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Patients' Experience with Polypharmacy and the Relationship with their Physicians

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Patients' Experience with Polypharmacy and the Relationship with their Physicians

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Advising Professor: Claudia Affonso Silva Araujo, D. Sc.

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MD MAFUZUL HUQ

PATIENTS' EXPERIENCE WITH POLYPHARMACY AND THE RELATIONSHIP WITH THEIR PHYSICIANS

Master's thesis presented to the Instituto Coppead de Administração, Universidade Federal do Rio de Janeiro, as part of the mandatory requirements in order to obtain the degree of Master in Business Administration (M.Sc.).

Approved by:

Claudia Affonso Silva Araujo, D.Sc
(COPPEAD/UFRJ)

Eduardo Raupp de Vargas, D.Sc
(COPPEAD/UFRJ)

Cecília Lima de Queirós Mattoso, D.Sc
(UNESA)

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Abstract

In health care, patients' value depends not only on clinical therapies but also on several non-clinical perspectives, which define whether clinical therapies are going to be beneficiary or problematic. In a healthcare context, non-clinical perspectives refer to the elements from social, economic and ecological environments that influence a patient's care process (Duerden et al., 2013). Recently, healthcare research has emphasized to explore non-clinical perspectives in care processes. This research explored non-clinical perspectives of polypharmacy through some patients' and physicians' participation. Polypharmacy refers to the simultaneous use of multiple medications and is called necessary evil because of its association with several adverse consequences such as adverse drug events, drug-drug interactions, poor medication adherence, and additional health expenditure. This research aimed to illustrate how physicians can reduce cases of polypharmacy or help patients in dealing with the adverse effects of this condition by focusing on non-clinical perspectives of polypharmacy. In this context, this research answered three specific questions: how patients experience consequences of polypharmacy; what causes polypharmacy; and what are the possible initiatives to manage polypharmacy. This research collected qualitative data only, using a phenomenological approach. The unit of analysis was patients and physicians. The data were collected conducting in-depth naturalistic interviews with structured open-ended questionnaires. In analyzing the data, this research sought a comparative approach, in which the findings of this research have been compared to the findings in the literature. The outputs of this comparison have been reported in the relevant sections. This research found that several non-clinical factors cause polypharmacy and trigger problematic phenomena in polypharmacy. Accordingly, several initiatives that targeted those factors have been suggested. Those initiatives will likely add value

for patients who are in polypharmacy or who are likely to experience polypharmacy. The added value can prevent some potential costs related to the utilization of additional health services and improve care management processes for patients in polypharmacy.

Keywords: Healthcare, Polypharmacy, Non-clinical Perspective, Value for Patients, and Co-production.

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1. Introduction

1.1. Objective

In healthcare, patients' value depends not only on clinical therapies but also on several non-clinical perspectives, which define whether clinical therapies are going to be beneficiary or problematic (Dadfar, Brege, & Semnani, 2013). In a healthcare context, non-clinical perspectives refer to the elements from social, economic and ecological environments that influence a patient's care process (Duerden, Avery, & Payne, 2013). Widely elucidated non-clinical perspectives are patients' and physicians communication and cooperation, patients`quality of life experienced in a medical regimen, patients' financial ability and health care policies or guidelines (Duerden et al., 2013; Duffett, 2017).

Physicians should explore non-clinical perspectives of healthcare (Duerden et al., 2013). Dadfar et al. (2013) reasoned that, in a care process, the difference between what patients say they want to do and how they put into practice is enormously instructive because the difference illustrates that patients' living environments may constrain or facilitate the adoption of the prescribed care. Thus, patients cannot separate themselves from their living environments. The environments influence their activities and experiences with a care. The role of physicians is to understand those environments and support patients in adopting a care (Dadfar et al., 2013). Duffett (2017) added that whereas healthcare professionals have disease-specific expertise, patients have experience based expertise, which denotes those skills and knowledge that patients derive by experiencing a medical regiment personally, for example, coping with the daily management while living with a chronic illness. This expertise should be valued and added to scientific knowledge (Duffett, 2017).

Exploring non-clinical perspectives of care processes can be a driving force in managing polypharmacy. Polypharmacy has commonly been referred to as the simultaneous use of multiple medicines (Payne, et al., 2014; Abolhassani, Castioni, Marques, Vollenweider, & Waeber, 2017) and has been associated with several adverse consequences such as adverse drug events, drug-drug interactions (Herr et al., 2017), poor medication adherence, additional health expenditure (Bjerrum, Rosholm, Hallas, & Krogstrup, 1997; Colley & Lucas, 1993; Gorard, 2006), and poor quality of life (Fincke, Miller, and Spiro, 1998).

Several non-clinical factors cause polypharmacy. Abolhassani et al. (2017) reported smoking, patients` atypical behaviors, self-medication, and the lack of cooperation among multiple providers. Junius-Walker (2007) mentioned prescribers' relationships with patients. Some non-clinical factors emerge in polypharmacy and trigger problematic phenomena. Goulding (2004) and Fields et al. (2001) found that polypharmacy induces patients' non-compliance, which cause poor medication adherence. Pappa et al. (2011) reported increased pharmaceutical expenditures, which is associated with poor quality of life (Fincke et al., 1998). Duerden et al. (2013) argued that physicians efforts to minimize cases of polypharmacy or cases of problematic phenomena in polypharmacy is unlikely if physicians focus on illness only. They added physicians should explore non-clinical aspects of care processes such as communication, cooperation or patients`quality of life and to deliver a care that reduces cases of polypharmacy or prevent polypharmacy from becoming a problematic phenomenon.

This research aims to illustrate how physicians can reduce cases of polypharmacy or help patients in dealing with the adverse effects of this condition by focusing on non-clinical perspectives of care processes. In this context, it is important to answer the following specific questions:

- How do patients experience consequences of polypharmacy - how do they perceive, describe, feel, judge, remember, understand, and talk about it with others?
- What are the causes of polypharmacy?
- What are the appropriate initiatives to manage polypharmacy?

1.2. Implication

Findings of the research will contribute to the understanding of non-clinical aspects relevant for care delivery process in polypharmacy and designing interventions that will not only provide value for the patients but also make the health care service efficient. Moreover, the findings can generate essential insights for existing and potential researchers who seek scholarly works on polypharmacy.

1.3. Scope

This research was concerned to understand, explain and report non-clinical perspectives of care processes relevant to manage polypharmacy. The research focused on patients who take at least five medicines a day and physicians who work at health care insurance companies. It is worthwhile to mention that this research did not interview patients' relatives and other caregivers such as nurses. Moreover, this research did not explore clinical therapies and their outcomes.

1.4. Organization of this Thesis

This thesis has been organized into eight chapters. The first chapter introduced the research topic and outlined the objectives, the implication and the scope of this research.

Chapter two discussed the relevant literature, dividing into two sections. The first section detailed the relevant literature regarding polypharmacy and included a synthesis, which laid the theoretical background of the research questions and which guided the analysis of the data and the reporting of the findings. The last section discussed co-production, which can be an effective approach to manage polypharmacy and some of its challenges.

Chapter three presented the methodology, describing the research approach, unit of analysis, nature of data, data collection process, data analysis, and ethical measures.

