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Long Abstract

**The Sense of Self-Efficacy, Managerial Autonomy,
and Leadership of the Managers within IPC-Units**

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Abstract

This doctoral dissertation explores the impact of managerial traits on the implementation of the National Program for Infection Prevention and Control (NPIPC) in Israeli hospitals. Specifically, it examines the intricate relationship between key managerial attributes of IPC Unit managers—namely, their sense of self-efficacy, managerial autonomy, and leadership capabilities—in the successful implementation of NPIPC in Israeli public hospitals. Set against the backdrop of the global COVID-19 pandemic, this research aims to develop an "Autonomous Management Model" tailored to enhance the effectiveness of IPC programs. This model is uniquely designed to address both routine operational needs and crisis situations, providing a robust framework that empowers IPC managers to lead their units effectively under various conditions. The research utilized a mixed methods approach, combining qualitative and quantitative tools. The findings revealed a significant positive relationship between the degree of NPIPC implementation and the managerial traits of autonomy, self-efficacy, and leadership within IPC Units. IPC Unit managers with higher degrees of autonomy were more successful in implementing tailored and responsive IPC strategies, suggesting that empowering managers is crucial for the adaptive and effective execution of IPC measures. Additionally, a strong sense of self-efficacy among managers correlated with higher success rates in IPC implementation. Managers confident in their abilities were better equipped to face challenges, lead their teams, and drive IPC initiatives forward, particularly under the pressure of crisis conditions. Furthermore, effective leadership, characterized by the ability to inspire, motivate, and guide teams, was pivotal in the successful implementation of NPIPC. Leadership styles that fostered team cohesion, clear communication, and a shared vision for IPC excellence significantly impacted program outcomes.

This doctoral research highlights the importance of managerial autonomy, self-efficacy, and leadership in effectively implementing the NPIPC in Israeli hospitals. By developing these traits, healthcare institutions can significantly enhance their IPC programs, improving patient safety and infection control outcomes. The proposed autonomous management model offers a strategic framework to navigate modern healthcare challenges, providing resilience and efficacy in both routine and crisis scenarios.

INTRODUCTION

Research Background

Research Topic

This doctoral dissertation explores the impact of managerial traits on the implementation of the National Program for Infection Prevention and Control (NPIPC) in Israeli hospitals. It aims to develop an Autonomous Management Model to enhance the effectiveness of IPC programs by focusing on key managerial attributes: self-efficacy, managerial autonomy, and leadership capabilities within IPC Units.

Research Problem and Knowledge Gap

Healthcare-associated infections (HCAIs) pose significant public health challenges globally, increasing morbidity, mortality, and healthcare costs. Despite existing guidelines and programs to mitigate these infections, implementation remains inconsistent. The literature highlights a gap in understanding the role of leadership, especially at the managerial level, in effectively implementing IPC programs. This research addresses the need for comprehensive studies on leadership strategies, the unique challenges faced by IPC unit managers, and the impact of managerial autonomy and self-efficacy on IPC practices.

Research Background – Local and Global Context

Global Context: HCAIs are a significant global issue, affecting millions annually. In the US, about 3.2% of hospitalized patients developed HCAIs by 2015, and in Europe, HCAIs are linked to around 37,000 deaths each year. In Israel, 5% to 10% of hospitalized patients suffer from HCAIs annually, with a mortality rate of about 6% (Sreeramoju, 2019; Allegranzi et al., 2013; State Comptroller of Israel Report, 2012). Efforts to combat HCAIs have historical roots with pioneers like Ignaz Semmelweis advocating for improved hygiene practices in the 19th century (WHO, 2016). The CDC has issued IPC guidelines since 1981, yet implementation remains inconsistent (Allegranzi et al., 2013). The WHO emphasizes effective IPC programs and has developed guidelines to support these efforts globally (Storr et al., 2017). Barriers to IPC implementation include excessive workloads, lack of awareness, insufficient resources, and

inadequate management (Boscart et al., 2012; McAteer et al., 2014). Multimodal intervention programs, emphasizing education, training, and a multidisciplinary approach, have been introduced to address these issues (Wang et al., 2019). The WHO's eight core components of IPC programs provide a comprehensive strategy for prevention (WHO, 2016).

Local Context – Israel: Israel has taken significant steps to address HCAs. The National Committee for the Elimination of Infections caused by Carbapenem-Resistant Enterobacteriaceae (CRE) was established in 2005, followed by the National Institute of IPC and Antibiotic Resistance (NIIPC&AMR) (MOH, 2005). The Ministry of Health issued IPC guidelines in 2005, providing a structured framework for hospitals (MOH, 2005).

Gap in Knowledge

Despite global and national efforts, a significant gap exists in the practical implementation of IPC guidelines. Key international bodies like the WHO have developed extensive guidelines, yet their adoption remains inconsistent (Allegranzi et al., 2013; Storr et al., 2017). Leadership within IPC, particularly at the managerial level, needs more exploration to understand its impact on IPC outcomes (Gould, Gallagher, Allen, 2016; Sreeramoju, 2019). The concepts of managerial autonomy and self-efficacy in IPC leadership are recognized as crucial but are seldom explored in depth (Storr et al., 2017; Zingg et al., 2015). Sociological theories like NPT and DoI Theory are proposed to enhance IPC practices but their practical integration remains limited (Mody et al., 2017; Sreeramoju, 2019). In summary, to enhance IPC program effectiveness, it is essential to focus on leadership, managerial autonomy, and self-efficacy within IPC units, addressing both global and local challenges.

Research Aims

Objective: To develop an Autonomous Management Model for the successful implementation of IPC programs in Israeli hospitals.

1. To Examine the relationship between the degree of NPIPC implementation and the levels of managerial autonomy, managerial self – efficacy, and leadership skills demonstrated by IPC managers in IPC units within public hospitals in Israel.

2. To explore the relationship between background characteristics (such as levels of seniority and job engagement) and MA, MSE, and leadership skills among managers in IPC units.
3. To assess specific managerial factors, including facilitators and barriers, which significantly influence the implementation of the NPIPC, among PMs-IPC and NMs-IPC.
4. To investigate the influence of IPC unit managers' perceptions and their implemented interventions on the effectiveness of the NPIPC.
5. To explore the impact of the COVID-19 pandemic on managerial traits (MA, MSE, and leadership skills) and the correlation between these traits and perceived management effectiveness during the pandemic.

Research Questions

1. How does the degree of NPIPC implementation correlate with levels of MA, MSE, and leadership skills among PMs-IPC and NMs-IPC within Israeli hospitals?
2. How do background characteristics, including different levels of seniority and job engagement, influence MA, the sense of MSE, and leadership skills among PMs-IPC and NMs-IPC in Israeli hospitals?
3. What are the specific managerial factors that impact the implementation of IPC programs in Israeli hospitals, considering both facilitators and barriers, particularly among PMs-IPC and NMs-IPC?
4. How do the perceptions and interventions of IPC unit managers affect the effectiveness of the NPIPC implementation scores in Israeli hospitals?
5. How has the COVID-19 pandemic impacted MA, MSE, and leadership skills among IPC-Unit managers, within public hospitals in Israel? Moreover, what is the relationship between managerial activities during the pandemic and their perceived management effectiveness?

Conceptual frameworks

Conceptual frameworks- Autonomous Management Model

Diagram Explanation: (1) NPIPC influences Managerial Traits such as autonomy, self-efficacy, and leadership skills, which are crucial for the successful implementation of IPC programs; (2) IPC Programs are shaped by these managerial traits and are guided by principles from Implementation

Science, which includes frameworks like Evidence-Based Practices, Diffusion of Innovations, and Normalization Process Theory; (3) IPC Unit Managers play a critical role in leading and implementing the NPIPC within hospitals, managing and reducing HCAs; (4) HCAs are a focal point of the IPC programs, with outcomes aimed at reducing these infections through effective management and protocol implementation; (5) Challenges and Facilitators identified by managerial perceptions influence the effectiveness of IPC programs, and the impact of COVID-19 necessitates adaptations in IPC protocols; (6) Training enhances managerial traits by developing competencies needed for both routine operations and crisis management; (7) The ultimate Outcomes of the IPC programs include enhanced IPC effectiveness and a significant reduction in HCAs, demonstrating the successful implementation of IPC measures.

Key Concepts

IPC (Infection Prevention and Control); NPIPC (National Program for IPC); Healthcare-associated infections (HCAs); COVID-19 Epidemic; Managerial Autonomy; Managerial Sense of Self-Efficacy; Leadership Skills; Infection Prevention and Control Units (IPC-Units); Managerial Factors; Implementation; Normalization Process Theory (NPT); Diffusion of Innovations Theory (DoI); Implementation Science; Facilitators and Barriers.

Significance of this research

This dissertation explores the relationship between the implementation of the National Program for IPC (NPIPC) and the critical managerial traits - managerial autonomy (MA), managerial self - efficacy, and leadership—within IPC units in Israeli public hospitals. It assesses how these factors influence the effective implementation of IPC practices, while identifying the barriers and facilitators impacting program success. Furthermore, the study examines the perceptions of IPC unit managers regarding the essential conditions necessary for effective IPC program execution and investigates the impact of the COVID-19 pandemic on their managerial capabilities. A significant component of this research is the development of an "Autonomous Management Model," which integrates sociological theories such as the NPT and DoI with the practical application of socio-adaptive interventions. This model is designed to enhance the effectiveness of

IPC programs by providing a tailored framework that supports IPC unit managers in the dynamic healthcare environment of Israeli hospitals.

Research Boundaries

This doctoral research focuses on the implementation of NPIP within Israeli public hospitals, specifically investigating the impact of managerial autonomy, self-efficacy, and leadership skills on the success of these programs. The study employs a mixed methods approach, combining qualitative techniques through in-depth interviews with IPC unit managers and quantitative analysis using structured questionnaires. It does not cover private hospitals or community health centers.

CHAPTER I: LITERATURE REVIEW

I.1 Main Theories

I.1.1 Theoretical Frameworks in IPC Management

Effective IPC practices in healthcare require both technical solutions and behavioral shifts. Historical figures like Ignaz Semmelweis and Florence Nightingale highlighted the complexity of implementing IPC interventions. This chapter introduces key theoretical frameworks—Normalization Process Theory (NPT), Diffusion of Innovations (DoI), Implementation Science, and Self-Efficacy Theory—that inform the development of an "Autonomous Management Model" for enhancing IPC in Israeli hospitals. NPT, developed by Carl May and colleagues, provides a framework for understanding how new practices are embedded in healthcare settings. It emphasizes coherence, cognitive participation, collective action, and reflexive monitoring, highlighting the importance of social and organizational contexts in IPC management (May et al., 2009). DoI, conceptualized by Everett M. Rogers, explores how new ideas spread within a social system. It focuses on communication channels, social systems, and adopter categories, which are critical for the adoption of IPC measures across diverse healthcare settings (Rogers, 1993, 2003). Implementation Science bridges the gap between research and practice by integrating evidence-based interventions into healthcare settings. Frameworks like the Consolidated Framework for Implementation Research (CFIR) and the Theoretical Domains Framework (TDF) highlight the importance of

organizational culture, leadership, and resource availability in successful IPC implementation (Aarons et al., 2011; Durlak & DuPre, 2008; Damschroder et al., 2009; Proctor et al., 2011; Clack et al., 2018). Albert Bandura's Self-Efficacy Theory emphasizes individuals' belief in their ability to achieve specific goals, especially in challenging situations. High self-efficacy among IPC managers enhances motivation, goal setting, and effective crisis response, thus improving IPC program effectiveness (Bandura, 1982, 1997).

1.1.2 The Normalization Process Theory (NPT)

The NPT, developed by Carl May and colleagues, provides a comprehensive framework for understanding how new practices and innovations are embedded within healthcare settings. This theory is particularly relevant to implementing and normalizing IPC practices. NPT is characterized by four key constructs: coherence, cognitive participation, collective action, and reflexive monitoring, which collectively help comprehend the lifecycle of an intervention from its introduction to its normalization within everyday practice (May et al., 2022). The theory has been applied across various healthcare domains, demonstrating its versatility and utility in understanding the complex dynamics involved in implementing change in healthcare practices (Murray et al., 2010).

