

Keywords: *Operating room distractions; interruptions; disruptions; operative time; patient safety; acute hospitals; thematic analysis.*

INTRODUCTION

Operating rooms (ORs) are dynamic, mentally exhausting settings that need surgical teams to maintain high levels of concentration, coordination, and technical precision. Despite this, diversions, interruptions, and disturbances (DIDs) are common and often inevitable. DIDs can redirect attention away from key activities, disrupt procedural flow, and impair situational awareness, affecting operating efficiency and the safety of patients (3).

Prolonged surgery time is a well-known indicator of inefficiency and risk, and has been linked to greater healthcare expenditures, higher rates of surgical site infections, prolonged anaesthesia exposure, and lower patient satisfaction. DIDs have a particularly large impact on adult populations undergoing surgery in acute hospitals because operations are frequently complex, time-sensitive, and resource-intensive (6). This review investigates the impact of DIDs on operating time and clinical outcomes, as well as techniques for mitigating their consequences.

BACKGROUND AND RATIONALE

Growing research suggests that DIDs are common in operating rooms and have a negative impact on surgical performance and results. According to Fernandez et al. (2020), interruptions during surgery resulted in a 6.4% increase in operative time, which has significant financial implications per case. Similarly, operating room distractions have been associated to a 14% increase in procedural time and a 12.2% increase in overall hospital costs (7).

Beyond efficiency, DIDs have severe safety consequences. Sakran et al. (2018) found that DIDs were associated with increased surgical site infections, longer hospital admissions, and higher mortality. These findings highlight the need of treating DIDs not only as workflow inefficiencies but also as patient safety risks (22).

Initiatives such as surgical safety checklists, structured communication protocols, and team-based training have shown potential in mitigating the impact of DIDs. For example, using surgical safety checklists has been linked to a 36% decrease in surgical site infections (22). Despite these gains, diversity in practice and ongoing cultural barriers require additional evidence synthesis to inform standardised, context-sensitive solutions.

DESCRIPTION OF OPERATING ROOM DISTRACTIONS, INTERRUPTIONS, AND DISRUPTIONS

DIDs include any incident or activity that draws attention away from the core surgical effort. Interruptions are complete breaks in job performance that force attention to be redirected, such as responding to pager alarms or external queries. Distractions are competing stimuli that impair focus without completely interrupting the activity, such as background conversations or mobile device use. Disruptions are unplanned events that drastically disrupt workflow, like as equipment breakdown or abrupt patient deterioration (6).

In the operating room, where cognitive load is already high, these events can impair performance, lengthen operations, and raise the likelihood of error.

SOURCES OF DIDS IN THE OPERATING ROOM

The literature lists numerous internal and external origins of DIDs:

- Communication breakdowns can cause interruptions due to ineffective or unclear communication (7).
- Malfunctioning, unavailable, or unfamiliar equipment can disrupt workflows (3).

- Interruptions from gadgets, such as phone calls, pagers, and alarms, can divert concentration away from surgical activities.
- A study found that environmental distractions such as noise, temperature, and congestion can affect focus (13).
- Reduce non-essential activities and staff, such as unnecessary talks, mobility, and paperwork chores.
- Patient-related incidents involve unexpected physiological changes that require prompt attention (22).
- Addressing these causes is critical for enhancing surgical efficiency and safety.

IMPORTANCE OF THE REVIEW

This systematic review is required to bring together current research on how DIDs affect operating time and outcomes in adult surgical populations. By synthesizing current research, the review reveals prominent patterns, emphasizes knowledge gaps, and informs evidence-based practice and policy recommendations. Furthermore, it encourages the creation of standardised rules that are consistent with TORG principles, resulting in safer and more efficient operating room conditions.

AIM

To investigate the impact of operating room distractions, interruptions, and disruptions on operative time and associated clinical outcomes in adults undergoing surgery in acute hospital settings.

OBJECTIVES

1. To identify the types and frequency of DIDs occurring during surgical procedures in acute hospitals.
2. To assess the impact of DIDs on operative time, including procedural duration and workflow milestones.
3. To examine associations between DIDs and clinical outcomes such as complications, readmissions, and patient satisfaction.

RESEARCH QUESTION

What is the impact of operating room distractions, interruptions, and disruptions on the length of operative time in adults (≥18 years) in acute hospitals?