Chapter four reported the findings of this research. Interviews profiles have been provided. Their responses have been organized and reported, generating themes and constructing cases.

Chapter five presented a discussion of this thesis. Some relevant observations have been reported at the beginning. The subsequent discussions followed two sections. These sections detailed the output of the comparison carried out to analyze the data.

Chapter six presented the conclusion of this thesis, summarizing the objectives and the findings, and outlining the contributions of this research.

Chapter seven outlined the limitation of this research. Finally, some recommendations for future research have been provided in chapter eight.

2. Literature Review

2.1. Polypharmacy

In the past, when an apothecary compounded medications, polypharmacy referred to the mixing of many drugs in one prescription (Colley & Lucas, 1993). Today, polypharmacy referred to prescribing too many medicines to an individual (Stedman & Thomas, as cited in Colley & Lucas, 1993). However, Colley and Lucas (1993) questioned, "How many medications constitute too many-- four, five, ten" (p. 278)? Bejerrum et al. (1997) classified two or four drugs as minor polypharmacy and five or more drugs as major polypharmacy. However, Jyrrka et al. (2009)

defined polypharmacy as six to nine drugs and excess polypharmacy as ten or more drugs. On the other hand, Stewart, Moore, May, Marks, and Hale (1991) selected three drugs as the cut-off for polypharmacy whereas Nobili (2011) chose five drugs as the cut-off for polypharmacy. Colley and Lucas (1993) emphasized the individual context in the numerical counts. They stated, "Quantitative definitions vary, and the answer to this question may ultimately depend on the individual patient" (p. 278). A similar account has been given by Aronson and Steinman (2010). They argued patients` context, functional status, life expectancy, and preferences might affect how many drugs are appropriate.

However, the quantitative definition itself may not be sufficient in defining polypharmacy. Fuller (2008) argued that numerical counts should not be the sole determinant of polypharmacy. Duerden et al. (2013) stated the randomness and the changing/fluid nature of the numerical threshold:

> Numerical thresholds are arbitrarily chosen, with more than three or four medicines commonly used as the cutoff value. Since the number of drugs that patients receive has been rising in recent years, it is possible that the utility of a specific threshold may change over time. For example, four or more drugs was considered high a decade ago, but this is now commonplace and a threshold of ten or more might be more appropriate (p. 5).

Several studies have emphasized qualitative aspects, to define polypharmacy. Duerden et al. (2013) proposed the terms appropriate polypharmacy and problematic polypharmacy. Appropriate polypharmacy is "Prescribing for an individual for complex conditions or for multiple conditions in circumstances where medicines use has been optimized and where the medicines are prescribed according to best evidence" (p. ix). Problematic polypharmacy is "Prescribing of multiple

medications inappropriately, or where the intended benefit of the medication is not realized" (p. ix). Beers and Ouslander (1989) have stated that any medication that increases the risk of iatrogenic illness or any medical regiment with at least one unnecessary medication may be considered polypharmacy.

The above discussion on polypharmacy revealed that medical literature lacks a clear and uniform definition of polypharmacy. Masnoon, Shakib, Kalisch-Ellett, and Caughey (2017) raised the concern that this lack of clarity and uniformity poses challenges for healthcare professionals when they have to assess and consider efficacy and safety issues within a clinical setting.

The heterogeneity creates difficulty in adopting a particular definition. However, in a study, Hovstadius, Åstrand, & Petersson (2009) set at least five medications as the occurrence of polypharmacy and 10 or more drugs as excessive polypharmacy, excluding OTC medications. Moreover, devices and externally used substances were excluded (Guthrie et al. (2015). They reasoned that the cutoffs are the same in most studies in polypharmacy and thus, this deliberate action will enable comparisons with other studies. This study also aims to compare its findings to that of other studies. Therefore, this study will follow the account of Hovstadius et al. (2009) in defining polypharmacy.

Polypharmacy has been associated with several adverse consequences. Polypharmacy may cause poor medication adherence (Goulding, 2004; Fields et al., 2001) and has been associated with ADEs (Bourgeois, Shannon, Valim, & Mandl, 2010). ADEs (adverse drug events) refer to the injury resulting from medicine related health interventions (Kohn, Corrigan, & Donaldson, 2000). ADEs have been attributed to causing hospital admission (Burgess et al., 2005), outpatient and

emergency room visits (Bourgeois, Shannon, Valim, & Mandl, 2010) and high economic burden (Köberlein, Gottschall, Czarnecki, Thomas, & Bergmann, 2013). Nobili et al. (2011) found a positive correlation between polypharmacy and potentially serious DDIs. DDI (drug-drug interactions) refers to the circumstances in which the efficacy or toxicity of one drug changes because of the prior or concomitant use of a second drug (Rodvold & Kraus, 2010). Additionally, polypharmacy can increase health care costs, requiring additional treatments, which may increase pharmaceutical expenditures or the utilization of health services (Bradley, Fahey, & Cahir, 2012; Pappa et al., 2011). Moreover, Fincke et al. (1998) argued that patients in polypharmacy experience poor quality of life including physical and social function.

Known predictors of polypharmacy include clinical and non-clinical factors. Clinical factors are out of the scope of this research and have not been discussed in this literature. An extensive focus has been given to explore non-clinical factors that cause polypharmacy. Some forms of lifestyle induce polypharmacy. Smokers are likely to experience polypharmacy (Abolhassani, Castioni, Marques, Vollenweider, & Waeber, 2017). Pappa et al. (2011) reasoned that smokers are more likely to suffer from multiple diseases, which require multiple medications. Research findings regarding urbanity are contradictory. Guthrie et al. (2015) found that polypharmacy is slightly more prevalent among people living in urban areas than those living in rural areas. However, Pappa et al. (2011) stated this association is unlikely.

Degli et al. (2006) found that obese individuals are more exposed to multiple drug treatments, which is a likely cause of polypharmacy. Pappa et al. (2011) have reasoned that obesity can

deteriorate individuals` quality of life and correlate with poor health and many chronic diseases and those conditions will likely require multiple medications and thus induce polypharmacy.

Self-medication induces polypharmacy (Anthierens et al., 2010). "Self-medication is medicating yourself [oneself] without the supervision of a health-care professional" (Collins Dictionary, 2018). Patients received medications not only from their physicians but also from their well-wishers such as friends, relatives or neighbors (Anthierens et al., 2010). Those channels increase the number of medication in addition to prescribed ones. Thus, patients are more likely to experience polypharmacy. Additionally, self-administered medications may cause side effects or poor adherence to prescribed medicines (Anthierens et al., 2010). Physicians may prescribe additional medicines to treat these conditions, assuming that prescribed medicines did not function as intended (Anthierens et al., 2010).

Medication disagreement between doctors and patients is a known predictor of polypharmacy (Junius-Walker, 2007). Anthierens et al. (2010) reasoned that disagreement usually prevails among patients who follow similar prescriptions for long-term; those patients become stubborn; consequently, prescribers face challenges if they try to reduce the number of medicines. Anthierens et al. (2010) also reported that prescribers' lack of pharmacological knowledge induces polypharmacy. This finding is also confirmed by Larson (2001).