Structure of NPT

The four constructs of NPT—coherence, cognitive participation, collective action, and reflexive monitoring—are essential for the successful and sustainable implementation of IPC practices. Coherence involves understanding and valuing new practices, while cognitive participation refers to engaging stakeholders in the process. Collective action covers the practical aspects of implementing new practices, and reflexive monitoring involves evaluating and adjusting these practices based on feedback and outcomes (Murray et al., 2010; Gould et al., 2016). By employing NPT, researchers and practitioners can enhance their understanding and approach to implementing complex interventions, leading to improved outcomes in healthcare and other settings (May, 2013; May et al., 2018).

Application in IPC

NPT's constructs offer a valuable lens through which to view the implementation of IPC practices (Gould et al., 2016; May et al., 2018; Murray

et al., 2010; Xanidis & Gumley, 2020). Coherence involves understanding and embracing new IPC practices, recognizing differences from current practices, communal specification, individual roles, and internalization. Cognitive participation focuses on the commitment to new practices, initiation of the change process, involvement of the whole team, validation of relevance and benefits, and implementation. Collective action includes executing new practices, interactional workability, building trust and accountability, ensuring necessary skills, and contextual integration. Reflexive monitoring evaluates the effectiveness through regular review and optimization, collective assessment, personal reflection, and adjustment based on feedback.

NPT's focus on action and contextual considerations helps overcome barriers to change in IPC. It has proven effective in guiding interventions tailored to specific healthcare settings, providing a structured approach to the integration of new practices (May, 2013; Murray et al., 2010). NPT helps bridge the gap between IPC guidelines and their practical implementation by emphasizing the importance of understanding social processes and actions in enhancing IPC practices (Moralejo et al., 2018; O'Boyle et al., 2001; Agreli et al., 2019). Insights from NPT: In healthcare, NPT provides a structured approach to understanding the challenges and strategies involved in implementing and integrating new practices, such as IPC guidelines. An ethnographic study in Ireland revealed gaps in IPC guideline implementation that align with NPT constructs, demonstrating the theory's applicability in identifying and addressing barriers to effective IPC practice (May et al., 2009; Gould et al., 2016; May, 2013; Murray et al., 2010; Agreli et al., 2019; May et al., 2022).

1.1.3 Diffusion of Innovations Theory (Rogers, 1962)

The Diffusion of Innovations (DoI) Theory, developed by sociologist Everett M. Rogers in 1962, offers a foundational perspective on adopting new ideas and technologies within social systems. Rogers' theory outlines a stratified model of adoption, categorizing individuals based on their receptivity to innovation - ranging from innovators and early adopters to the more cautious late majority and laggards. This categorization underscores the varied pace at which innovation is embraced across a community, highlighting the importance of tailored strategies to facilitate widespread adoption (Rogers, 2003). This holistic approach helps integrate new practices into healthcare routines by understanding the adoption trends and

strategically planning the introduction of new practices across different segments of the healthcare workforce (Greenhalgh et al., 2004).

The DoI Theory – Theory Structure: DoI Theory outlines five key elements: innovation, communication channels, time, social system, and adopter categories. Understanding these elements helps healthcare organizations plan and execute the introduction of new practices effectively. Applying DoI Theory in IPC highlights the importance of both technical and adaptive solutions, guiding the strategic adoption of new practices and ensuring their integration into healthcare routines (Rogers, 2003; Greenhalgh et al., 2004; Sreeramoju, 2019). Rogers identified five key factors influencing the rate of innovation adoption: (1) Relative Advantage: The degree to which an innovation is seen as better than the idea it supersedes; (2) Compatibility: How consistent the innovation is with the values, experiences, and needs of the potential adopters; (3) Complexity: How difficult the innovation is to understand and use; (4) Trialability: The extent to which the innovation can be experimented with; (5) Observability: The extent to which the innovation's results are visible to others (Rogers, 2003). The social system can range from a small group to an entire organization or society. *Adopter Categories*: Rogers proposed that individuals within a social system do not adopt an innovation simultaneously; instead, they adopt in a time-ordered sequence. He grouped adopters into five classes, each characterized by a unique set of traits: (1) Innovators; (2) Early Adopters; (3) Early Majority; (4) Late Majority; (5) Laggards. The last to adopt an innovation, showing little to no opinion leadership.

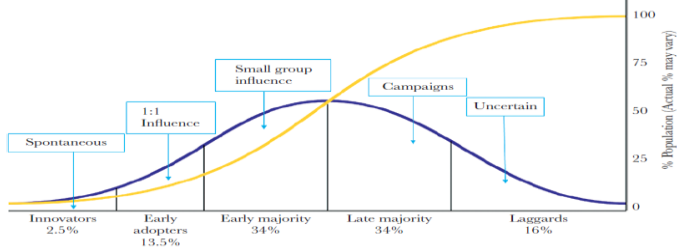


Figure 1: DoI Theory's structure and the Adopter Categories

Adopter Categories: Rogers proposed that individuals adopt innovations in a sequence. Innovators (2.5%) are the first, taking risks and being socially distant. Early Adopters (13.5%) follow, with high opinion leadership. The Early Majority (34%) adopts after some time, more cautiously. The Late Majority (34%) adopts later, showing skepticism. Laggards (16%) are the last, with little to no opinion leadership.

Integrating Theories in IPC: A Multifaceted Approach: NPT and DoI Theory offer complementary insights into the assimilation of IPC measures. NPT focuses on the social and organizational dynamics of integrating new practices, while DoI Theory maps the adoption trends across different segments of the healthcare workforce. Together, these theories help identify barriers and enablers to IPC practice implementation, providing a comprehensive understanding of how to enhance IPC practices effectively (May et al., 2018; Rogers, 2003).

I.2 Implementation Science

I.2.1 Bridging Research and Practice

Implementation Science is crucial for transforming healthcare by applying research to practical settings. It highlights the importance of contextual factors and customized methodologies to improve implementation effectiveness (Durlak & DuPre, 2008; Damschroder et al., 2009; Proctor et al., 2011; Clack et al., 2018; Aarons et al., 2011). Successful implementation involves adopting new methods, ideas, and technologies to enhance processes and outcomes, influenced by factors like organizational culture, leadership, readiness for change, and available resources (Damschroder et al., 2009; Aarons et al., 2011; May et al., 2022). A tailored approach that respects each healthcare setting's unique characteristics is essential (Durlak & DuPre, 2008; Aarons et al., 2011).

I.2.2 Navigating Complexities: Insights and Strategies

The implementation process involves stages from initial consideration of evidence-based practices (EBPs) to their integration and sustainment. The quality of implementation, particularly fidelity—how closely delivery matches the original design—critically impacts outcomes (Durlak & DuPre, 2008; Damschroder et al., 2009). Developing measurement tools is vital for evaluating EBP effectiveness. Proctor et al. (2011) outlines key implementation outcomes, including adoption, fidelity, sustainability, feasibility, penetration, and cost, requiring reliable, valid, and adaptable tools (Proctor et al., 2011).

The Role of Context: Both outer and inner contexts are crucial for EBP success. External factors like sociopolitical influences and funding, along with internal factors such as organizational culture, leadership, readiness for change, and resource availability, significantly affect EBP adoption and sustainability (Aarons et al., 2011; Clack et al., 2018). Aarons et al.

(2011) present a model emphasizing the dynamic relationship between these contexts, outlining four phases: exploration, adoption/preparation, implementation, and sustainment. Strategies for success include engaging leadership, building capacity, providing training, and establishing monitoring mechanisms (Clack et al., 2018). Sustainable implementation requires ongoing support and resources (Damschroder et al., 2009). Understanding these processes and contexts is vital for enhancing EBP effectiveness, allowing researchers and policymakers to translate research into practice and improve healthcare and public service quality.

I.3 Healthcare-associated Infections (HCAIs)

HCAIs significantly affect various healthcare settings, leading to prolonged hospital stays, increased morbidity and mortality rates, and reduced quality of life (Allegranzi et al., 2011; 2013; Sreeramoju, 2019). The epidemiology of HCAIs varies by infection type and healthcare setting. While urinary tract infections are common, *Clostridium difficile* infections, though rarer, have high morbidity and mortality rates. The World Health Organization (WHO) reported that, on average, 7% of patients in developed countries and 10% in developing countries acquire at least one HCAI at any given time, contributing to about 10% of patient deaths (WHO, 2016). HCAIs impose substantial economic burdens due to additional treatments and extended hospital stays. The financial costs of HCAIs to hospitals in the United States alone range from \$35.7 billion to \$45 billion annually (WHO, 2016; CDC, 2021). The burden of HCAIs extends beyond healthcare systems, affecting patients' quality of life and overall healthcare outcomes (Sreeramoju, 2019). Effective IPC measures are crucial for containing antimicrobial resistance and preventing HCAIs (Sreeramoju, 2019; Shepard et al., 2020).

I.4 Impact of COVID-19 on HCAIs

The COVID-19 pandemic posed unprecedented challenges to healthcare systems worldwide, leading to increased workloads, modified infection control protocols, and higher patient numbers. This situation heightened the risk of HCAIs like CLABSI, CAUTI, VAEs, and MRSA bacteremia (Najjar-Debbiny et al., 2022; Weiner-Lastinger et al., 2022; Baker et al., 2022). In Israeli public hospitals, IPC unit managers faced numerous challenges and rapidly adapted to the evolving pandemic landscape. Effective

leadership was crucial, requiring dynamic decision-making and strategic planning (James & Bennett, 2020; Kackin et al., 2021). High self-efficacy among leaders facilitated proactive behaviors and organizational improvements (Bandura, 1977; 1982; 1997). The pandemic underscored the need for resilient healthcare systems and continuous improvement in IPC practices (Sands et al., 2023; Schwaber et al., 2023). IPC unit managers had to enhance their autonomy and leadership skills, adopting flexible strategies to meet the pandemic's unique demands. This period also spurred innovations in communication and operations, ensuring adherence to evolving IPC guidelines despite increased burnout risks (Chen & Cojocar, 2023; Knobloch et al., 2017; McAlearney et al., 2021). The resilience and adaptability shown were critical for sustaining effective IPC practices under unprecedented conditions. Effective leadership and heightened self-efficacy have historically been linked to better pandemic response, as seen during the 2009 H1N1 pandemic (Ehrenstein et al., 2006). Research emphasizes the significant influence of leadership quality and organizational structure on emergency responses (Barnett et al., 2009; Barnett et al., 2010), highlighting the importance of studying COVID-19's impact on IPC unit managers in Israeli hospitals (Gottesman et al., 2021; Rotaru et al., 2023; Shear & Cojocar, 2023).

I.5 National Programs for Infection Prevention and Control

The origins of NPIPC span over a century, marking a pivotal shift towards improved sanitation and hygiene in hospitals. The latter half of the 20th century saw the emergence of HCAs and antimicrobial resistance (AMR), prompting a global movement towards comprehensive IPC strategies (WHO, 2016). The WHO identifies eight essential components for effective NPIPC: IPC programs, national and facility-level IPC guidelines, IPC education and training, healthcare-associated infection surveillance, multimodal strategies for implementing IPC activities, monitoring and auditing IPC practices, workload, staffing, and bed occupancy, and built environment, materials, and equipment for IPC (WHO, 2016; Storr et al., 2017; Sreeramoju, 2019).

Bridging Gaps and Methods of Assimilating NPIPC: To safeguard public health and combat HCAs and AMR, it is crucial to bridge gaps in NPIPC implementation. Local adaptation and implementation of programs across diverse settings need more evidence, and the effectiveness of various

delivery methods requires further exploration (Storr et al., 2017; Sreeramoju, 2019). Effective NPIP implementation requires a comprehensive strategy that integrates WHO's core components into national and facility-level frameworks, addressing research gaps and adapting strategies to local contexts (Allegranzi et al., 2013; Fakhri et al., 2013; Atkins et al., 2020; WHO, 2016; Storr et al., 2017; Sreeramoju, 2019).