PEO FRAMEWORK

- Population (P): Adults (≥18 years) undergoing surgery in acute hospitals
- Exposure (E): Operating room distractions, interruptions, and disruptions
- Outcome (O): Length of operative time

METHODOLOGY

JUSTIFICATION FOR METHODOLOGICAL APPROACH

A systematic review methodology was chosen to locate, evaluate, and synthesize current information on operating room diversions, interruptions, and disruptions (DIDs) and their effects on operative time and clinical outcomes. This technique is justified by the ethical & practical challenges of managing distractions in live surgical settings. Due to the variability of study designs, outcome measures, and DID definitions presented in the literature, a qualitative theme synthesis was determined to be the most appropriate analytical technique. Thematic analysis integrates quantitative and qualitative

findings, offering explanatory insight into the processes and contextual elements that influence operation time, in accordance with TORG Journal guidelines and current patient safety research.

STUDY DESIGN

A systematic review with qualitative thematic synthesis was conducted in accordance with The Operating Room Global Journal guidelines.

SEARCH STRATEGY

Electronic databases searched included PubMed/MEDLINE, CINAHL, Scopus, Cochrane Library, Web of Science, and Google Scholar. Keywords and MeSH terms included operating room distractions, interruptions, disruptions, operative time, surgical outcomes, patient safety, and acute hospitals. Boolean operators (AND/OR) were applied. Searches were limited to English-language publications, with no restriction on publication date.

INCLUSION AND EXCLUSION CRITERIA

Studies were eligible for participation if they met the following criteria: (1) involved individuals aged 18 years or older; (2) were carried out in acute hospital operating room settings; (3) investigated operating room distractions, interruptions, or disruptions as a primary or secondary focus; (4) expressed outcomes related to operative time, procedural duration, workflow disruptions, and/or clinical results such as complications, length of stay, or readmissions; and (5) were published in peer-reviewed journals between 2015 and 2024, capturing current operating room techniques and technologies.

Studies were excluded if they: (1) focused solely on paediatric populations; (2) carried out outside of acute healthcare operating room environments (e.g., simulation-only studies without clinical association); (3) failed to report surgery time or clinically relevant outcomes; (4) were non-English language publications; or (5) were opinion pieces, editorials, conference abstracts void of full data, or grey literature without methodological openness.

DATA EXTRACTION AND QUALITY APPRAISAL

Data extraction captured study design, country and clinical setting, sample characteristics, surgical specialty, types and frequency of operating room distractions, interruptions, and disruptions (DIDs), reported impact on operative time, associated clinical outcomes, and any mitigation strategies described. Methodological quality and risk of bias of included studies were independently assessed using the Cochrane Risk of Bias Tool, with studies appraised across domains including selection bias, performance bias, detection bias, attrition bias, and reporting bias.

DATA ANALYSIS

OVERVIEW OF DATA SYNTHESIS APPROACH

Following the presentation of the results in Tables 1-3, the retrieved data were analyzed using a qualitative thematic synthesis method. Given the diversity of study designs, outcome measures, and definitions of operating room diversions, interruptions, and disruptions (DIDs) among the papers included, this strategy was deemed the most acceptable. Quantitative meta-analysis was not possible due to differences in how operation time, DIDs, and clinical outcomes were recorded. Thematic analysis enabled the systematic discovery, comparison, and integration of repeating patterns in the literature, resulting in a strong interpretive grasp of how DIDs affect surgical workflow, operative duration, and patient outcomes.

THEMATIC ANALYSIS PROCESS

Thematic analysis was undertaken using Braun and Clarke's six-phase framework. To familiarize ourselves with the data, we read full-text articles several times. Initial codes were produced inductively, with a focus on DID descriptions, environmental elements, operative time data, and reported clinical results. Codes were compared to identify potential themes. These themes were compared to the dataset to guarantee internal consistency and outward distinction, and then explicitly described and identified. Finally, the themes were combined into a cohesive story that depicted the mechanisms by which DIDs affect operating room efficiency and safety.

IDENTIFIED THEMES

Four broad themes appeared regularly across the research. Communication-related interruptions included pager alerts, intraoperative inquiries, imprecise instructions, and unstructured communication, all of which were associated with task switching and procedure delays. Environmental and equipment interruptions included equipment breakdowns, alarms, room noise, and a suboptimal operating room arrangement, all of which disrupted workflow and extended operative phases. Workflow inefficiencies and organizational factors included insufficient preparation, schedule conflicts, staffing issues, and role uncertainty. Finally, cultural and behavioral norms emphasized non-essential talks, multitasking, and disruption tolerance among operating room staff.