Prescribers` attitude toward polypharmacy may broaden cases of polypharmacy. Larson (2001) mentioned that prescribers consider polypharmacy as a routine approach. Anthierens et al. (2010) mentioned that it is often possible that prescribers do not consider polypharmacy as a critical phenomenon:

GPs refer to polypharmacy as a slowly growing process and because of that, they do not pay sufficient attention to this phenomenon. It is easy to start a new treatment for every new complaint without really evaluating the existing medication schedule. They do find that they are not critical enough. This routine approach might be one of the factors that make polypharmacy so common. (p. 1)

Multiple providers are likely to induce polypharmacy (Anthierens et al., 2010). They reasoned that each provider might treat a patient from his or her respective specialty. Consequently, patients are exposed to multiple medications (Anthierens et al., 2010). Larson (2001) added that one prescriber might be reluctant to interfere with the treatment prescribed by another prescriber because of congeniality and thus, the patients' medication intakes are not optimized and thus the patients are exposed to polypharmacy.

Herr et al. (2017) argued that types of institutional care might influence the prevalence of polypharmacy. They found that privately cared patients experience lower rates of polypharmacy than publicly cared patients.

Clinicians and healthcare system face challenges to manage polypharmacy, globally (Barnett et al., 2012; Guthrie et al., 2012). Payne et al. (2014) argued that interventions to manage polypharmacy will not only improve clinical outcomes but also reduce costs. Several interventions have been proposed. Guthrie et al. (2015) argued for optimizing medication regimens through regular medications review. Anthierens et al. (2010) emphasized physicians` due diligence on every prescription renewal. They also advocated for a coordinator to optimize patients medication if multiple providers cause polypharmacy. Moreover, prescriber's' knowledge of pharmacotherapy

has also been emphasized. Anthierens et al. (2010) proposed that prescribers` need training on pharmacotherapy. Guthrie et al. (2015) added prescribers should develop skills in applying the acquired knowledge. Furthemore, Spinewine et al. (2007) proposed a multidisciplinary approach in which prescribers, patient, and careers work closely to address the adverse effect of polypharmacy should be a useful intervention. Additionally, Anthierens et al. (2010) argued for prescribers` behavioral change; prescribers should not consider polypharmacy a routine approach rather they should be proactive in reducing cases of polypharmacy.

The above discussion on polypharmacy communicates what has already been known about the questions that this research seeks to answer. Known consequences, causes, and interventions of polypharmacy have been summarized in table-1.

Components	**Contents**	**Authors**
What are the consequences that patients experience in polypharmacy?	Poor medication adherence	Goulding (2004); Fields et al. (2001); Tsai et al. (2012)
	Increased health care costs	Bradley et al. (2012); Pappa et al. (2011)
	Poor quality of life	Fincke et al. (1998)
	Adverse drug events	Bourgeois, et al. (2010)
	Drug-drug interactions	Nobili et al. (2011)
What are the causes of polypharmacy?	Smoking	Abolhassani et al. (2017); Pappa et al. (2011)
	Self-medication	Anthierens et al. (2010).

	Obesity	Degli et al. (2006); Pappa et al. (2011)
	Urbanity	Guthrie et al. (2015)
	Physicians' relationship with patients	Junius-Walker (2007); Anthierens et al. (2010)
	prescribers' lack of pharmacological	Anthierens et al. (2010)
	Prescribers` attitude toward polypharmacy; prescribers consider polypharmacy routine approach	Anthierens et al. (2010); Larson (2011)
	Specialization when multiple providers are involved	Anthierens et al. (2010); Larson (2011)
	Institutional care; public vs. private	Herr et al. (2017)
What are the interventions available to manage polypharmacy?	Medications review.	Guthrie et al. (2015); Anthierens et al. (2010)
	A coordinator when multiple providers are involved	Anthierens et al. (2010)
	Prescribers' training and development	Anthierens et al. (2010); Guthrie et al. (2015)
	A multidisciplinary approach; prescribers, patient, and careers working closely	Spinewine et al. (2007)
	prescribers` behavioral change; prescribers should be proactive in reducing cases of polypharmacy	Anthierens et al. (2010)

Table-1: Known consequences, causes, and interventions of polypharmacy

Source: Elaborated by the author.

2.2. CoProduction-An Effective Approach to Manage Polypharmacy

Studies have advocated patients' and physicians' participation in exploring non-clinical perspectives of care processes to manage polypharmacy. Duerden et al. (2013) argued that patients should be actively pursued to report their experiences in polypharmacy. Craig (2015) argued that it is essential to reflect what matters to patients when they are in polypharmacy. We will not recognize their dilemmas unless we actively listen to patients' lived experiences with polypharmacy (Craig, 2015). Anthierens et al. (2010) emphasized the physicians' participation. They argued that it is essential to record prescribers views on polypharmacy. They added such views will help in understanding the mechanisms underlying their behaviors and promoting changes.

The joint effort between patients and physicians communicates co-production, which is an essential element of service operation management, in healthcare service. Co-production refers to active participation and mutual cooperation between service providers and customers to produce desired outcomes (Vargo & Lusch, 2004). In co-production, customers assume the primary role in service production and delivery and service providers facilitate and support customers' activities by providing necessary platforms (Dong et al., 2015).

Vargo and Lusch (2004) provided a conceptual underpinning of co-production. They argued that services, unlike products, are interactive and parties involved are inseparable until outputs produced are used by beneficiaries; consumptions are not inherently separate from productions. Value, for which customers seek services, is created during the interactive process and at the

interaction between service providers and customers (Vargo & Lusch, 2004). This value creation suggests that customers' contributions are essential in addition to resources provided by service providers. Thus, co-production, in which customers actively participate in service production and delivery and service providers facilitate and support customers' activities by providing the necessary platform (Dong et al., 2015), emerges and becomes an integral part of service processes (Vargo & Lusch, 2004).

Polypharmacy will be better managed If co-production becomes the primary model of care processes for the patients. Like other clinical therapies, managing polypharmacy requires patients' inputs (Craig, 2015). Co-production mobilizes customers and ensures that customers provide tangible resources and codified and tacit knowledge and service providers receive desired inputs to deliver the required output (Frei, 2008). Moreover, patients experiencing polypharmacy should assume some responsibilities in managing their care processes because they ultimately decide whether polypharmacy is manageable. Co-production activities ensure that customers assume a sense of control over service production and delivery process (Dabholkar 1990; Schneider & Bowen 1995) and spend considerable time in reviewing service processes or outcomes (Mustak et al., 2013). Doing so increases the likelihood that customers consider themselves a part of the service process and assume necessary responsibilities (Mustak et al., 2013). Furthermore, patients in polypharmacy may not be alike in terms of their medical conditions and medical therapies and their care should be individualized; physicians need to understand patients' context and prescribe care that best suits patients' living. Co-production activities ensure that customers establish close contact with service providers and service providers have opportunities to customize services (Chan et al., 2010).