Methods of Assimilating NPIP and Incentivization of Israeli Hospitals:

The NPIP in Israel has evolved significantly, reflecting a commitment to improving IPC within hospitals through strategic initiatives and evidence-based practices. Early initiatives and IPC framework establishment began in 2005 with the Ministry of Health (MOH) issuing guidelines mandating IPC units in hospitals (MOH, 2005). The 2006 outbreak of carbapenem-resistant *Klebsiella pneumoniae* led to the creation of the National Institute of IPC and Antibiotic Resistance (NIIPC&AMR), highlighting the importance of coordinated IPC responses (Schwaber et al., 2011; Carmeli et al., 2010). Following the creation of IPC units, the MOH launched the NPIP in 2007, aiming to strengthen IPC measures and reduce HCAs (MOH, 2007). Between 2011 and 2012, the MOH expanded IPC guidelines to include community healthcare facilities, establishing a comprehensive IPC framework across the healthcare spectrum (MOH, 2011; 2012). The 2012 State Comptroller's report emphasized the need for a comprehensive national IPC plan, advocating for the establishment of independent IPC units in healthcare institutions and communities (State Comptroller of Israel Report, 2012).

From 2015 to 2021, significant investments were made in IPC, leading to marked improvements in practices and a decrease in ICU blood infections. The NPIP underwent a comprehensive evaluation in 2022, focusing on specific measurements to assess hospital compliance and effectiveness in infection control (Knesset of Israel, 2016; MOH, 2017; MOH, 2022).

I.6 Evolution and Impact of IPC Units in Israeli Hospitals

The establishment of IPC units in Israeli hospitals has significantly improved infection control practices. Initially managed under nursing or infectious diseases units, independent IPC units were promoted by the Ministry of Health (MOH) following the carbapenem-resistant *Klebsiella pneumoniae* outbreak in 2006. This crisis highlighted the need for dedicated IPC measures, leading to enhanced guidelines and the creation of

specialized task forces (Schwaber et al., 2011). By 2012, MOH guidelines had expanded to include community medical facilities and established a comprehensive IPC framework (MOH, 2011; 2012). The formation of the National Institute of IPC and Antibiotic Resistance (NIIPC&AMR) promoted a collaborative approach to infection control across hospitals. Today, IPC units operate with significant autonomy, playing vital roles in institutional IPC committees and antibiotic management sub-committees. Responsibilities include monitoring infection rates, overseeing antibiotic use, developing prevention programs, providing consultations, analyzing outbreaks, conducting research, and implementing IPC programs (NPIPC, 2021).

Over the past 15 years, resources for IPC units have increased, driven by the NPIPC and an incentivization model. By 2016, the ratio of infection control nurses improved to one nurse per 200 beds, further enhanced to one nurse per 125 beds by 2022 (NPIPC, 2022). Despite progress, challenges remain, such as outdated staffing ratios, high turnover rates, and limited resources. Addressing these involves updating staffing guidelines and supporting IPC professionals. Institutional leaders are crucial in fostering effective IPC environments through educational initiatives and safety rounds (Zingg et al., 2015).

I.7 Self-Efficacy, Leadership, and Managerial Autonomy in IPC

This doctoral research explores the complex interplay between key managerial traits—self-efficacy, leadership, and managerial autonomy—and their impact on the implementation of the NPIPC in Israeli public hospitals. Set against the backdrop of the COVID-19 pandemic, this research aims to develop an Autonomous Management Model that enhances the effectiveness of IPC programs by empowering IPC managers to lead their units effectively under various conditions.

I.7.1 Self-Efficacy

Self-efficacy, defined by Bandura (1977) as an individual's belief in their capacity to execute behaviors necessary to produce specific performance attainments, plays a crucial role in IPC management. IPC unit managers with high self-efficacy were significantly more successful in implementing NPIPC. Managers who believed in their abilities were better equipped

to face challenges, lead their teams effectively, and drive IPC initiatives forward, especially under crisis conditions (Bandura, 1982; Bandura, 1997). High self-efficacy among IPC managers also translated into more effective communication and enforcement of infection prevention measures, such as hand hygiene and proper use of personal protective equipment (PPE). These managers were adept at motivating healthcare workers to adhere to IPC protocols, thus reducing the incidence of HCAs (Sax et al., 2007).

1.7.2 Leadership

Effective leadership is another crucial trait that significantly influences the implementation of NPIP. Leadership involves the ability to inspire, motivate, and guide teams towards achieving common goals. Transformational leadership styles, which foster team cohesion, clear communication, and a shared vision for IPC excellence, were particularly impactful (Bass, 1985; Bass & Riggio, 2006). Leaders who engaged and motivated their teams were more successful in implementing IPC strategies, ensuring adherence to protocols and encouraging proactive problem-solving among staff (Avolio & Luthans, 2006; Bass, 1997). Transformational leaders in IPC units played a key role in creating a culture of safety and continuous improvement, inspiring their teams to follow suit and leading to higher compliance with infection control measures and lower rates of HCAs (Pittet, 2004; Saint et al., 2010).

1.7.3 Managerial Autonomy

Managerial autonomy, defined as the freedom and authority managers have over decision-making, goal setting, and resource allocation, was found to be a critical factor in the successful implementation of NPIP (Ng et al., 2008). IPC unit managers with higher degrees of autonomy were more successful in implementing tailored and responsive IPC strategies. Autonomy allowed these managers to make swift decisions and adapt their approaches based on the specific needs and conditions of their healthcare settings. This flexibility is crucial for effective infection control, particularly in dynamic and high-pressure environments like hospitals during the COVID-19 pandemic (Gözükara & Şimşek, 2015). The ability to make autonomous decisions enabled IPC managers to quickly address emerging infection threats, allocate resources where they were most

needed, and implement targeted interventions to prevent the spread of infections (Chen & Cojocaru, 2023).

Integration of Self-Efficacy, Leadership, and Autonomy: The interplay between self-efficacy, leadership, and managerial autonomy creates a robust framework for enhancing IPC program effectiveness. Managers who possess a strong sense of self-efficacy, exhibit effective leadership, and operate with a high degree of autonomy are better positioned to implement NPIPC successfully. These traits collectively enable managers to navigate the complexities of infection control, motivate their teams, and make informed, timely decisions that improve patient safety and reduce healthcare-associated infections (Bandura, 1997; Bass & Avolio, 1994; Gözükara & Şimşek, 2015).

I.8 Research Context and Implications

This doctoral dissertation examines these managerial traits within the context of Israeli public hospitals, using a mixed-methods approach to provide a comprehensive understanding of their impact on NPIPC implementation. The findings underscore the critical role of fostering self-efficacy, leadership, and autonomy among IPC unit managers to enhance the overall effectiveness of IPC programs. By developing an Autonomous Management Model that integrates these traits, healthcare institutions can better prepare for both routine operations and crisis situations, ultimately improving patient outcomes and infection control measures (Chen & Cojocaru, 2023; Hobfoll, 1989; Ryan & Deci, 2000).

In conclusion, the research highlights that by empowering IPC unit managers with the necessary self-efficacy, leadership skills, and managerial autonomy, hospitals can significantly enhance their IPC efforts. This approach not only addresses current challenges but also provides a strategic framework for future IPC program development and crisis management. The integration of these managerial traits into the Autonomous Management Model offers a path towards more resilient and effective healthcare systems, capable of maintaining high standards of infection control in both everyday operations and during public health emergencies.

CHAPTER II: RESEARCH PROCEDURE AND METHODOLOGY

II.1 The Methodology

This study employs a mixed methods research (MMR) design to explore factors facilitating the implementation and assimilation of IPC measures in Israeli hospitals. The choice of MMR was driven by its ability to provide a comprehensive understanding of the research topic by leveraging the strengths of both qualitative and quantitative paradigms (Creswell & Plano Clark, 2018; Mody et al., 2017). The research aimed to develop an Autonomous Management Model for successful IPC program implementation, revealing the complex dynamics involved in effectively implementing IPC measures.

II.2 Research Design

II.2.1 Research Objectives

Objective: To develop an Autonomous Management Model for the successful implementation of IPC programs in Israeli hospitals.

1. To Examine the relationship between the degree of NPIPC implementation and the levels of managerial autonomy, managerial self – efficacy, and leadership skills demonstrated by IPC managers in IPC units within public hospitals in Israel.
2. To explore the relationship between background characteristics (such as levels of seniority and job engagement) and MA, MSE, and leadership skills among managers in IPC units.
3. To assess specific managerial factors, including facilitators and barriers, which significantly influence the implementation of the NPIPC, among PMs-IPC and NMs-IPC.
4. To investigate the influence of IPC unit managers' perceptions and their implemented interventions on the effectiveness of the NPIPC.
5. To explore the impact of the COVID-19 pandemic on managerial traits (MA, MSE, and leadership skills) and the correlation between these traits and perceived management effectiveness during the pandemic.

II.2.2 Research Questions

1. How does the degree of NPIPC implementation correlate with levels of MA, MSE, and leadership skills among PMs-IPC and NMs-IPC within Israeli hospitals?
2. How do background characteristics, including different levels of seniority and job engagement, influence MA, the sense of MSE, and leadership skills among PMs-IPC and NMs-IPC in Israeli hospitals?
3. What are the specific managerial factors that impact the implementation of IPC programs in Israeli hospitals, considering both facilitators and barriers, particularly among PMs-IPC and NMs-IPC?
4. How do the perceptions and interventions of IPC unit managers affect the effectiveness of the NPIPC implementation scores in Israeli hospitals?
5. How has the COVID-19 pandemic impacted MA, MSE, and leadership skills among IPC-Unit managers, within public hospitals in Israel? Moreover, what is the relationship between managerial activities during the pandemic and their perceived management effectiveness?

Table 1: Summary of Research design Methodology

Study Aim	Questions	Re-search Methods & Tools	Re-search Participants	Data Analysis
Study 1: <i>Objective 1:</i> To examine the relationship between the degree of NPIPC implementation and the levels of MA, MSE, and leadership skills demonstrated by physician-managers and nurse-managers in IPC units within public hospitals in Israel.	How does the degree of NPIPC implementation correlate with levels of MA, sense of self-efficacy in management, and leadership skills among physician-managers and nurse-managers in IPC units within Israeli hospitals?	Questionnaires+ Semi-structured In-depth interviews + NPIPC Data	19- PMs-IPC 31- NMs-IPC 5 - PMs-IPC 5- NMs-IPC.	Quantitative analysis+ Qualitative analysis – by themes and categories

<p>Study 2: <i>Objective 2:</i> To investigate the influence of background characteristics on MA, self-efficacy in management, and leadership skills among managers in IPC units.</p>	<p>How do background characteristics, including different levels of seniority and job engagement, influence MA, the sense of MSE, and leadership skills among managers in IPC-Units in Israeli hospitals?</p>	<p>Questionnaires</p>	<p>19-PMs-IPC 31-NMs-IPC</p>	<p>Quantitative-analysis</p>
<p>Study 3: <i>Objective 3:</i> To Identify and assess the managerial factors impacting the implementation of the program, encompassing both <u>facilitators</u> and <u>barriers</u> among Physician-managers and nurse-managers in IPC units.</p>	<p>What are the specific managerial factors that impact the implementation of IPC programs in Israeli hospitals, considering both <u>facilitators</u> and <u>barriers</u>, particularly among physician-managers and nurse-managers in IPC units?</p>	<p>Questionnaires+ Semi-structured In-depth interviews</p>	<p>19-PMs-IPC 31-NMs-IPC 5 - PMs-IPC 5-NMs-IPC.</p>	<p>Quantitative analysis+ Qualitative analysis – by themes and categories</p>
<p>Study 4: <i>Objective 4:</i> To investigate the influence of IPC unit managers' perceptions and their implemented interventions on the <u>effectiveness of the NPIP</u>C within Israeli hospitals, aiming to identify key factors that contribute to successful program outcomes.</p>	<p>How do the perceptions and interventions of IPC unit managers affect the effectiveness of the NPIP implementation scores in Israeli hospitals?</p>	<p>Questionnaires+ Semi-structured In-depth interviews + NPIP Data</p>	<p>19-PMs-IPC 31-NMs-IPC 5 - PMs-IPC 5-NMs-IPC.</p>	<p>Quantitative analysis+ Qualitative analysis – by themes and categories</p>

<p>Study 5: <i>Objective 5:</i> To explore the impact of the COVID-19 pandemic on MA, self-efficacy, and leadership capabilities among IPC-Unit managers, including both PMs-IPC and NMs-IPC, and to examine the correlation between managerial activities during the pandemic and their perceived management effectiveness.</p>	<p>How has the COVID-19 pandemic impacted MA, MSE, and leadership skills among IPC-Unit managers, including both PMs-IPC and NMs-IPC, within public hospitals in Israel? Moreover, what is the relationship between managerial activities during the pandemic and their perceived management effectiveness?</p>	<p>Questionnaires+ Semi-structured In-depth interviews</p>	<p>19-PMs-IPC 31-NMs-IPC 5 - PMs-IPC 5-NMs-IPC.</p>	<p>Quantitative analysis+ Qualitative analysis – by themes and categories</p>
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To build a questionnaire on the basis of the interview findings and validating it: Data Analysis - Analysis of the questionnaire validity and reliability

II.2.3 Hypotheses and Research variables

Higher levels of managerial traits such as MA, MSE, and leadership skills contribute to the comprehensive and effective implementation of NPIPIC among both PMs-IPC and NMs-IPC in Israeli public hospitals.