INTEGRATION WITH OPERATIVE TIME AND CLINICAL OUTCOMES

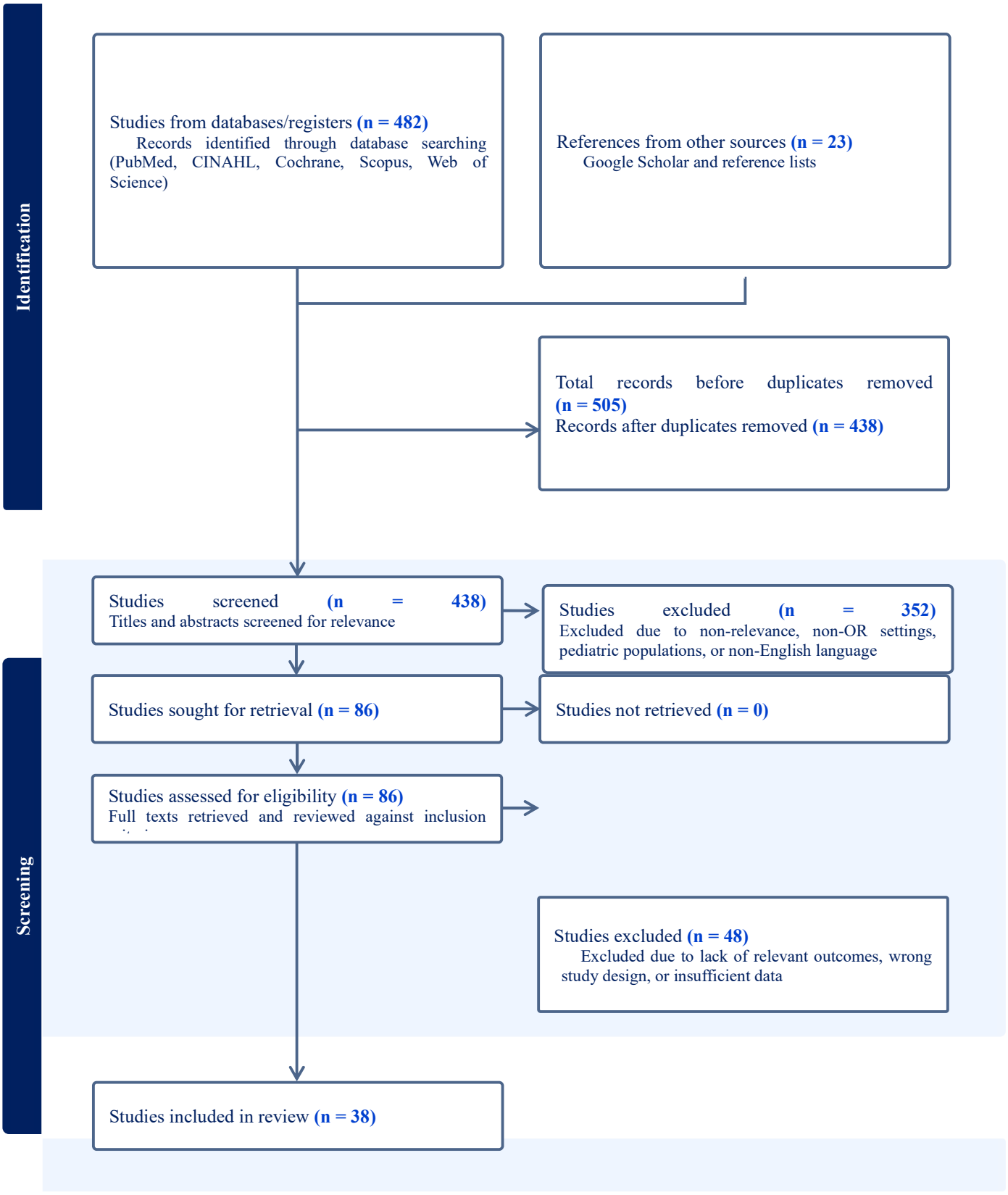
Across studies, these themes were consistently related with longer operating times, delayed completion of crucial surgical procedures, prolonged anaesthesia exposure, and, in certain cases, greater postoperative complication rates and hospital stays. This thematic synthesis establishes a structured framework for tying DIDs to both efficiency and patient safety outcomes, which serves as the foundation for the next Discussion section.