Co-production activities may also result in increased efficiency in healthcare services offered for patients in polypharmacy. Physicians will be more efficient and accurate in diagnosing ailments if patients provide the required information in a timely fashion (Bitner et al., 1997). Moreover, physicians may shift a portion of their productive tasks to patients (Lovelock & Young, 1979; Mills et al., 1983) and thereby allocate the resources elsewhere. Furthermore, physicians can use patients' inputs to develop new therapies (von Hippel; Magnusson; Wikstrom as cited in Mustak et al., 2013) or enhance care processes (Bitner et al., 1997). Additionally, physicians may experience relational value in friendly, respectful, and attentive communication with patients, that, in turn, may help physicians to perceive more satisfaction in their jobs (Yoon, Seo, & Yoon, 2004). Health care literature shows that physicians perceive a sense of appreciation and protect them against frustration and burnout through enjoyable and open relationships with their patients (Chan et al., 2010).

However, co-production initiatives in managing polypharmacy can be a double-edged sword; it can benefit patients and physicians, but it can also yield negative consequences such as increasing physicians' job stress and reducing their job satisfaction (Chan et al., 2010).

Co-production is a social exchange, which accommodates people` norms, roles, and expectations, which, in turn, are influenced by each party's cultural background (Patterson, Cowley, & Prasongsukarn, 2006). Co-production introduce new norms, roles, and expectations to patients and physicians (Solomon, Michael, Carol, John, & Evelyn, 1985). Therefore, the benefits of co-production depend on how well patients and physicians adapt to the newly defined social behaviors (Youngdahl et al., 2003). Studies (Malhotra et al., 1994; Tata, 2005) have found that high

collectivist value-oriented people tend to be more expressively motivated in establishing social relationships. Co-production will likely flourish among those people because they will adapt their behaviors in roles that facilitate cooperation and personal connections (Stryker & Statham, 2005). On the other hand, high individualist value-oriented people prefer rewards that are proportional to their contributions (Chen, Chen, & Meindl, 2005). They are more likely to involve in a business relationship and are less concerned about building a personal relationship (Chan, Yim, & Lam, 2010) and thus, are inappropriate candidates for co-producing initiatives.

Hofstede (1980) found that high power distance oriented people do not view "superiors" and "subordinates" alike. They believe people are not necessarily equal and therefore inequality is desirable (Hofstede, 1980). In contrast, low power distance oriented people tend not to differentiate power distances and believe in equality regardless of their status (Gudykunst & Ting-Toomey, 2010). If patients value high power distance, they may accrue less benefit from co-production (Johansson, 1990). They may tend to limit the degree and closeness of their interactions with physicians, perceiving physicians as subordinates (Guerrier & Adib, 2000). Moreover, patients may perceive participatory initiatives as face-losing situations, thinking that those initiatives will likely diminish their desired inequality in service interactions (Patterson, Cowley & Prasongsukarn, 2006). Conversely, patients who value low power distance will prioritize cooperation and will be more comfortable in environments that enable them to have an active voice in decision making (Eylon & Au, 1999). Thus, these patients are more likely to make co-production more beneficial to them and their physicians.

Co-production might heighten physicians` job stress and lower their job satisfaction, increasing the loss of power and control, input uncertainty, and incompatibility in expectations and demands (Chan et al., 2010). Co-production may shift more power from physicians to patients (Hsieh, Change, and Chin, 2004). The loss in power and control may trigger a role incongruence, in which physicians perceive their job duties different from what patients expect and thereby, poorly understand their newly defined roles (Solomon, Carol, John, Czepiel, & Evelyn, 1985). Moreover, they may perceive disruption in the smooth functioning of the service process and this perceived disruption might induce them to struggle with patients for control (Chase, 1978). Those anomalies will likely heighten physicians` job stress and lower their job satisfaction (Chan et al., 2010).

Co-production might increase patients` spontaneous and unscripted behaviors (Martin, Horne, & Schultz, 1999; Larsson & Bowen, 1989). Consequently, physicians may perceive greater demand diversity, which will trigger uncertainty (Duerden et al., 2013). This added uncertainty might ultimately hamper their job satisfaction and increase their job stress (Chan et al., 2010). Moreover, physicians may engage in emotional labor to control their expressions in handling incompatible demands (Brotheridge & Grandey, 2002; Hochschild, 2005). Emotional labor increases the stress level and dissatisfaction, causing burnout and hampering work performance (Rupp, Deborah, Silke, Sharmin, & Karlheinz, 2008).

Therefore, every simulation of co-producing initiatives may not benefit patients and physicians. Additionally, it can overwhelm service scripts and jeopardize treatment process. It is utmost important that physicians understand how to harness the benefits and limit the drawbacks (Chan et al., 2010). They may need to adopt some practical actions. They should remain sensitive to their

and patients' cultural value (Chan et al., 2010). In some cases, they may need to introduce cultural changes in their operations (Chan et al., 2010). They should introduce appropriate training and reward system to equip and motivate staffs (Mustak, Jaakkola, & Halinen, 2013). They may select those staffs who are flexible, responsive and facilitate personal relationships (Chan et al., 2010). They may also diversify special cases (Chan et al., 2010). Furthermore, they should motivate (Chan et al., 2010) and train patients to embrace co-production and develop abilities to follow prescribed behaviors (Chan et al., 2010). Motivation and training are particularly important for care processes that are more complex and contain situations that are less familiar to patients (Chan et al., 2010).

3. Methodology

This research used a phenomenological approach. Polypharmacy is a situation that some patients experience. Their experiences channel through their senses. Physicians also observe those experiences in the patients' lives through senses. Capturing and describing sensory perceptions are the focus of phenomenological research (Patton, 2002). Phenomenological research aims to "capture and describe how people experience some phenomenon-how they perceive it, make sense of it, judge it, remember it, and talk about it with others" (Patton, 2002, p. 104). Experiences have to be recorded retrospectively because an individual can not reflect on his or her experiences when sensed. Phenomenological research records people's experiences retrospectively (Patton, 2002).

The unit of analysis of the research was patients and physicians. Four patients and three physicians were interviewed. The patients take at least 5 medicines in a day, live in Brazil, and are suffering from multiple chronic diseases. The reported medical conditions are high blood pressure, heart problem, asthma, depression, and breast cancer. The physicians work for Prevent Senior. The organization is in Sao Paulo, a state of Brazil, and accommodates elderly patients. Most of the patients at Prevent Senior are in polypharmacy. Therefore, the physicians have extensive experiences in dealing with polypharmacy.

Only qualitative data were collected. Separate questionnaires were used for the patients and the physicians (*please see the attached annex-1 for interview protocol*). Questions to the patients were grouped under feeling, behavioral, knowledge, and opinion. The aim was to understand how patients experience polypharmacy and how their behaviors influence problematic phenomena in polypharmacy and to include the patients' concerns in designing interventions. Questions to the physicians were to understand what causes polypharmacy and what interventions are in practice or should be designed in managing polypharmacy.

The data were collected conducting in-depth naturalistic interviews with a structured open-ended questionnaire. The interviews lasted twenty to fifty minutes. Most of the interviews were recorded using an electronic recorder. A few interviews needed manual recording using a paper and pen. The electronic recordings were transcribed for analysis.

An analytical framework approach was followed to analyze the data. The consequences, causes, and interventions of polypharmacy known through the literature and summarized in table-1 laid the foundation of this analytical framework. This research sought a comparative approach, in

which the findings of this research have been compared to the findings in the literature. The research intended to communicate the output of the comparison in three different components:

- What are the findings that conform to the literature?
- What are findings that oppose the literature?
- What are findings that were hidden and that were not communicated in the literature?