Research Variables: *Dependent Variables:* NPIPIC Implementation Scores for 2022; 2-AAQ: Annual Activity Questionnaire; Roles within IPC Units: PMs-IPC and NMs-IPC. *Independent Variables:* 5-MngAutoQ; 6-ManSelfEffQ; 7-LeadEvalQ

There is a positive relationship between background characteristics (such as levels of seniority and job engagement) and MA, MSE, and leadership skills among managers in IPC units in Israeli hospitals.

Research Variables: *Dependent Variables:* 5-MngAutoQ; 6-ManSelfEffQ; 7-LeadEvalQ. *Independent Variables:* Background Characteristics: Level of seniority; Job engagement

Specific managerial factors, including facilitators and barriers, significantly influence the implementation of NPIPIC in Israeli hospitals. These

factors vary between PMs-IPC and NMs-IPC, affecting their perceptions and approaches to implementing new practices within IPC units.

Research Variables: *Dependent Variables*: Annual 2-AAQ; 5-MngAutoQ; 6-ManSelfEffQ; 7-LeadEvalQ. *Independent Variable*: 3-OrgChangeImplQ; Professional Role (PMs-IPC and NMs-IPC)

The effectiveness of NPIPC in Israeli hospitals is significantly influenced by the perceptions and engagements of PMs-IPC and NMs-IPC, emphasizing the critical role of managerial insights into operational needs and constraints.

Research Variables: *Dependent Variable*: NPIPC implementation scores for 2022; roles of PMs-IPC and NMs-IPC. *Independent Variables*: Annual 2-AAQ; Scores from the 3-OrgChangeImplQ reflecting IPC unit managers' perceptions of implementation components

The COVID-19 pandemic has reshaped the managerial capabilities of PMs-IPC and NMs-IPC in Israel, enhancing their MSE, MA and leadership skills, hypothesized to have improved IPC program implementation and altered organizational perceptions positively.

Research Variables: *Dependent Variables*: 5-MngAutoQ; 6-ManSelfEffQ; 7-LeadEvalQ; 3-rgChangeImplQ; 2- AAQ. *Independent Variable*: Pandemic Impact: 4-COVID-19-MIQ; roles of PMs-IPC and NMs-IPC.

II.3 Research Methods and Tools

1. Qualitative Component: In-depth interviews with IPC professionals.
2. Quantitative Component: Questionnaires:
 - DemographicQ: Demographic Questionnaire
 - 2-Activity Assessment Questionnaire (2-AAQ): Using 6 items
 - Organizational Change Implementation Questionnaire (3-OrgChangeImplQ): Using 20 items (Aarons et al., 2011; Durlak & DuPre, 2008; Damschroder, Aron, Keith et al., 2009; Proctor et al., 2011; Clack et al., 2018; Creswell & Plano Clark, 2018; Flick, 2017; Greene, 2015), High Cronbach's Alpha scores 0.95.
1. Implementation Science: High Cronbach's Alpha scores (0.71 to 0.92)
2. NPT Constructs (Braun & Clarke, 2006; Feters & Molina-Azorin, 2017a; May et al., 2009): High reliability, Cronbach's Alpha scores (0.75 to 0.89)

3. DoI Constructs (Rogers, 1993, 2003; Fetters & Freshwater, 2015): High reliability, Cronbach's Alpha scores (0.70 to 0.88)
 - The 4-COVID-19 Managerial Impact Questionnaire (4-COVID-19-MIQ): Using 13 items (Chen & Cojocar, 2023; Koonin, 2020; Creswell, 2018). High Cronbach's Alpha scores (0.86 to 0.94), Total for the entire scores 0.94.
 - The 5-Managerial Autonomy Questionnaire (5-MngAutoQ): Using 10 items (Deci, Vallerand, Pelletier, & Ryan, 1991). High Cronbach's Alpha scores (0.68 to 0.89), Total for the entire scores 0.89.
 - The 6-Managerial Self-Efficacy Questionnaire (6-ManSelfEffQ): Using 16 items (Bandura, 1977; Bandura, 1997; Gagné & Deci, 2005; Ryan & Deci, 2000). High Cronbach's Alpha scores (0.91 to 0.97), Total for the entire scores 0.97
 - Leadership Evaluation Questionnaire (7-LeadEvalQ): Using 20 items (Bass & Avolio, 1994, 1995, 1997, 2011; Bryman, 2012; Creswell, 2018). High Cronbach's Alpha scores (0.65 to 0.97), Total for the entire scores 0.97.

Development and Adaptation: Pilot testing and expert feedback ensured content validity and reliability. Combining theoretical foundations with practical insights, expert feedback, and rigorous statistical validation, the methodology underscores the potential of these instruments to provide meaningful insights into IPC management practices.

2. NPIPC for 2022 - Evaluation Categories and Key Metrics.

By combining the insights from in-depth interviews with responses from the questionnaires, a comprehensive understanding of the IPC program implementation process and managers' perspectives was achieved. This integrative approach provided a holistic examination of the research objectives, linking the theoretical framework with real-world experiences and practices of IPC unit managers.

II.4 Research Procedure

The research aimed to comprehensively assess IPC management within Israeli public hospitals, focusing on NPIPC implementation, managerial autonomy, self-efficacy, leadership skills, and the impact of the COVID-19 pandemic. Ethical approval was obtained from the institutional review board, ensuring adherence to ethical standards (Peled & Leichtentritt,

2002). Convenience sampling was used to recruit IPC-Unit Physician-managers and Nurse-managers, facilitating the collection of both qualitative and quantitative data from the same population.

II.4.1 Data Collection and Analysis Framework

Qualitative Data Collection: In-depth interviews with selected managers provided insights into managerial factors influencing NPIPC implementation, essential conditions for effective IPC, and experiences during the COVID-19 pandemic (Sabar Ben-Yehoshua, 2001a, 2001b; Bryman, 2006).

Quantitative Data Collection: Structured questionnaires were administered to 25 IPC-Unit Physician-managers and 35 IPC-Unit Nurse-managers, quantifying relationships between NPIPC implementation and managerial attributes. The questionnaires were developed based on literature review and expert consultations, with reliability validated using Cronbach's Alpha (Creswell & Plano Clark, 2018).

Data Analysis: The analysis included descriptive statistics, Pearson correlation, t-tests/ANOVA, and multiple regression analysis for quantitative data (Tabachnick & Fidell, 2019). Thematic analysis was used for qualitative data, extracting patterns and themes related to managerial factors and the impact of the pandemic (Braun & Clarke, 2006).

II.4.2 Population and Sample

The target population included IPC Unit Physician-managers and Nurse-managers in Israeli public hospitals. Participants were selected using convenience sampling, focusing on those directly involved in IPC strategy implementation and management. The study included 50 IPC managers, with 19 Physician-managers and 31 Nurse-managers.

Participant Demographics:

The study analyzed the demographic and professional profiles of 50 IPC unit heads in Israeli public hospitals. The hospitals varied in size, with licensed beds ranging from 65 to 1580. In 19 hospitals, both PMs-IPC and NMs-IPC jointly led IPC units, while others were led exclusively by NMs-IPC. One larger hospital had several NMs-IPC, indicating a detailed division of roles. Public hospitals showed high compliance with IPC leadership requirements. The gender distribution showed a predominance of female IPC unit heads. Educational backgrounds revealed that 16% of physicians held MDs, and 84% of nurses held master's degrees, with 9.5%

holding PhDs. Both groups showed high participation in specialized IPC training.

Professional Tenure and Infrastructure: PMs-IPC had an average age of 52 years and professional tenure of 23 years, while NMs-IPC had an average age of 54 years and tenure of 30 years. Tenure in IPC units averaged 11 years for PMs-IPC and 12 years for NMs-IPC. Hospital infrastructure analysis included licensed beds, ranging from 65 to 1580, and general beds, ranging from 65 to 1123.

II.4.3 Reliability and Validity

The study used a mixed-methods approach to ensure high reliability and validity, guided by principles ensuring quality and trustworthiness. Ethical credibility was maintained through informed consent and rich data description (Shkedi, 2003). Triangulation and transparency were employed to enhance reliability and validity, contributing to the body of knowledge in social research (Patton, 2002; Archibald, 2016).

II.4.4 Data Analysis

A robust statistical analysis framework was used to explore the relationships between NPIP implementation, managerial autonomy, self-efficacy in management, leadership skills, and the impact of the COVID-19 pandemic. The data was sorted, cleaned, and preliminarily analyzed before conducting advanced statistical analysis using SPSS. Techniques included T-tests, ANOVA, Pearson correlation, and multiple regression (Creswell & Plano Clark, 2018; Fetters & Molina-Azorin, 2017a, 2017b). The qualitative component involved thematic analysis of interview transcripts to identify patterns and themes related to IPC program implementation and managerial practices (Braun & Clarke, 2006).

II.4.5 Ethical Considerations

Ethical considerations were prioritized, with research conducted under approval from the Ethics of Research Committee of the Faculty of Philosophy and Social-Political Sciences at "Alexandru Ioan Cuza" University of Iasi, Romania (Peled & Leichtentritt, 2002). Confidentiality and privacy were maintained throughout data collection, analysis, and reporting (Levitt et al., 2017). Strategies such as member checking and peer debriefing ensured the credibility and trustworthiness of the findings (Creswell & Plano Clark, 2018; Fetters et al., 2013; Fetters & Molina-Azorin, 2017).

CHAPTER III: FINDINGS

This chapter analyzes the relationship between managerial traits—managerial autonomy (MA), managerial self-efficacy (MSE), and leadership skills—and the implementation of the NPIPC in Israeli public hospitals. The aim is to develop an "Autonomous Management Model" to enhance IPC practices by empowering IPC unit managers. The research combines qualitative insights from interviews with IPC unit managers and quantitative data from questionnaires to offer a holistic understanding of IPC management challenges and facilitators.

III.1 Hypothesis 1: Impact of Managerial Skills on NPIPC Implementation

III.1.1 Managerial Autonomy and NPIPC Implementation

This sub-hypothesis examines the relationship between MA and NPIPC implementation in 2022. Autonomy in decision-making and operational independence is crucial for developing and adapting IPC strategies.

Table 2: Comparing Managerial Autonomy in IPC between PMs- and NMs-IPC

IPC - Physician Managers	IPC - Nurse Managers	Interpretations
Categories: Leadership and Management		
<i>"I hold the highest authority within the organization when it comes to IPC." (S5, P, 10/04/2023)</i>	<i>"I have complete autonomy and authority to determine the IPC program and motivate the team." (S3, N, 04/04/2023)</i>	Both groups value autonomy in IPC management, with PMs-IPC focusing on authority and NMs-IPC on collaboration.
Categories: Acquisition of Knowledge and Management Skills		
<i>"Leadership is built upon confidence in knowledge, abilities, communication, and training. Formal management training in IPC is necessary." (S1, P, 29/03/2023)</i>	<i>"Interpersonal communication, creativity, and decision-making are crucial. Being knowledgeable in various fields is important." (S2, N, 31/03/2023)</i>	Both emphasize the development of autonomy through knowledge and skills, highlighting leadership and adaptability.
Categories: IPC Program Goals and Objectives		

<i>"I have full autonomy and realistic authority in setting goals for the IPC program." (S4, P, 03/04/2023)</i>	<i>"Decisions are made in collaboration with the unit manager." (S1, N, 30/03/2023 & S5, N, 10/04/2023)</i>	PMS-IPC stress unilateral control over IPC goals, while NMs-IPC focus on collaborative decision-making.
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Explanation: This table presents a statistical comparison of autonomy perceptions between PMS-IPC and NMs-IPC, using mean scores, standard deviations, and t-tests. The analysis examines significant differences in autonomy across strategic planning, operational management, and communication within IPC roles.