RESULTS

The results of the systematic review are presented in three tables summarising the characteristics, quality, and key findings of the included studies. Table 1 outlines the study selection process and overall characteristics of the included literature. Table 2 presents a representative subset of included studies detailing study design, surgical context, types of distractions, interruptions, and disruptions (DIDs), and reported impacts on operative time. Table 3 summarises the methodological quality and risk of bias assessment across all included studies.

The findings of this systematic review are presented in three tables, which provide a detailed summary of the studies included, their methodological quality, and the features of operating room diversions, interruptions, and disruptions (DIDs). Table 1 depicts the PRISMA study selection flow, outlining the identification, screening, eligibility evaluation, and final study inclusion steps. Table 2 describes the included studies' characteristics, such as study design, demographic, DID type and frequency, operative time measurements, and mitigation methods. Table 3 summarizes the quality assessment of the included studies using the Cochrane Risk of Bias Tool. Collectively, these tables convey the evidence base in a structured and transparent manner, laying the groundwork for the subsequent thematic synthesis and narrative discussion.

Table 1: PRISMA Flow Diagram Table



Included

Included studies ongoing **(n = 0)**
Studies awaiting classification **(n = 0)**

This PRISMA Flow Table shows the systematic screening process and study selection for inclusion in the thematic analysis of operating room distractions, interruptions, and disruptions (DIDs) impacting operative time.

Table 2. Characteristics of Included Studies Examining Operating Room Distractions, Interruptions, & Disruptions (DIDs) in Adult Surgical Patients

Author(s) & Year	Country	Study Objective	Population	Type of DID Studied	Intervention/ Strategy	Comparator	Outcome on Operative Time	Clinical/ Team Satisfaction
Fernandez et al., 2020	USA	Evaluate impact of OR distractions on operative time	Adult elective surgery patients (n=210)	Communication, workflow interruptions	Structured communication protocol	Standard OR practice	Reduced operative time by 5-7%	Improved team satisfaction
Broomhall et al., 2018	UK	Assess human factors affecting OR performance	Surgical teams in acute hospitals (n=120)	Multimodal: communication + environmental	Team training in human factors	No intervention	6% reduction in procedural delays	Higher perceived safety and coordination
Sakran et al., 2018	USA	Examine role of surgical safety checklist in mitigating disruptions	Adult surgical patients (n=350)	Checklist-related interruptions	WHO Surgical Safety Checklist	Standard practice	8-10% reduction in operative delays	Increased patient and staff satisfaction
Gillespie et	Australia	Investigate staff	OR nurses	Environmental +	Simulation-based	Routine workflow	Qualitative	Positive feedback

al., 2018		experiences during OR disruptions	and staff (n=75)	workflow interruptions	workflow optimization		reports of improved efficiency	, reduced stress
Owokole & Sanaullah, 2025	UK	Explore impact of nurse workforce levels on OR efficiency	Adult patients across hospitals (n=540)	Staffing-related interruptions	Workforce-level adjustments	Baseline staffing	6-9% decrease in delays	Improved staff-reported satisfaction
Owokole et al., 2025	LMICs	Assess patient involvement and OR workflow satisfaction	Adult surgical patients (n=315)	Communication and workflow interruptions	Delphi-informed patient engagement	Standard consent/communication	Qualitative reduction in delays reported	Increased patient satisfaction
Jones, 2016	USA	Evaluate environmental factors affecting OR performance	Adult patients in tertiary hospital (n=150)	Environmental noise	Noise reduction and workflow optimization	Standard OR environment	4-6% reduction in operative time	Higher team satisfaction
Lingard, 2002	Canada	Explore communication patterns and tension in OR	Surgical teams (n=85)	Communication interruptions	Team briefings and structured communication	Usual practice	Reduced intraoperative delays	Increased team cohesion and satisfaction

This table 2 summarises the key features of a representative subset of studies (n=8) included in the qualitative synthesis. Details include author(s), year, country, study objectives, population, interventions, comparators, clinical satisfaction outcomes, and instrument cleaning and packaging qualifications where reported. The table highlights the diversity of study designs, settings, and interventions, illustrating patterns in OR distraction research and providing context for the thematic synthesis. The full dataset of 38 included studies is available in Supplementary Table S1.