The structured open-ended questionnaires helped in organizing the data. The responses of the interviewees were grouped following the questions in the interview protocol. The grouped responses were codified using self-generated codes (please see Annex-2 for the list of codes). The codes were cross-matched. Consequently, some commonalities and variations were found. The commonalities were used to generate themes. The variations were reported as special cases.

Approval has been obtained from the Brazilian Ethical Committee in Healthcare Research, before conducting the interview. No interviewee was identified by his or her name, gender, profession, employability and social status. If a specific interviewee needed to be quoted, he or she was quoted pseudonymously. The data was used strictly for academic purpose. No part of the data was produced for any commercial activity. The access of the data was restricted to the researcher, the academic staffs of Coppead, and the dissertation committee.

4. Findings

4.1. Interviewees' Profiles

The patients interviewed live in Brazil and are suffering from multiple chronic diseases. The reported medical conditions are high blood pressure, heart problem, asthma, depression, and breast cancer. Most of the patients are in multimorbidity. Their medication intake ranges from fourteen to five. The physicians work for Prevent Senior. The organization is in Sao Paulo, a state of Brazil and accommodates elderly patients. Useful information about the respondents has been detailed in the table-2.

Respondents (pseudomonas name)	Category	Gender	Age	Medication Intake per day	Medical Condition
PA1	Patients	Female	76	14	Blood pressure Heart disease

					Asthma
PA2	Patients	Female	55	6	Breast cancer
PA3	Patients	Female	28	5	Depression Mineral deficiency
PA4	Patients	Male	64	10	Blood pressure Heart disease
PH1	Physicians	Male	Not Known	Not applicable	Not applicable
PH2	Physicians	Male	Not Known	Not applicable	Not applicable

Table-2: Useful information about the respondents

Source: Elaborated by Author

The subsequent discussion has been organized into three sections, which answered the questions that this research sought to respond.

4.2. How Do Patients Experience Consequences of Polypharmacy - how do they perceive, describe, feel, judge, remember, understand, and talk about it with others?

This research found that polypharmacy triggered several consequences. Figure-1.1, which resembles an inverted fishbone diagram, visualizes the consequences. The figure should be read from left to right. Far left of the figure stands polypharmacy. To the right, there are consequences of polypharmacy that have been outlined in ribs and branches. The consequences outlined in

branches were direct results of polypharmacy. These consequences further triggered the consequence that is at the tip of a rib. For example, on the lower side of the figure, poor quality of life is at the tip of a rib. The branches of the rib are recurring costs, fear of side effects, unhappiness, and unpleasant feelings. Polypharmacy caused recurring costs, fear of side effects, unhappiness, and unpleasant feelings, those, in turn, caused poor quality of life. Some consequence added another layer. For example, poor medication adherence is caused by non-compliance, which is caused by patients` forgetfulness and atypical behaviors.

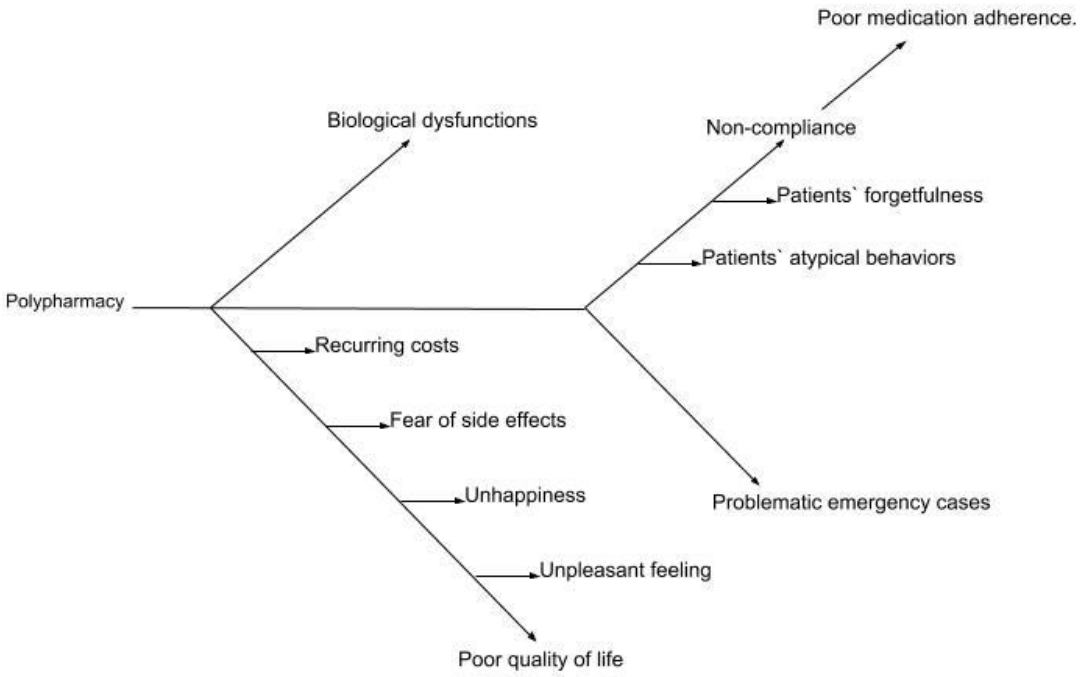

Figure-1.1: Consequence of polypharmacy

Source: Elaborated by the author, inspired by Ishikawa, Kaoru (1968). *Guide to Quality Control*. Tokyo: JUSE.

Polypharmacy may induce non-compliance to medication guidelines. This research found that excessive numbers may cause the patients to forget doses and name of medicines. Additionally, they are unlikely to get someone to manage their medication intake. Thus, the patients` forgetfulness emerges and triggers the non-compliance. Polypharmacy may induce patients' atypical behaviors. The patients may be annoyed by excessive numbers and skip doses. Moreover, they may feel accomplished and take a break by non-complying. Furthermore, they may be overwhelmed by excessive numbers and remember doses by color, but segmentation by color is faulty since colors do not represent medicines.

The non-compliance causes poor medication adherence. One of the fatal consequences of poor adherence is that the diseases progress. The patients remain ill. Moreover, the uncured diseases may trigger other biological dysfunctions. PA1 described:

> *if you have poor treatment adherence to the patient rather than being treated, the disease is progressing and can bring evil consequences to it because you are not treating it right. I think the biggest factor is poor adherence that leads to disease progression. This is a big problem.*

Polypharmacy can cause biological dysfunctions, triggering abnormal activity in body functions. Sometimes, the patients cannot experience the effects immediately but suffer afterward. The dysfunctions are the typical case for some medicines. PH2 said:

> *Another thing is that polypharmacy can make dysfunction in other organs. For example, the gastric, stomach issue. The patient who takes many medications, depending on the time taken, may have a gastric intolerance causing it to have a greater production of gastric*

juice, generating gastritis. This indeed happens. Depending on the type of medication certainly happens. It is because some have already turned some things, even if they have not, put it in the head that it has. Then all this happens.