Table 3: Comparative Analysis of 5-MngAutoQ Between PMS and NMs-IPC

Questionnaire: 5-MngAutoQ Dimension, df 50	PMS-IPC Mean (Std. Dev.)	NMs-IPC Mean (Std. Dev.)	t (Equal variances assumed)	p-Value (One-Sided)	p-Value (Two-Sided)
Strategy and Vision (3 items)	5.28 (1.10)	5.20 (0.97)	-0.26	0.40	0.80
Process Management and Intervention Boundaries (4 items)	5.61 (0.67)	5.79 (0.90)	0.78	0.22	0.44
Human Relations and Communication (3 items)	5.86 (0.69)	6.09 (0.73)	1.09	0.14	0.28
Overall Autonomy Score	5.58 (0.69)	5.70 (0.77)	0.55	0.29	0.59

Table 4: Correlations between 2-AAQ and MA in IPC Units

5-MngAutoQ Domain	Management & Promotion	Training & Instructions	Audits/ Observations	Infection Monitoring	Event Investigation	Research
Strategy and Vision	.301*	.250*	.091	.094	.093	.307*
Process Management	.301*	.310*	.185	.141	.123	.207
Human Relations	.251*	.362**	.107	.125	.000	.232
Overall Autonomy	.330**	.345**	.150	.137	.093	.285*

*Correlation is significant at the 0.05 level (1-tailed). **Correlation is significant at the 0.01 level (1-tailed). Explanation: This table examines the correlation between MA and various components of the NPICP program, showing how autonomy perceptions relate to different IPC activities.

Table 5: Correlations between NPIP Implementation and MA

NPIP Components, N=48	Strategy and Vision	Process Management	Human Relations	Overall Autonomy
1. Organizational Infrastructure & Cleaning	.143	.036	.061	.057
2. Structural Aspects	.014	.206	.128	.133
3. Training & Education	.113	.054	.028	.031
4. Intervention & Implementation	.158	.138	.271*	.206
5. Diagnosis & Treatment	.047	.140	.095	.109
6. Outcome Monitoring	.135	.043	.052	.060
7. Protection of Healthcare Workers	.076	.157	.093	.128
Overall NPIP	.075	.058	.104	.026

*Correlation is significant at the 0.05 level (1-tailed). Explanation: This table examines the correlations between different components of NPIP implementation and dimensions of MA among IPC unit leaders. It highlights significant relationships and areas where MA influences IPC practices.

Managerial Autonomy (MA):

Qualitative Findings: Both IPC-Physician Managers (PMs-IPC) and IPC-Nurse Managers (NMs-IPC) value autonomy in IPC management. PMs-IPC focus on decision-making authority, while NMs-IPC emphasize collaborative decision-making.

Quantitative Findings: Statistical analysis (Table 3) showed no significant differences in perceived autonomy between PMs-IPC and NMs-IPC. However, there were slight differences in perception reflecting the unique roles and responsibilities of each group. Correlations between NPIP components and MA (Table 5) indicate significant relationships in the 'Human Relations and Communication' dimension, suggesting the importance of autonomy in fostering effective IPC interventions.

Conclusion: Autonomy is critical for effective IPC management, with both groups recognizing its importance, though their approaches differ. Enhancing autonomy through strategic support can improve IPC leadership.

III.1.2 Managerial Self-Efficacy and NPIPC Implementation

Sub-Hypothesis 1.2 examines the relationship between MSE and NPIPC implementation in 2022. MSE, defined as a manager's belief in their capability to execute roles and responsibilities effectively, is paramount within the context of IPC.

Table 6: Comparing Managerial Self-Efficacy in IPC Between PMs NMs-IPC

IPC - Physician Managers	IPC - Nurse Managers	Interpretations
Categories: Lifelong Learning and Professional Growth		
<i>"Experience is invaluable, and I continuously invest in self-development and seek guidance from senior colleagues" (S4, P, 03/04/2023).</i>	<i>"High management skills, perseverance, persuasiveness, and effective communication are required, especially in unpopular positions" (S5, N, 10/04/2023), emphasizing adaptability and relational skills.</i>	PMs-IPC and NMs-IPC both value ongoing development, focusing on leveraging experience and mentorship or emphasizing a broad range of management and interpersonal skills, respectively.
Categories: Structured Learning for Skill Enhancement		
<i>"Formal training in management and leadership abilities is crucial" (S5, P, 10/04/2023).</i>	<i>"Listening, management, time management, prioritization, flexibility, and vigilance are important. Being knowledgeable in various fields and interacting with the team using a common language to convey a uniform message is crucial" (S2, N, 31/03/2023), focusing on a comprehensive skill set.</i>	Both emphasize the importance of formal education and training in enhancing management skills and self-efficacy, with PMs-IPC highlighting the role of formal training in leadership and NMs-IPC on the development of comprehensive skills for effective team management.

Table 7: Differences in MSE Between PMs and NMs Based on 6-ManSelfEffQ

Dimension	PMs-IPC Mean (Std. Dev.)	NMs-IPC Mean (Std. Dev.)	t (Equal variances assumed)	df	One-Sided p	Two-Sided p
1. Team Goal Management (5 items)	5.13 (0.81)	6.12 (0.76)	4.37	50	<.001	<.001

2. Problem-Solving (4 items)	4.97 (0.86)	5.85 (0.95)	3.29	50	<.001	.002
3. Team Adaptation (3 items)	5.11 (0.88)	5.96 (0.92)	3.23	50	.001	.002
4. Resource Management (4 items)	4.75 (0.75)	5.62 (1.06)	3.14	50	.001	.003
Overall Self-Efficacy Score	4.99 (0.76)	5.90 (0.82)	3.91	50	<.001	<.001

This table explores the differences in self-efficacy between PMs-IPC and NMs-IPC in IPC units, highlighting variations in their self-perceived abilities across critical management areas. The higher self-efficacy scores among NMs-IPC across various domains highlight their stronger perceived capabilities in IPC unit management.

Table 8: Correlations between 2-AAQ for IPC Activities and 6-ManSelfEffQ

6-ManSelfEffQ Domains	Management & Promotion	Training & Instructions	Audits/ Observations	Infection Monitoring	Event Investigation	Research
1. Team Goal Setting	.332**	.397**	.344**	-.074	.025	.039
2. Coping with Problems	.266*	.375**	.304*	-.135	.035	.020
3. Team Adaptation	.345**	.384**	.279*	-.063	-.042	.100
4. Resource Management	.235*	.387**	.298*	-.156	-.044	-.034
Overall Self-Efficacy Score	.315*	.417	.334	-.118	-.004	.029

*Correlation is significant at the 0.05 level (1-tailed). **Correlation is significant at the 0.01 level (1-tailed). This table explores the relationship between time spent on various IPC activities and self-perceived managerial efficacy.

Table 9: Correlations between NPIP Implementation Programs and MSE

NPIP Implementation Programs N=48	Team Goal Management	Dealing with Problems	Team Adaptation	Resource Management	Overall Self-Efficacy Score
Organizational Infrastructure IPC + Cleaning (7)	.170	.183	.248*	.230	.220
Structural Aspects (2)	.074	.022	.014	.228	.099
IPC Training and Education (4)	.244*	.278*	.335**	.220	.285*
Intervention & Implementation Programs (6)	.329*	.312*	.315*	.213	.315*

Diagnosis Process for Infection Monitoring and Treatment (5)	.130	.187	.165	.109	.157
Infection Outcome Monitoring (8)	.089	.057	.090	.097	.058
Protection of Healthcare Workers (1)	.191	.259*	.299*	.318*	.284*
Overall NPIP Score (31)	.225	.111	.254*	.199	.210

*Correlation is significant at the 0.05 level (1 tailed). **Correlation is significant at the 0.01 level (1 tailed). This table investigates the impact of MSE on the implementation of NPIP programs, correlating self-efficacy with various NPIP components.

Managerial Self-Efficacy (MSE): Qualitative Findings: PMs-IPC prioritize formal training and leadership abilities, whereas NMs-IPC focus on comprehensive skills and adaptability. *Quantitative Findings:* Higher self-efficacy scores among NMs-IPC across various domains (Table 7) highlight their stronger perceived capabilities in IPC unit management. Correlations between NPIP components and MSE (Table 9) show significant relationships in areas such as IPC training and education, intervention programs, and healthcare worker protection. *Conclusion:* MSE is vital for IPC implementation, with distinct approaches between PMs-IPC and NMs-IPC emphasizing different aspects of leadership and adaptability.

III.1.3 Leadership Skills in IPC Units and NPIP Implementation

This sub-hypothesis explores the relationship between leadership skills and NPIP implementation. Effective leadership in IPC requires diverse skills, including strategic vision, communication, empathy, and the ability to create a positive team environment.

Table 10: Comparing Leadership Skills in IPC Between PMs-IPC and NMs-IPC

PMs-IPC	NMs-IPC	Interpretations
Leadership Aspect- Vision and Direction		
<i>"Building trust and confidence takes time. Professionalism, facing objections, empathy, and collaboration with the teams are critical." (S4, P, 03/04/2023) "</i>	<i>"My aim is to empower my team and promote their independence." (S2, N, 31/03/2023)</i>	PMs-IPC emphasize establishing vision and direction through motivation and external representation. In contrast, NMs-IPC focus on empowerment and credibility within the team, indicating a more transformational approach.
Leadership Aspect- Professional Inspiration and Role Modeling		

<i>"I lead my team and provide professional inspiration. I feel like a leader in the field." (S1, P, 29/03/2023)</i>	<i>"I see myself as a role model, practicing what I preach." (S2, N, 31/03/2023)</i>	PMs-IPC view their role as inspirational leaders, focusing on professional growth. NMs-IPC, however, emphasize role-modeling and the development of leadership skills within their teams.
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Table 11: Leadership Style Differences Between PMs and NMs in IPC Units

Leadership Style	PMs-IPC Mean (Std. Dev.)	NMs-IPC Mean (Std. Dev.)	t-Value	df	P-Value (One-Sided)	P-Value (Two-Sided)
Transformative Leadership (10)	4.99 (1.56)	6.00 (0.68)	3.18	50	.001	.003
Rewarding Leadership (6)	4.51 (1.63)	6.06 (0.72)	4.66	50	<.001	<.001
Passive Leadership (4)	2.84 (1.52)	3.24 (1.38)	0.96	50	0.17	0.34
Overall Leadership Score	4.66 (1.48)	5.76 (0.57)	3.73	50	<.001	<.001

Explanation: Significance levels are marked at the 0.05 level (1-tailed) and 0.01 level (1-tailed). This table examines the leadership styles of physician managers and nurse managers in IPC units using the 7-LeadEvalQ. The table categorizes leadership styles into Transformative Leadership, Rewarding Leadership, and Passive Leadership. It examines these styles across 20 statements to offer insights into their prevalence and effectiveness among IPC unit managers.

Table 12: Correlations between 2-AAQ and Leadership Skills in IPC Units

Leadership Aspect	Management & Promotion	Training & Instructions	Audits/Observations	Infection Monitoring	Event Investigation	Research
Formative Leadership	.618*	.428**	.465**	-.050	.214	-.036
Rewarding Leadership	.520*	.459**	.579**	.094	.286*	-.255*
Passive Leadership	.198	.224	.194	-.001	.123	.014

Overall Leadership	.603*	.460**	.518**	-.007	.243*	-.103
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*Correlation is significant at the 0.05 level (1-tailed). **Correlation is significant at the 0.01 level (1-tailed). This table examines the relationship between time spent on IPC activities and perceived leadership qualities.