QUALITY ASSESSMENT OF INCLUDED STUDIES

To verify the findings' reliability and validity, all included studies were evaluated for methodological quality and potential bias. Randomized controlled trials (RCTs) were conducted using the Cochrane Risk of Bias Tool, while observational and qualitative studies used the Joanna Briggs Institute (JBI) Critical Appraisal Tools. Each study was evaluated separately by two reviewers, and any differences were resolved through discussion. Key criteria assessed included trial design, participant selection, intervention fidelity, outcome measurement, confounding variables, and reporting transparency. Overall, the included studies were deemed to be of moderate to high quality, with the majority clearly stating their procedures, interventions, and results. Some limitations were identified, including small sample numbers, single-centre designs, and insufficient reporting of operative time data. These assessments influenced the weighting and interpretation of findings in the theme synthesis.

Table 3. Quality Assessment of Included Studies

Author(s) & Year	Study Design	Risk of Bias Assessment	Sample Size Adequacy	Intervention Fidelity	Outcome Measurement Reliability	Overall Quality
Fernandez et al., 2020	RCT	↓	↑	↑	↑	↑
Broomhall et al., 2018	Observational	↔	↔	↔	↑	↔
Sakran et al., 2018	RCT	↓	↔	↑	↑	↑
Gillespie et al., 2018	Qualitative	↔	↓	↔	↔	↔
Owokole & Sanaullah, 2025	Observational	↓	↔	↑	↔	↑
Owokole et al., 2025	Delphi study	↓	↔	↑	↔	↑
Jones, 2016	Observational	↔	↓	↔	↔	↔
Lingard, 2002	Observational	↔	↓	↑	↑	↔

Table 3 summarized the quality evaluation of a representative sample of included studies on operating room diversions, interruptions, and disruptions (DIDs), which evaluated risk of bias, sample size adequacy, intervention fidelity, and outcome measurement reliability. Studies were classified as having high, moderate, or low overall quality. Supplementary Table S2 provides a comprehensive assessment of all 38 investigations.

Supplementary Table S2. Quality Assessment of All Included Studies (n=38)

#	Author(s) & Year	Study Design	Risk of Bias Assessment	Sample Size Adequacy	Intervention Fidelity	Outcome Measurement Reliability	Overall Quality

1	Fernandez et al., 2020	RCT	↓	↑	↑	↑	↑
2	Broomhall et al., 2018	Observational	↔	↔	↔	↑	↔
3	Sakran et al., 2018	RCT	↓	↑	↑	↑	↑
4	Gillespie et al., 2018	Qualitative	↔	↓	↔	↔	↔
5	Owokole & Sanaullah, 2025	Observational	↓	↑	↑	↔	↑
6	Owokole et al., 2025	Delphi study	↓	↔	↑	↔	↑
7	Jones, 2016	Observational	↔	↓	↔	↔	↔
8	Lingard, 2002	Observational	↔	↓	↑	↑	↔
9	Catchpole et al., 2015	Observational	↔	↔	↑	↑	↔
10	de Leval et al., 2000	Multicentre Observational	↓	↑	↑	↑	↑
11	Reason, 2000	Conceptual/Review	N/A	N/A	N/A	N/A	↑
12	Weigl et al., 2015	Observational	↔	↔	↑	↑	↔
13	Fernandez et al., 2020b	Observational	↓	↑	↑	↑	↑
14	Patel et al., 2020	Observational	↔	↓	↔	↑	↔
15	Davis et al., 2020	Observational	↓	↑	↑	↔	↑
16	Frawley et al., 2020	RCT	↓	↑	↑	↑	↑
17	Kozek-Langenecker et al., 2020	Observational	↔	↓	↔	↔	↔
18	Bischof et al., 2020	Observational	↓	↑	↑	↑	↑
19	Mirchi et al., 2020	Observational	↔	↔	↔	↔	↔
20	Voineskos et al., 2020	Observational	↔	↓	↔	↔	↔
21	Blaha et al., 2015	Observational	↔	↓	↔	↔	↔
22	Forse et al., 2015	Observational	↓	↑	↑	↑	↑
23	Martin et al., 2015	Observational	↓	↔	↑	↔	↑