Polypharmacy may be problematic for emergency cases. PS1 recalled a situation when she needed emergency treatment and was treated by the doctors who do not know about her medication intake. They provided treatments that worsen her emergency case. Later her regular doctors explained to her that the emergency treatments counter interacted with the medications taken already and produced side effects, which worsen her emergency case. The excessive number mingled with the special circumstance prevent and she could not communicate the medication intake.

Polypharmacy may deteriorate patients` quality of life. Fear of side effects is common among those patients. The fear origin from the realization that too many medications are not good for bodies. Although medications provide benefits, they can be harmful to bodies. Excessive numbers cause the patients to take precautionary measures. For example, one patient put the medicines in her kitchen. Another patient sort and keep the medicines in tiny boxes. However, organizing themselves is not a pleasant experience for them. Sometimes they forget to take the medicines. Those situations irritate them. The patients are unhappy since they are forced to accept their life with multiple medications. One of the respondents, PA2, illustrated the glimpse of unhappiness, communicating the obligation and advising on how to lessen the burden. She said:

My medical condition [breast cancer] is chronic. I am taking those medicines for almost six years. It…[medicines] does not bother me. I think if you need to take, you have to take. Don't look at the supplements information on the label...it can make you more worried. ...trusts your doctors and follows their recommendations.

There is an unpleasant feeling associated with multiple medicines. One respondent, PA3, explained that she felt uncomfortable when her doctor prescribed too many medicines. She described:

> *....she prescribed many medications. I felt uncomfortable. I think it is not necessary to take so many medications. Our health can be managed without pills because medications are complementary. Medications can interfere with one`s personality, how one` think, how one` talk, and have side effects.*

4.3. What Are the Causes of Polypharmacy?

This research found that several non-clinical factors induced polypharmacy. The causes of polypharmacy found in this research have been visualized in Figure-2.1, which resembles a fishbone diagram.

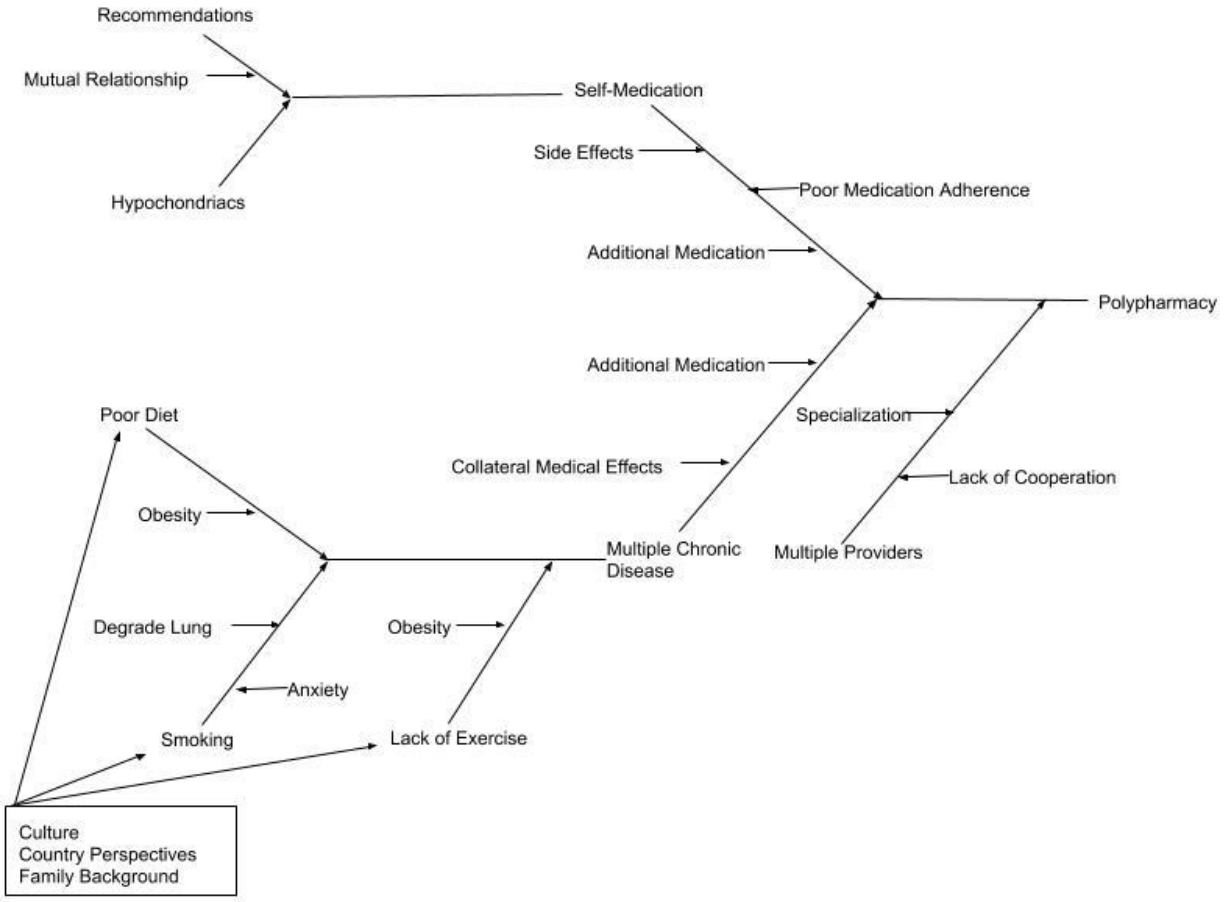

Figure-2.1: Causes of Polypharmacy

Source: Elaborated by the author, inspired by Ishikawa, Kaoru (1968). *Guide to Quality Control*. Tokyo: JUSE.

The figure should be read from right to left. The effect, polypharmacy, is to the right side of the figure. The causes, which have been outlined in ribs and branches, are to the left side of the figure. Each rib represents a cause. Branches add detail on how a cause contribute to the effect. For example, multiple providers, which represents a rib, causes polypharmacy. Specialization and lack

of cooperation, the branches, emerge when multiple providers are involved and expose patients to polypharmacy. Some ribs add layers. For example, poor diet, smoking, and lack of exercise cause multiple chronic diseases that, in turn, cause polypharmacy.

Visiting multiple providers is common to cause polypharmacy. When patients visit multiple physicians, the physicians do not cooperate to optimize the patients' medication intake. Each provider specializes treatments, focusing on his or her field of expertise. The specialization may generate redundancy in the patients` medication intake. The patients who lack explanations remain unaware of the duplication. Consequently, they take more medicines than is necessary. Different hours of doses might strengthen the redundancy. The physicians may set a different time for doses. Now, the same medicines are disguised in different hours. Because of this incognito, the patients will likely believe that the medicines are different. The redundancy may also cause the patients to lose confidence in the physicians. The physicians might find that redundant medicines have been prescribed and try to correct the mistake. This corrective behavior may represent the physicians' lack of expertise, which contributes to the patients' lack of confidence. The lack of confidence might induce the patients to resist other cases in which the physicians try to reduce doses or ask to discontinue medications.