Table 13: Correlations between NPIPC Implementation and Leadership Skills

NPIPC Implementation Programs, N=48	Transformative Leadership (10)	Rewarding Leadership (6)	Passive Leadership (4)	Overall Leadership Score
Organizational Infrastructure IPC + Cleaning (7)	.217	.111	.209	.205
Structural Aspects (2)	.002	.040	.026	.015
IPC Training and Education (4)	.222	.064	.139	.191
Intervention & Implementation Programs (6)	.228	.141	.119	.212
Diagnosis Process for Infection Monitoring and Treatment (5)	.275*	.153	.041	.228
Infection Outcome Monitoring (8)	.171	.069	.231	.161
Protection of Healthcare Workers (1)	.338**	.208	.126	.304*
All Categories NPIPC (31)	.245*	.104	.309*	.233

*Correlation is significant at the 0.05 level (1-tailed). **Correlation is significant at the 0.01 level (1-tailed).

Leadership Skills:

Qualitative Findings: PMs-IPC adopt a strategic leadership style focusing on external advocacy and professional growth, while NMs-IPC prefer a transformational approach, emphasizing team empowerment and internal collaboration.

Quantitative Findings: NMs-IPC's higher scores in transformative and rewarding leadership styles (Table 11) suggest a more dynamic and engaging approach to leadership. Correlations between NPIPC components and leadership skills (Table 13) indicate significant relationships, particularly with transformative leadership impacting various aspects of NPIPC implementation.

Table 14: Correlation with 5-MngAutoQ, 6-ManSelfEffQ, and Leadership Styles

Correlations	Overall, 6-ManSelfEffQ Score	Formative Leadership	Rewarding Leadership	Passive Leadership
Overall, 5-MngAutoQ Score	.513**	.367**	.172	-.032
Overall, 6-ManSelfEffQ Score		.511**	.508**	.058
Formative Leadership			.829**	.397**
Rewarding Leadership				.324*

*Correlation is significant at the 0.05 level (1-tailed). **Correlation is significant at the 0.01 level (1-tailed).

III.2 Hypothesis 2: Background Characteristics and Managerial Factors

This hypothesis explores the relationship between IPC unit managers' background characteristics and key managerial factors like MA, MSE, and leadership skills.

Table 15: Correlations between Background Characteristics and Managerial Factors

Component / Background Variable	Professional Seniority	Unit Seniority	Management Seniority	Job Percentage
Managerial Autonomy				
Strategy and Vision	.030	.130	.127	.113
Process Management	.132	.031	.081	.120
Human Relations	.125	-.063	-.005	.205
Overall Autonomy	.107	.049	.087	.160
Managerial Self-Efficacy (MSE)				
Goal Management	.541**	.212	.316*	.454**
Problem Solving	.412**	.188	.306*	.206
Team Adaptation	.458**	.226	.353*	.289*
Resource Management	.401**	.140	.259	.098
Overall MSE	.492**	.205	.330*	.287*
Leadership				
Formative Leadership	.427**	.190	.319*	-.055
Rewarding Leadership	.467**	.232	.313*	-.089

Passive Leadership	.348**	.118	.253*	.007
Overall Leadership Score	.483**	.221	.344**	-.062

Explanation: **Correlation is significant at the 0.01 level (2-tailed). *Correlation is significant at the 0.05 level (2-tailed).

Background Characteristics and Managerial Factors: Quantitative Findings: Correlations (Table 15) indicate that professional and management seniority are key predictors of enhanced managerial and leadership capabilities. Conclusion: A holistic approach to professional development, emphasizing experience and leadership competencies, is essential for effective IPC management.

III.3 Hypothesis 3: Specific Managerial Factors, Facilitators, and Barriers Influencing the Implementation

Table 16: Managerial Factors Promoting Implementation of NPIPC

PMs-IPC	NMs-IPC	Interpretation
Contact with Hospital Management		
Team Management in IPC		
<i>"Our team holds meetings to identify failures and address gaps." (S5, P, 10/04/2023).</i>	<i>"I encourage my team to attend relevant courses, share updates through Journal Club meetings, and trust them transparently." (S1, N, 30/3/2023).</i>	PMs-IPC focus on knowledge sharing and evaluation, while NMs-IPC emphasize professional development, mentorship, and engagement.
Routine, Fostering a Culture of IPC in a Hospital Unit		
<i>"Our organization believes in a carrot-and-stick approach to IPC culture" (S4, P, 03/04/2023).</i>	<i>"Every member of the healthcare team plays a critical role in IPC" (S4, N, 09/04/2023).</i>	PMs-IPC highlight methodical approaches, training, and patient stories to foster IPC culture. NMs-IPC focus on inclusivity, education, and the involvement of all team members.

This hypothesis examines how managerial factors impact the implementation of IPC programs in Israeli hospitals, focusing on PMs-IPC and NMs-IPC perceptions and approaches.

III.3.1 Differences in Perceptions Regarding Facilitators and Barriers of Implementation

Table 17: Managerial Factors Hindering Implementation of IPC

PMs-IPC	NMs-IPC	Interpretation
Factors Related to the Organization		
<i>"I have no independence when it comes to the budget for strengthening the organizational infrastructure " (S5, P, 10/04/2023).</i>	<i>"People within the organization do not always recognize the role of the unit" (S4, N, 09/04/2023).</i>	PMs-IPC stress budget constraints and complex IPC processes, needing autonomy and collaboration. NMs-IPC highlight organizational recognition and support.
Work Practices		
<i>"The controls are often done manually and not automatically, hindering efficiency" (S4, P, 03/04/2023).</i>	<i>"The assimilation process for IPC practices is done in stages... " (S2, N, 31/3/2023).</i>	Both identify inefficiencies and technological needs, with PMs-IPC focusing on systemic challenges and NMs-IPC on practical application and structural support.

III.3.2 Correlation Between 2-AAQ and Implementation Components

Table 18: Correlations between 2-AAQ and 3-OrgChangeImplQ in IPC Management

2-AAQ & OrgChange-ImplQ	Management & Promotion	Training & Instructions	Audits/ Observations	Infection Monitoring	Event Investigation	Research
Questionnaire Distribution by Implementation Stages						
Preparation and Planning	.045	.374**	.070	-.131	.011	.137
Execution and Implementation	-.001	.272*	.098	-.140	-.065	.066
Monitoring and Control	-.035	.270*	-.052	-.099	.029	.128
Maintenance and Promotion	.180	.407**	.120	-.170	-.052	.044
Questionnaire Distribution by NPT Theory						
Coherence	.080	.344**	.021	-.146	-.006	.129
Conscious Participation	-.019	.335**	.120	-.113	-.026	.137

Collective Action	.052	.345**	.050	-.176	-.023	.051
Reflective Monitoring	.160	.355**	.049	-.151	-.012	.018
Questionnaire Distribution by Diffusion of Innovations (DoI)						
Characteristics of Innovation	.095	.345**	.018	-.116	-.021	.106
Communication Pathways	-.011	.357**	.138	-.058	-.073	.019
Time Characteristics	-.027	.209	-.018	-.219	-.091	.190
Social System	.104	.447**	.103	-.173	.078	.096
Innovators	.127	.399**	.178	-.130	.051	.047
Overall Score in Change	.057	.372**	.076	-.150	-.020	.106

Explanation: **Correlation is significant at the 0.01 level (2-tailed). *Correlation is significant at the 0.05 level (2-tailed). This table explores the relationship between time allocation by IPC unit heads across various activities and their involvement in organizational change implementation, utilizing the 3-OrgChangeImplQ framework.

The table highlights the significant correlation between time spent on training and instructions and higher engagement in organizational change, particularly in preparation and planning stages, as well as in coherence and collective action within NPT. This suggests that prioritizing training enhances the effectiveness of organizational change efforts in IPC.

III.3.3 Correlation Between OrgChangeImplQ and Managerial Skills

Table 19: Correlation between Questionnaires and OrgChangeImplQ Final Scores

Overall OrgChange-ImplQ Score	4-COVID-19-MIQ: Overall Score	Overall, 5-MngAutoQ: Score	Overall, 6-ManSelfEffQ: Score	Formative Leadership	Rewarding Leadership	Passive Leadership
Pearson Correlation	.080	.164	.211	.035	-.016	-.062
Sig. (1-tailed)	.291	.128	.071	.405	.456	.334

Explanation: The table presents correlations between the overall OrgChangeImplQ score and various factors, including COVID-19 management (4-COVID-19-MIQ), managerial autonomy (5-MngAutoQ), MSE (6-ManSelfEffQ), and different leadership styles: formative, rewarding, and passive.

The weak correlations suggest that the effectiveness of organizational change, as measured by the overall OrgChangeImplQ score, is not strongly dependent on COVID-19 management, managerial autonomy, self-efficacy, or specific leadership styles. This indicates that implementing organizational changes in IPC settings requires a multifaceted approach considering various contextual factors.

Specific Managerial Factors, Facilitators, and Barriers Influencing the Implementation

Facilitators: *Qualitative Findings:* PMs-IPC focus on structured approaches and advocacy, while NMs-IPC emphasize inclusivity, professional development, and positive reinforcement. *Quantitative Findings:* Significant correlation (Table 18) between time spent on training and instructions and higher engagement in organizational change, particularly in preparation and planning stages. *Conclusion:* Complementary strategies from both groups enhance IPC practices, with a focus on training and professional development being crucial for successful implementation.

Barriers: *Qualitative Findings:* PMs-IPC highlight systemic issues such as budget constraints and inefficiencies due to manual processes. NMs-IPC stress the need for organizational recognition, adequate resources, and practical application of knowledge. *Quantitative Findings:* Weak correlations (Table 19) between overall organizational change implementation and specific factors like COVID-19 management, managerial autonomy, and self-efficacy. *Conclusion:* Addressing systemic issues and providing adequate resources and recognition are key to overcoming barriers in IPC implementation.

III.4 Hypothesis 4: The Effectiveness of the NPIP and the Role of IPC Unit Managers

This hypothesis examines how the perceptions and engagements of managers within IPC units impact the effectiveness of the NPIP in Israeli hospitals.

III.4.1 Managerial Perceptions on Essential Conditions for Effective IPC Implementation

Table 20: Perceptions of Managers IPC-Units Regarding the IPC Program

PMs-IPC Quotes	NMs-IPC Quotes	Interpretation
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Categories: The Essence of the IPC Program		
<i>"The program needs to be simple, clear, and practical, detailing what needs to happen."</i> (S5, P, 10/04/2023)	<i>"Most work involves leading new processes and writing procedures."</i> (S1, N, 30/3/2023)	PMS-IPC emphasize simplicity and practicality, while NMs-IPC highlight leadership and process management.
Categories: The Importance of the Program		
"A crucial unit for hospital functioning, pivotal for quality and risk management." (S3, P, 03/04/2023)	<i>"The IPC unit is essential for patient safety and communication across teams."</i> (S2, N, 31/3/2023)	PMS-IPC emphasize the IPC unit's foundational role in hospital operations, focusing on quality and risk management. NMs-IPC stress its critical impact on patient safety and effective team communication.

Table 21: Perceptions of Managers within IPC-Units Regarding the Essential Conditions Necessary for the Implementation of the IPC Program

PMS-IPC Quotes	NMs-IPC Quotes	Interpretation
Categories: Management Skills		
<i>"Possessing basic management skills is essential for managing the IPC unit."</i> (S5, P, 10/04/2023)	<i>"Experience in different areas of nursing is valuable."</i> (S4, N, 09/04/2023)	Both recognize the importance of management skills, with PMS-IPC emphasizing fundamental abilities and NMs-IPC highlighting diverse nursing experience and strong organizational management skills.
<i>"Persuasive abilities and motivation are crucial for managing compliance."</i> (S4, P, 03/04/2023)	<i>"Senior management skills are crucial for obtaining necessary resources."</i> (S2, N, 31/3/2023)	PMS-IPC focus on persuasion and motivation, while NMs-IPC stress strong organizational management and resource acquisition skills.
Categories: Measurement in IPC Program		
<i>"The IPC program requires skills in setting measurable goals."</i> (S1, P, 29/3/2023)	<i>"A risk survey should encompass all areas and address identified risks."</i> (S2, N, 31/3/2023)	PMS-IPC highlight the importance of setting measurable goals and continuous monitoring, while NMs-IPC emphasize the need for comprehensive risk assessment and regular evaluation to adapt the IPC program to current realities.