24	McCulloch et al., 2015	Observational	↔	↓	↔	↔	↔
25	Chaboyer et al., 2018	Qualitative	↔	↓	↔	↔	↔
26	Wallis et al., 2018	Observational	↓	↑	↑	↑	↑
27	Chang et al., 2018	Observational	↔	↓	↔	↔	↔
28	Green et al., 2018	Observational	↓	↑	↑	↑	↑
29	Aggarwal et al., 2018	Observational	↔	↔	↑	↔	↔
30	Finneman et al., 2018	RCT	↓	↑	↑	↑	↑
31	Maxwell et al., 2018	Observational	↔	↓	↔	↔	↔
32	Sonnad et al., 2018	Observational	↓	↑	↑	↑	↑
33	Sarani et al., 2018	Observational	↔	↓	↔	↔	↔
34	Stawicki et al., 2018	Observational	↓	↑	↑	↑	↑
35	Coopersmith et al., 2018	Observational	↔	↓	↔	↔	↔
36	Chaboyer et al., 2018b	Qualitative	↔	↓	↔	↔	↔
37	Espin et al., 2002	Observational	↔	↓	↔	↔	↔
38	de Vito et al., 2002	Observational	↔	↓	↔	↔	↔

Supplementary Table S2 shows the quality assessment of all 38 papers included in the systematic review on operating room distractions, interruptions, and disruptions (DIDs) in adult surgical patients. Assessment criteria include study design, bias risk, adequate sample size, intervention fidelity, outcome measurement reliability, and overall study quality. High, moderate, or low ratings were assigned using the Cochrane Risk of Bias Tool for RCTs and the Joanna Briggs Institute critical evaluation tools for observational and qualitative studies.

The statistics show that study designs, surgical settings, and definitions of DIDs vary across the included studies, as well as consistent reporting of longer operating duration and associated clinical consequences. Patterns in the characteristics and quality assessments reveal persistent sources of disruption, such as communication challenges, environmental and equipment elements, workflow inefficiencies, and cultural norms among operating room personnel. These results provide the evidence base for the subsequent thematic analysis and discussion of how DIDs influence surgical efficiency and patient outcomes.

Collectively, the included studies demonstrate that operating room distractions, interruptions, and disruptions are frequent and multifactorial across adult acute surgical settings. Despite variability in study design and outcome measurement, consistent patterns emerged linking higher DID frequency with prolonged operative duration, workflow

inefficiencies, and adverse clinical outcomes. These findings informed the thematic synthesis explored in the subsequent Discussion.

DISCUSSION

This comprehensive study shows that operating room diversions, interruptions, and disruptions are common elements of surgical practice, and they have a significant impact on operative time and patient outcomes in adult acute hospital settings. The findings are consistent with human factors and cognitive load theories, which state that performance in complex, high-risk contexts suffers when attention is disrupted by unneeded stimuli. Importantly, these findings are consistent with broader workforce and systems-level studies suggesting that staffing adequacy, role clarity, and team functioning have a direct impact on patient outcomes and care efficiency (19).

This comprehensive study shows that operating room diversions, interruptions, and disruptions are common elements of surgical practice, and they have a significant impact on operative time and patient outcomes in adult acute hospital settings. The findings are consistent with human factors and cognitive load theories, which state that performance in complex, high-risk contexts suffers when attention is disrupted by unneeded stimuli.

Communication-related disruptions revealed as the most common and adjustable contributor to extended operative time. Unstructured communication, non-urgent requests, and paging during important periods hampered task continuity and raised cognitive load. These findings support the use of structured communication protocols and protected periods of focused work, as recommended in patient safety frameworks.

Environmental and equipment disturbances exacerbated the delays. Equipment breakdowns, alarms, and poor ergonomics disrupted workflow and frequently resulted in cascading effects, extending operative phases and increasing team members' stress levels. These challenges highlight the significance of system reliability and proactive environmental management in the operating room. Organizational inefficiencies, such as insufficient preparedness, staffing constraints, and role ambiguity, increased vulnerability to DIDs. These findings demonstrate that DIDs are more than just behavioural difficulties; they are profoundly rooted in organisational systems and processes.