Some forms of lifestyle are common to induce polypharmacy. Smoking, poor diet, and a lack of exercise are prominent. This research found that smoking is likely to degrade lung and causes anxiety. These conditions expose individuals to multiple diseases, which is a known predictor of polypharmacy. Polypharmacy is also associated with obesity caused by poor diet and a lack of exercise. This research found that some factors may induce smoking, poor diet, and a lack of

exercise. Some culture may influence in adopting these lifestyles. Country perspectives may influence as well. The government may lack the initiatives that motivate people to follow a healthy lifestyle. A person's family background may contribute to adopting these lifestyles. If parents are exposed to smoking, poor diet or a lack of exercise, they will unlikely to advise their children to abstain. Consequently, the children may face less barrier in adopting these lifestyles.

Accumulated multiple chronic conditions may trigger other medical conditions. Therefore, collateral medical effects, in which one dysfunction caused by a medical condition weakens other physiological functions and triggers other medical conditions, are common among those individuals. The patients need multiple medications to treat individual cases and the cases caused by collateral effects. PH1 described:

> *...so each pillar of this leads almost to a pathology. And one pathology leads to another...so each pathology of this you can treat each of them with a single medicine. Sometimes you have to treat a pathology like this with 2 or 3 medications for a single pathology.*

Self-medication may induce polypharmacy. This research found some forms of self-medication such as discontinuing prescriptions, continuing expired prescriptions, skipping doses, and overdosing. One of the causes of self-medication is recommendations from persons other than physicians. Patients received medications not only from their physicians but also from their well-wishers such as friends, relatives or neighbors. This research found that sometimes patients also recommend their neighbors on medications. This mutual relationship intensifies cases of self-medication. This research found another factor, hypochondriacs, that may induce self-medication. Patients who are hypochondriacs are abnormally anxious about their health. They feel insecure in

the prolonged gap and assure themselves by increasing doses. Moreover, they doubt the efficacy of the medication and increase the doses to compensate.

4.4. What Are the Appropriate Initiatives to Manage Polypharmacy?

This research perceived that several initiatives can be taken to minimize cases of polypharmacy and problematic phenomena in polypharmacy. Figure-1.2 and figure-2.2 visualize those initiatives. The ribs have been disjointed to enhance visibility.

Self-medication is caused by recommendations and hypochondriacs. Patients may receive medications from their well-wishers such as friends, relatives or neighbors and exposes to self-medication. Patients may also recommend medications to their neighbors. This mutual relationship may intensify cases of self-medication. This research suggests that patients` consciousness and knowledge can equip patients to refrain from acting on those recommendations or advise others in taking medication. Physicians should educate patients regarding the ill effects of self-medication and make them aware that people who advise in taking medication without prescription do not have sufficient knowledge and expertise.

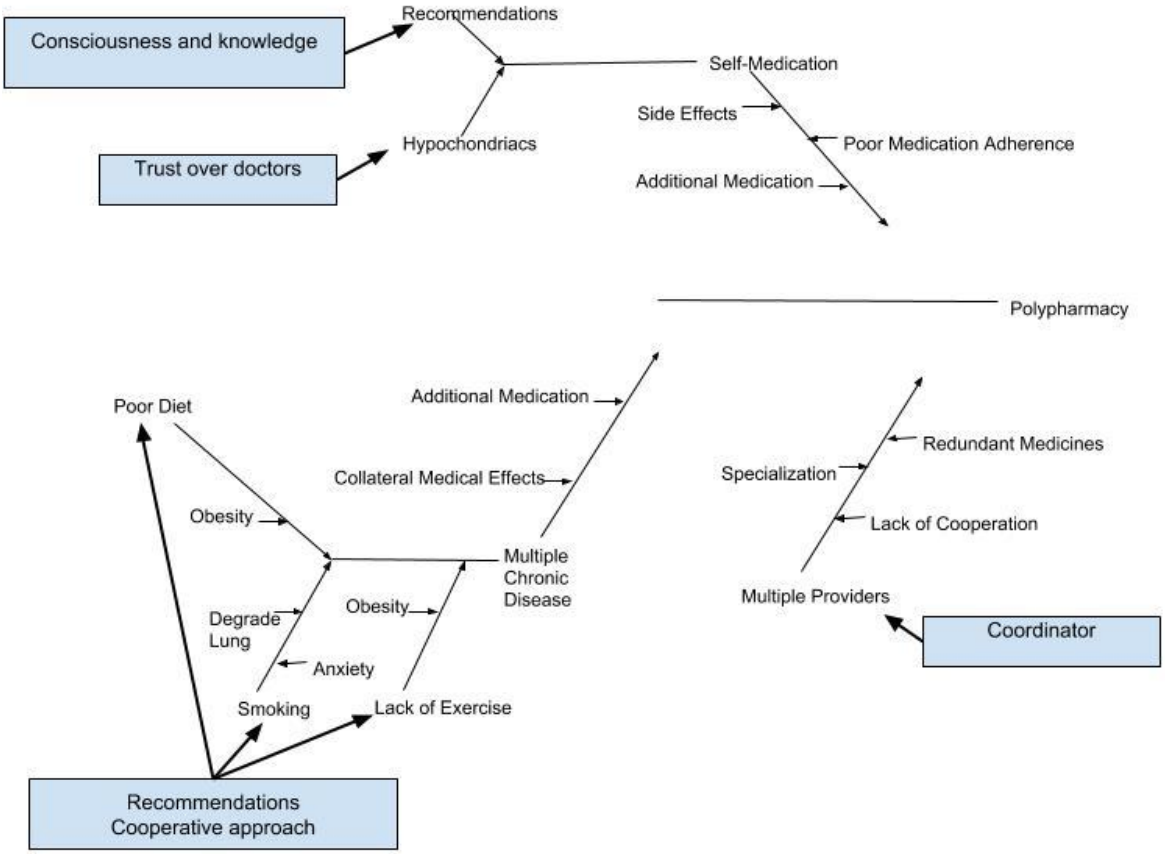

Figure-2.2: Suggested initiatives to mitigate the causes of polypharmacy

Source: Elaborated by the author.

One respondent, PA3, described that she is concerned about side effects that self-medication can cause. Moreover, she is also aware that people who advise taking medication without prescription are not expert. These precautionary measures helped her to refrain from acting on recommendations from others. She mentioned:

I am worried that those recommendations might be important but may worsen my medical conditions by interacting with the medicines that I am taking already. ...they [family] do not enough knowledge to advise.