Table 22: Challenges in IPC Program Implementation by Managers IPC-Units

Cate- go- ries	PMs-IPC Quotes	NMs-IPC Quotes	Interpretation
Organiza- tional Chal- lenges	<i>"Reducing bureau- cracy in work pro- cesses to retain skilled personnel."</i> (S5, P, 10/04/2023)	<i>"The focus of IPC has shifted to priori- tizing the human ex- perience."</i> (S4, N, 09/04/2023)	PMs-IPC aim to reduce bureaucracy; NMs-IPC emphasize integrating IPC culture and address- ing human resources.
Infrastruc- tural Chal- lenges	<i>"A good organiza- tional infrastructure and team collabora- tion are crucial."</i> (S1, P, 29/3/2023)	<i>"We need more NMs-IPC and better information systems for efficiency."</i> (S5, N, 10/04/2023)	Both groups stress the need for better infra- structure and resources.
Manage- rial Skills Chal- lenges	<i>"Managing infec- tions and staying updated on new pathogens requires constant effort."</i> (S3, P, 03/04/2023)	<i>"The lack of NMs- IPC specialized in IPC poses a signifi- cant challenge."</i> (S2, N, 31/3/2023)	PMs-IPC focus on lead- ership and adaptability; NMs-IPC highlight staffing and resource is- sues.

III.4.2 Correlations between NPIPC Implementation Scores and 2-AAQ

This section examines the relationship between NPIPC implementation scores for 2022 and the 2-AAQ scores in key IPC activities, hypothesizing that the allocation of time to various IPC activities by unit heads impacts the effectiveness of IPC programs.

Table 23: Correlations between NPIPC Implementation for 2022 and 2-AAQ s

Activities: 2-AAQ & NPIPC Implementation scores for 2022	Man- age- ment and Work Pro- grams	Train- ing and In- struc- tions	Audits/ Obs- ervations/ Con- sul- tations	Infec- tion Moni- toring	Investi- gation of Events and Out- breaks	Re- search
1A: IPC Unit, 1B: Cleaning & Disinfect- ion	-0.019	-0.089	0.027	0.245 *	0.231	0.232
Cat 2: Infrastructure As- pects	0.016	0.051	-0.013	0.261 *	-0.118	-0.031

Cat 3: IPC Training and Education	0.206	-0.052	-0.009	0.352 **	0.140	0.009
Cat 4: Intervention & Implementation Programs	0.271 *	-0.201	-0.052	0.140	0.017	-0.072
Cat 5: Diagnosis Process for Infection Monitoring	0.184	-0.064	0.016	-0.172	0.151	0.095
Cat 6: Infection Outcome Monitoring	-0.043	0.020	0.105	-0.157	0.109	0.025
Cat 7: Protection of Healthcare Workers	0.199	0.241	0.275*	0.012	0.131	0.134
All Categories 1-7: All Categories NPIP (31)	-0.098	0.076	0.068	0.022	0.196	0.094

Explanation: * Correlation is significant at the 0.05 level (1-tailed). ** Correlation is significant at the 0.01 level (1-tailed).

These correlations highlight that managerial focus on infection monitoring and training is crucial for successful IPC implementation. A balanced, multifaceted strategy is necessary for effective IPC leadership and program success.

The Effectiveness of the NPIP and the Role of IPC Unit Managers

Managerial Perceptions: Qualitative Findings: PMs-IPC emphasize practicality and preparedness, while NMs-IPC highlight the importance of process leadership and comprehensive education. Quantitative Findings: Positive correlations (Table 23) between managerial activities and NPIP program effectiveness, indicating the critical role of IPC unit managers. Conclusion: Strong leadership, precise measurement, and comprehensive management support are vital for IPC program success.

Challenges: Qualitative Findings: PMs-IPC focus on reducing bureaucracy and structural needs, while NMs-IPC emphasize technological support and addressing staffing challenges. Quantitative Findings: Significant correlation (Table 23) between specific managerial activities and improved IPC outcomes, underscoring the need for a balanced and multifaceted strategy. Conclusion: Effective communication, continuous monitoring, and adaptive strategies are crucial for overcoming implementation challenges.

III.5 Hypothesis 5: Impact of the COVID-19 Pandemic on Managerial Skills

This hypothesis explores the impact of the COVID-19 pandemic on managerial skills within IPC units, positing that the crisis has led to significant enhancements in MSE, autonomy, and leadership skills among IPC unit managers.

III.5.1 The COVID-19 Management Impact on Managerial Skills Disparities and Implementation Perceptions

Table 24: The COVID-19 Impact on Managerial Skills, Comparative Among PMs-IPC and NMs-IPC

PMs-IPC Quotes	NMs-IPC Quotes	Interpretation
Category: The Sense of MSE		
<i>"The importance of my decision-making skills became apparent." (S3, P, 03/04/2023)</i>	<i>"The COVID-19 pandemic presented new challenges and opportunities for skill development." (S2, N, 31/03/2023)</i>	PMs-IPC highlight growth in decision-making, while NMs-IPC emphasize skill development and rapid adaptation.
Category: Managerial Autonomy		
<i>"The epidemic taught me to delegate authority and share the burden." (S2, P, 02/04/2023)</i>	<i>"The pandemic made me more assertive and resilient." (S1, N, 30/03/2023)</i>	Both experienced increased autonomy, with PMs-IPC focusing on delegating authority and NMs-IPC on assertiveness and resilience.
Category: Leadership Skills		
<i>"I felt a leap in my ability to manage uncertainty and respond quickly to changes." (S1, P, 29/03/2023)</i>	<i>"I have gained valuable experience in managing epidemics, crisis management, and resource allocation." (S2, N, 31/3/2023)</i>	PMs-IPC emphasized managing uncertainty, while NMs-IPC focused on crisis management and resource allocation.
Category: Job Satisfaction and Well-being		
<i>"Well-being during the COVID-19 epidemic was low, but my job satisfaction improved with my growing</i>	<i>"The pandemic destroyed my home life, requiring constant availability and leading to high personal</i>	PMs-IPC reported a mix of stress and professional growth, leading to increased job satisfaction. NMs-IPC experienced high stress and personal sacrifices,

<i>capabilities.</i> " (S5, P, 10/04/2023)	<i>costs.</i> " (S3, N, 04/04/2023)	emphasizing the need for robust support systems.
Category: Implementation Skills		
"It was challenging to restart programs that had been stopped." (S4, P, 03/04/2023).	"The pandemic made me more assertive and resilient." (S1, N, 30/03/2023).	Both groups faced challenges in implementing IPC programs, but PMs-IPC focused on maintaining continuity, while NMs-IPC developed assertiveness in managing crises.

The pandemic increased managerial skills and autonomy for both groups, with PMs-IPC focusing on decision-making and NMs-IPC on resilience and assertiveness. Job satisfaction varied, with PMs-IPC reporting growth and NMs-IPC highlighting stress.

Table 25: Comparative Analysis of Managerial Impact During COVID-19 Among PMs-IPC and NMs-IPC

Dependent Variable -4-COVID-19-MIQ (Total 13)	Mean (PMs-IPC)	Std. Deviation (PMs-IPC)	Mean (NMs-IPC)	Std. Deviation (NMs-IPC)	F (1, 48)	Sig.
Autonomy Management during COVID-19 (5)	5.68	0.90	5.91	1.11	0.01	0.94
Conflict Management during COVID-19 (4)	5.84	0.80	5.82	1.34	0.35	0.56
Leadership and Crisis Management during COVID-19 (4)	6.03	0.72	6.03	0.72	0.16	0.69
Overall Score during COVID-19	5.84	0.75	5.92	1.07	0.09	0.76

Explanation: **P < .05 indicates statistical significance; *P < .01 indicates high statistical significance. The 4-COVID-19-MIQ assesses key managerial dimensions impacted by the COVID-19 pandemic, with each domain scored on a scale from 1 to 7.

Overall COVID-19 Impact Score: Despite different professional backgrounds, both groups managed similar challenges during the pandemic, indicating a comparable overall impact on their managerial practices.

III.5.2 Correlation Between COVID-19 Impact and 3-OrgChangeImplQ

Table 26: Correlation Analysis of 4-COVID-19-MIQ with 3-OrgChangeImplQ and Leadership

Parameter (N=50)	Correlation with COVID-19 Overall Score
3-OrgChangeImplQ Implementation Stages (20)	.080
Overall Autonomy Score: 5-MngAutoQ (10)	.473**
– Strategy and Vision (3)	.458**
– Process Management and Intervention Boundaries (4)	.463**
– Human Relations and Communication (3)	.275*
Overall, 6-ManSelfEffQ	.388**
Overall Leadership Score	.288*
– Transformative Leadership	.320*
– Rewarding Leadership	.271*
– Passive Leadership	-.081

Explanation: **P < .05 indicates statistical significance; *P < .01 indicates high statistical significance.

CHAPTER IV: CONCLUSIONS AND RECOMMENDATIONS

IV.1 Conclusions

This thesis thoroughly analyzes the relationships between managerial practices and IPC program effectiveness in Israeli public hospitals. By exploring five central hypotheses, the study identifies how managerial traits such as autonomy, self-efficacy, and leadership skills impact IPC success, considering the managers' backgrounds and challenges posed by the COVID-19 pandemic.

The NPIPC Implementation and Managerial Traits: Autonomy: High managerial autonomy is crucial for successful IPC interventions, fostering innovation and team empowerment. However, PMs-IPC and NMs-IPC perceive autonomy differently, suggesting a need for balanced strategic oversight and collaborative engagement, especially in 'Human Relations and Communication.' ***Managerial Self-Efficacy (MSE):*** Lifelong learning and formal training enhance MSE, with NMs-IPC showing higher self-efficacy in team goal setting, problem-solving, and resource management,

reflecting stronger perceived capabilities. *Leadership Skills*: Effective leadership, characterized by strategic vision, communication, empathy, and collaboration, is foundational for IPC success. PMs-IPC focus on strategic leadership, while NMs-IPC excel in transformational leadership, inspiring and empowering teams.

The Background Characteristics of IPC Unit Managers: Professional Seniority: Extensive experience enhances autonomy, self-efficacy, and leadership skills. Continuous professional growth and diverse experiences are crucial for strong managerial capabilities. *Tenure and Job Engagement*: Tenure in IPC units impact managerial factors, with job engagement consistently enhancing autonomy and leadership skills, making engaged managers more effective leaders.

The Managerial Influence on NPIP Implementation: Strategic Engagement and Advocacy: Proactive engagement and advocacy by IPC unit managers with hospital management are vital for securing support and resources, facilitating successful IPC implementation. Continuous education and staff development are essential, aligning daily operations with strategic changes. *Change Management*: Effective IPC implementation requires understanding organizational change dynamics, integrating adaptive leadership with strategies addressing individual and organizational factors. Cultivating a supportive IPC culture and focusing on positive reinforcement contribute to an adaptable environment.

Essential Conditions and Challenges for Effective IPC Program Implementation: Strategic Management and Preparation The effectiveness of IPC programs depends on strategic management and preparation. Managers who prioritize clear planning and foster collaborative environments achieve higher program effectiveness. Addressing organizational, infrastructural, and skill-related challenges is essential for effective IPC measures. *Direct Managerial Involvement* Direct involvement of managers in specific IPC activities, such as infection monitoring and healthcare worker protection, correlates with improved IPC outcomes. Emphasizing preparation, planning, and collective action enhances program effectiveness.

The Impact of COVID-19 on Managerial Skills and Implementation Skills: Enhanced Managerial Skills: The COVID-19 pandemic significantly enhanced MSE, autonomy, and leadership capabilities among IPC unit managers. It accelerated the development of essential competencies required for effective crisis management. *Adaptability and Decision-*

Making: The pandemic underscored the need for rapid adaptation and advanced decision-making skills. Managers developed high adaptability and emotional intelligence, crucial for team cohesion and morale during crises. *Communication and Recognition:* Effective communication became critical during the pandemic, ensuring clear and timely information dissemination. The pandemic enhanced the recognition of IPC units' strategic role within healthcare systems.