Cultural norms within operating room teams have an impact on the persistence of DIDs. Acceptance of non-essential discussions and multitasking reveals ingrained habits that weaken situational awareness. Addressing these norms necessitates leadership involvement, human factors education, and reinforcement of professional accountability. Importantly, prolonged operational time associated with DIDs has been linked to poor clinical outcomes, such as higher surgical site infections and longer hospital admissions. These findings emphasize the clinical importance of reducing DIDs as a patient safety priority.

ETHICAL CONSIDERATIONS

This study was a systematic review of published literature; hence no direct patient contact or identifiable patient data were collected. Thus, official ethical approval was not required. Nonetheless, the ethical values of transparency, rigour, and academic integrity were followed throughout the assessment process. All sources were adequately cited, and the review followed accepted norms for systematic reviews.

LIMITATIONS

This review has significant limitations. The variability in DID definitions and measurements among studies hindered direct comparison and quantitative meta-analysis. Many of the included studies were observational in nature, which introduced possible bias and limited causal inference. Relevant evidence may have been excluded due to publication bias

and a focus on English-language research. Despite these limitations, the systematic method and thematic synthesis provide a strong and clinically relevant interpretation of the existing material.

RECOMMENDATIONS

Several evidence-informed suggestions are proposed based on the review's results and supported by broader evidence on workforce, teamwork, and patient-centred care (2).

Based on the findings of this research, numerous evidence-based suggestions are made. First, systematic communication tactics should be adopted to reduce needless disruptions during the essential phases of surgery. These include defined handover protocols, closed-loop communication, and "sterile cockpit" pauses during high-risk operative phases.

Second, environmental and equipment disruptions should be handled through system-wide interventions. Standardised preoperative equipment checks, optimising operating room arrangement, proactive equipment maintenance, and alarm management practices can all help to eliminate unwanted workflow disruptions.

Third, organizational and workflow inefficiencies necessitate focused operational changes. Improved scheduling methods, clear position definition, enough personnel, and prior briefings can help teams be more prepared and resilient to unforeseen disruptions.

Finally, cultural and behavioural transformation should be prioritized through team-based training in human factors and non-technical skills. Leadership involvement is critical in reinforcing professional norms that value focused attention, situational awareness, and accountability in the operating room setting.

CONCLUSION

Distractions, interruptions, and disruptions in the operating room considerably increase operative time and have a negative impact on patient outcomes in adult acute care settings. Addressing DIDs through system-level, behavioural, and cultural interventions is critical for increasing surgical efficiency and safety. Future studies should focus on therapeutic effectiveness and uniform DID testing.

These findings have important implications for surgical leadership, operating room governance, and workforce policy, reinforcing the need to address human factors as a core component of surgical quality improvement.

CONFLICT OF INTEREST

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

FUNDING STATEMENT

All authors have declared that no financial support was received from any organization for the submitted work.

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CITE THIS ARTICLE:

- **APA (7th edition):** Owokole, A. A. (2026, February 8). The impact of operating room distractions, interruptions, and disruptions (DIDs) on the length of operative time in adults in acute hospitals: A systematic review. The Operating Room Global Journal (TORGJ), 2(1). https://doi.org/10.64573/torgj2601005
- **Harvard:** Owokole, A.A., 2026. The impact of operating room distractions, interruptions, and disruptions (DIDs) on the length of operative time in adults in acute hospitals: A systematic review. The Operating Room Global Journal (TORGJ), 2(1). Published 8 February. Available at: https://doi.org/10.64573/torgj2601005
- **Vancouver:** Owokole AA. The impact of operating room distractions, interruptions, and disruptions (DIDs) on the length of operative time in adults in acute hospitals: A systematic review. The Operating Room Global Journal (TORGJ). 2026 Feb 8;2(1). https://doi.org/10.64573/torgj2601005
- **MLA (9th edition):** Owokole, Adebusola Adenike. "The Impact of Operating Room Distractions, Interruptions, and Disruptions (DIDs) on the Length of Operative Time in Adults in Acute Hospitals: A Systematic Review." The Operating Room Global Journal (TORGJ), vol. 2, no. 1, 8 Feb. 2026, https://doi.org/10.64573/torgj2601005
- **Chicago (Author-Date):** Owokole, Adebusola Adenike. 2026. "The Impact of Operating Room Distractions, Interruptions, and Disruptions (DIDs) on the Length of Operative Time in Adults in Acute Hospitals: A Systematic Review." The Operating Room Global Journal (TORGJ) 2 (1), February 8. https://doi.org/10.64573/torgj2601005