Overall Implications: The conclusions highlight the importance of managerial autonomy, self-efficacy, and leadership in fostering successful IPC measures within Israeli public hospitals. Recognizing and reinforcing these attributes can significantly enhance IPC innovation, effective management, and health outcomes. The insights offer valuable perspectives on essential competencies and adaptations required for effective healthcare management, particularly in crises.

IV.2 Recommendations

The recommendations guide healthcare organizations in enhancing IPC practices through an "Autonomous Management Model," integrating key managerial traits and evidence-based practices to empower IPC managers.

Enhancing IPC Implementation Through Managerial Factors: *Comprehensive Training and Professional Development:* Programs should focus on strategic planning, decision-making, and crisis management, incorporating practical experience, continuous learning, and adaptation. *Strengthening Leadership Skills:* Tailored programs should focus on ethical decision-making, team leadership, and conflict resolution, with mentorship programs to reinforce skills. *Promoting Evidence-Based Practices:* IPC operations should integrate the latest research, regularly updating protocols and adopting proactive strategies to anticipate challenges. *Improving Communication Strategies:* Clear communication policies and advanced communication skills training are crucial for effective team management and collaboration. *Regular Performance Evaluations:* Evaluations should assess IPC managers' effectiveness, providing fair, transparent feedback to tailor individual development plans.

Impact of Background Variables on Managerial Functions in IPC Units: Optimizing professional tenure and employment status is essential for enhancing managerial autonomy and capabilities. Healthcare organizations should recognize and leverage experienced managers' insights to

improve decision-making and strategic planning. Tailored training programs should address the unique needs of managers at different career stages. Flexible working conditions should promote job satisfaction and effective performance. Cultivating a culture of continuous professional development encourages lifelong learning, and clear pathways for career advancement motivate managers and foster leadership development.

Addressing Enablers and Barriers in Organizational Change for IPC:

Understanding and leveraging sociological theories can enhance IPC training module development. Regular organizational assessments are necessary to identify barriers to effective IPC implementation. Strengthening change management skills among IPC managers is crucial for handling resistance and managing team dynamics. Enhancing interdepartmental collaboration supports IPC measures, fostering a cohesive environment. Continuous learning opportunities should be provided, focusing on advancements in IPC. Recognition and reward systems should acknowledge successful change leadership.

Addressing Challenges in Operating Effective IPC Programs:

Enhancing managerial training involves robust initiatives focused on strategic planning and crisis management. Continuous professional development should be encouraged to update managerial skills. Strengthening leadership and strategic engagement requires tailoring leadership training programs that foster a proactive management style. Facilitating cross-departmental cooperation and strengthening team dynamics through regular strategy sessions and collaborative training are essential. Upgrading technological and infrastructural support involves investing in advanced IPC tools and developing robust data management systems. Establishing protocols for regular policy reviews ensures IPC practices remain relevant and effective.

Addressing the Impact of COVID-19 on Managerial Skills in IPC

Units: Enhancing Professional Development and Resilience Training: Crisis management and emotional intelligence programs build resilience, and developing support systems improves emotional well-being. Strengthening Strategic Communication Skills: Training programs enhance communication, and cultivating a flexible organizational culture encourages innovation in IPC program implementation.

IV.2.6 Summary of Main Recommendations for Enhancing IPC Management

To enhance IPC practices in healthcare organizations, the following recommendations focus on improving managerial practices in training, leadership, evidence-based practices, proactive management, communication, and performance evaluations:

Enhanced Managerial Training: Engage managers in strategic planning, crisis management, and decision-making training, emphasizing practical experience through simulations and case studies to boost confidence and self-efficacy. *Strengthen Leadership Skills:* Develop leadership through initiatives focused on ethical decision-making, team leadership, and conflict resolution. Implement mentorship programs to reinforce leadership skills and inspire teams. *Promote Evidence-Based Practice:* Integrate the latest research into IPC operations by establishing a digital library and conducting monthly reviews of recent IPC literature, normalizing new practices within the organization. *Foster a Proactive Management Culture:* Develop strategies for proactive management, such as scenario planning and risk assessment workshops, to enhance responsiveness and anticipate future challenges. *Improve Communication Strategies:* Implement clear communication policies within IPC units and the organization. Training should emphasize clarity, empathy, and effectiveness in crisis communication. *Regular Performance Evaluations:* Establish comprehensive performance evaluation systems for IPC managers, assessing process and outcome metrics. Provide structured feedback to support continual professional development. *Conclusion:* These recommendations aim to strengthen IPC practices through an "Autonomous Management Model" by focusing on critical areas such as training, leadership, evidence-based practices, proactive management, communication, and performance evaluations. Integrating these recommendations will enhance the capabilities of IPC units, ensuring healthcare facilities can effectively handle current and emerging health challenges, improving patient outcomes and safety.

IV.3 Autonomous Management Model for the successful implementation

Autonomous Management Model

The Autonomous Management Model emphasizes *flexibility and responsiveness*, allowing IPC managers to adapt quickly to emerging information and changing circumstances without compromising the rigor of IPC protocols. The model prioritizes *managerial autonomy and empowerment*, enabling IPC managers to make informed decisions swiftly and adjust IPC protocols as situations evolve. By integrating theoretical insights from NPT and DoI with evidence-based practices, the model provides a comprehensive framework supporting the adoption and normalization of innovations within hospital routines.

A structured yet adaptable training component ensures IPC managers enhance their capabilities through workshops, simulation exercises, and continuous learning opportunities. This prepares managers to face current challenges and equips them to handle future crises. The model fosters a culture of *continuous improvement and evaluation* through regular feedback mechanisms and reflexive monitoring, allowing IPC practices to evolve based on real-world performance and outcomes. The core stages of the Autonomous Management Model are:

Exploration Phase: Understanding and Assessing Needs - The objective is to assess the current IPC landscape and identify needs. Activities include gathering data on current IPC practices, outbreaks, and compliance issues. The NPT aspect involves coherence, where managers make sense of the need for changes or enhancements in IPC practices. Information gathered here feeds into strategic planning, ensuring that training and development initiatives are relevant and targeted.

Adoption/Preparation Phase: Strategic Planning and Engagement - The objective is to develop strategic plans incorporating new IPC practices and secure stakeholder buy-in. Activities involve formulating IPC policies, setting goals, and planning for resource allocation. The NPT aspect involves cognitive participation, engaging and enrolling stakeholders to commit to implementing IPC changes. The DoI aspect focuses on the social system and communication channels, utilizing effective communication strategies. Strategies developed are based on insights from the Exploration Phase, and leadership skills are crucial to drive the process and foster a culture of engagement.

Implementation Phase: Execution of IPC Strategies - The objective is to implement strategies effectively across the hospital. Activities include training sessions, procedure updates, and introducing new protocols. The NPT aspect involves collective action, requiring coordinated efforts across teams. The DoI aspect highlights the benefits and compatibility of new practices. This phase builds directly on the planning and engagement from the previous phase, requiring strong communication skills and MSE to manage and adapt to challenges effectively.

Sustainment Phase: Evaluation and Iteration - The objective is to sustain and improve IPC practices over time. Activities include ongoing training, performance evaluations, feedback loops, and adaptation of strategies. The NPT aspect involves reflexive monitoring, evaluating the impact of new practices and making necessary adjustments. Continuous evaluation informs further training needs and strategic adjustments, promoting a cycle of improvement.

Key Success Factors for Managers: Managerial Self-Efficacy (MSE): Confidence in their abilities to implement and sustain IPC measures effectively. Managerial Autonomy: Freedom to adapt IPC practices to their hospital's specific context. Leadership Skills: Ability to lead and motivate teams, resolve conflicts, and drive IPC practices through effective communication and strategic decision-making.

Training IPC Managers for Rapid Scenario Execution

In response to the dynamic challenges of IPC in healthcare settings, especially during crises such as pandemics, IPC managers need skills and knowledge to adapt and lead effectively. The comprehensive training model incorporates various strategic components to enhance decision-making capabilities, leadership skills, and practical knowledge application, ensuring managers are prepared to handle current challenges and adaptable to future scenarios.

Adjusted Model for Rapid IPC Protocol Implementation during COVID-19

In scenarios like the COVID-19 pandemic, rapid decision-making is crucial for integrating and updating new IPC protocols. The model emphasizes flexibility, rapid communication, and responsive leadership. Integration with managerial elements such as MSE and autonomy is critical, equipping managers to make quick decisions and manage rapid changes

effectively. Leaders must navigate uncertainty and maintain team cohesion under changing circumstances.

To implement this model effectively during a crisis, hospitals should establish dedicated teams focused on rapid response, utilize technology for real-time data gathering and communication, train leaders and staff on flexibility and crisis management techniques, and create protocols for quick adjustments with immediate stakeholder feedback. These strategies ensure IPC managers are well-prepared to lead their teams through crises and dynamically implement IPC practices, ultimately improving healthcare outcomes and patient safety.

IV.4 Contribution to Knowledge

This study enhances understanding and implementation of IPC programs in Israeli public hospitals, emphasizing the roles of managerial autonomy, self-efficacy, and leadership. By distinguishing between physician-managers and nurse-managers, it highlights the importance of professional development in these traits. It identifies the impact of professional seniority and job engagement on IPC management, providing a framework to optimize IPC through managers' expertise. Integrating NPT and DoI theories, it offers a practical framework for adopting and normalizing IPC measures, improving change management. The research details COVID-19's impact on IPC management, stressing the need for adaptability, strategic communication, and emotional intelligence during crises. Tailored questionnaires and data collection tools offer a structured approach for future IPC research. The Autonomous Management Model combines autonomy, flexibility, responsiveness, and leadership, empowering managers to make informed decisions, especially in crises. It uses NPT and DoI frameworks to normalize IPC practices and includes adaptable training for continuous improvement. Strategic planning and preparation are vital for IPC effectiveness. The study highlights the need for strategic alignment, infrastructural enhancements, and leadership development to overcome barriers. Direct involvement in infection monitoring and management is crucial for better IPC outcomes. In summary, this research promotes a management-led approach to IPC, emphasizing leadership, organizational support, and continuous professional development. It offers practical insights for enhancing infection control and prevention across healthcare settings.

IV.5 Future Research Directions

Building on the insights from this research, future studies should explore several areas to deepen and expand the understanding of IPC management. Investigating the relationship between managerial traits and IPC implementation across various healthcare settings, including private clinics and community health centers, can help develop tailored IPC strategies. Conducting longitudinal studies on the evolution of managerial traits and their sustained impact on IPC practices will identify traits crucial for long-term success. Applying and extending sociological frameworks like NPT and DoI can uncover new methods for overcoming barriers and leveraging facilitators in IPC implementations. Studying how IPC management adapts to emerging infectious diseases, focusing on protocol flexibility and managerial responsiveness, is essential for future preparedness. Testing the Autonomous Management Model across various healthcare settings will confirm its applicability and effectiveness, making necessary modifications. Investigating how specific components of the Autonomous Management Model, such as managerial autonomy and training, impact IPC practices will help optimize these elements. Exploring the long-term efficacy of the model, particularly during health crises, will assess its utility in enhancing rapid response capabilities. Conducting comparative research on IPC practices across different countries and cultural settings will identify universal strategies and locale-specific adaptations. These future research initiatives are essential for advancing our understanding of IPC management and enhancing the efficacy of IPC practices across various healthcare settings. By addressing these areas, researchers can contribute significantly to the development of more effective and resilient healthcare environments capable of facing both current and future challenges in IPC.

IV.6 Universal Significance of This Research

The universal importance of IPC underscores the global significance of this research. It provides frameworks for managerial excellence by improving IPC practices through enhanced managerial competencies, emphasizing autonomy, self-efficacy, and leadership. The research offers guidelines for fortifying emergency preparedness and response, serving as a strategic guide for resilience against future health emergencies like COVID-19. It highlights the need for adaptable and resilient IPC protocols to ensure effectiveness under changing circumstances. The Autonomous

Management Model offers a comprehensive and adaptable framework for improving infection control globally, integrating flexibility, evidence-based practices, and sociological theory. This model prepares healthcare managers for efficient responses to global health emergencies and supports sustained growth and resilience through proactive management and continuous professional development. In summary, this research provides practical insights and strategies for global application, helping healthcare leaders and policymakers strengthen IPC programs, improve patient safety, and achieve better outcomes across various healthcare settings.

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