A hypochondriac is a condition in which patients are abnormally anxious about their health. They feel insecure in prolonged gaps. Moreover, they doubt the efficacy of medications. This research suggests that if patients trust their doctors' opinions, they will likely avoid those obsessive behaviors. Patients should be trained to trust their doctors. They should be advised to consult their doctors if they feel that they are experiencing hypochondriacs. One respondent, PA2, mentioned how she controls herself against hypochondriacs. She mentioned:

> *...the doctors know my lifestyle. ...my doctors advise me not to take medicines without prescription...I first communicates with my physicians to know whether I should take those medicines.*

PH1 communicated that poor diet, smoking, and a lack of exercise are likely to induce multiple chronic diseases. This research also suggests that physicians provide recommendations specific to those aspects and encourage patients to adopt a healthy lifestyle and that physicians design their care in a way that communicates a cooperative approach, in which patients assume some responsibilities in care processes. It is the patients who determine whether a particular treatment is going to be beneficiary or problematic. Physicians can not force patients to be proactive. It is also difficult to follow up with every patient. One respondent, PH1 described:

The patient has to take formally continues is the question of you having a two-way hand
> *treatment. Because I indicate the treatment, I explain the treatment, I explain what the treatment is, and the patient has to understand that...the only person who will be able to determine whether or not to treat is called a patient. I cannot force you to do the treatment, I cannot follow every patient that we prescribe something. So that's why I always like to make this exchange with patients. I always say that treatment is a two-way street.*

Multiple providers are likely to induce polypharmacy. They are unlikely to cooperate in optimizing patients' medication intake. Moreover, each provider specializes treatments, focusing on his or her field of expertise. This behavior increases the number of medications and the possibility of

redundant medications. This research suggests that there should be a coordinator when patients visit multiple providers. The coordinator will look after patients' medications intake. The coordinator can be any physicians who are aware of the patients' medical history.

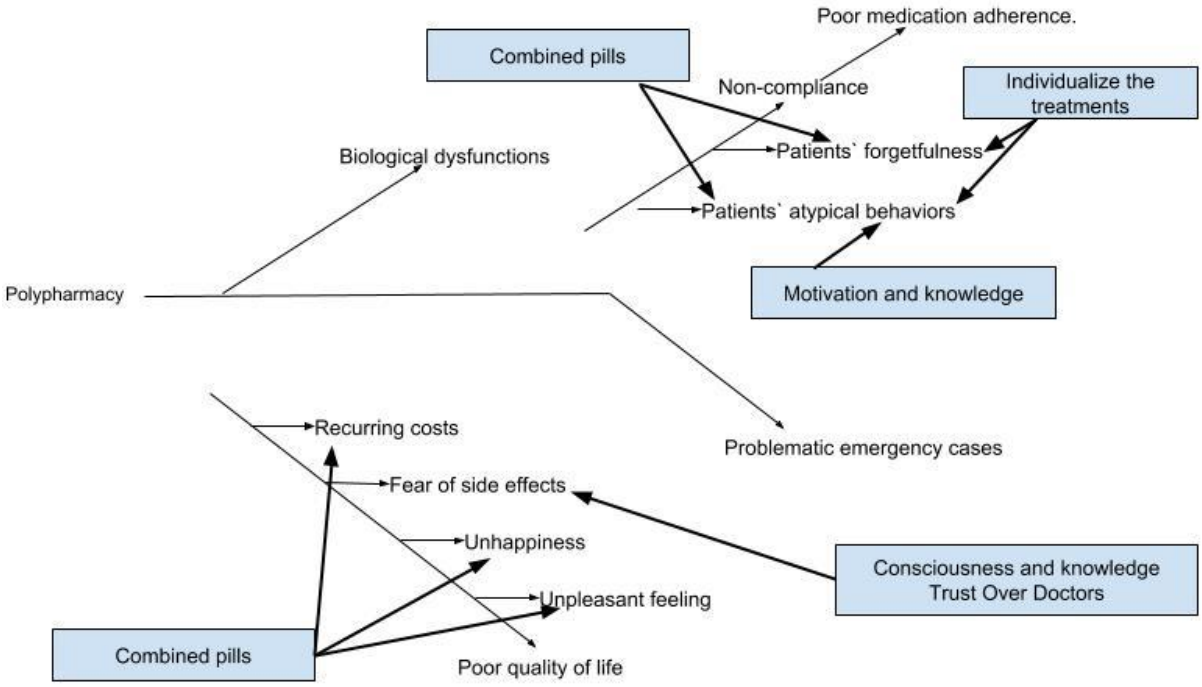

Figure-1.2: Suggested Initiatives to lessen the consequences of polypharmacy
Source: Elaborated by the author.

Figure: 1.2 communicated several consequences of polypharmacy. Biological dysfunctions are a direct result of polypharmacy. Others consequences are indirect results of polypharmacy. For example, patients may experience recurring costs, fear of side effects, unhappiness, and unpleasant

feelings while they are in polypharmacy. These life events result in a poor quality of life. The ribs have been disjointed to improve visibility.

Patients may experience recurring costs, unhappiness, and unpleasant feelings, while they are in polypharmacy. This research found that those adverse experiences are a result of excessive pills. This research suggests that the patients should be offered combined pills, in which several substances are combined in a pill or several pills are merged and put in an ingesting form. This initiative might reduce the number of pills and the corresponding adverse consequences. Fear of side effects, which contributes to poor quality of life, is a typical case of a lack of consciousness and knowledge. This research suggests that physicians educate patients about medication intake. The patients should know how multiple medication intake might affect them and what they should do in different circumstances. PH1 described:

> *If you really want to take care of the actual patient, the ideal is always to explain...explain the purpose, leave written what will be if looking there. ... explaining things that can happen. People who have experience, each in your area, of some medications, what are the things that can happen when you start a treatment…*

Polypharmacy can induce patients' forgetfulness and atypical behaviors. Consequently, the patients may not comply with the medication guidelines. This non-compliance may trigger poor medication adherence. Patients' forgetfulness may vary. What stimulates a patient to forget may not stimulate others. This research suggests that physicians understand how the patients adopt treatments and individualize the treatments that minimize the adverse circumstances. This research also found that the number of pills can trigger patients' forgetfulness. This research suggests combined pills, which will reduce the number of pills. Combined pills will also be useful to minimize the patients' atypical behaviors. PH1 communicated that the patients may be annoyed

by the excessive number or felt accomplished and skip doses or remember doses by color and trigger faulty compliance. A lack of motivation and knowledge are likely to cause these atypical behaviors. Physicians should individualize treatments to prevent circumstances that induce the patients toward those atypical behaviors and provide appropriate knowledge to prevent behaviors such as remembering doses by color.

5. Discussion

This discussion has been organized into two sections, which presented the output of the comparative approach sought to analysis the data.

5.1. What Conforms Literature. What Was Hidden and Has Been Not Communicated in Literature?

5.1.1. The Consequences of Polypharmacy

Polypharmacy induces non-compliance to medication guidelines (Goulding, 2004; Fields et al., 2001). However, the literature did not discuss how polypharmacy induces patients` non-compliance. This research found that excessive numbers may cause the patients to forget doses. Additionally, they are unlikely to get someone to manage their medication intake. Thus, the patients` forgetfulness triggers the non-compliance. Polypharmacy may also induce patients' atypical behaviors. The patients may be annoyed by excessive numbers and skip doses. Moreover, they may feel accomplished and take a break by non-complying. Furthermore, they may be overwhelmed by excessive numbers and remember doses by color; but segmentation by color is faulty since colors do not represent medicines.

The non-compliance may cause poor medication adherence. Goulding (2004) and Fields et al. (2001) also confirmed this finding. This research found that when the patients experience poor medication adherence, the diseases progress. The patients remain ill. The uncured diseases may trigger other biological dysfunctions.

Fincke et al. (1998) argued that patients in polypharmacy experience poor quality of life including physical and social function. Bradley et al. (2012) and Pappa et al. (2011) argued that increased pharmaceutical expenditures (because of polypharmacy) results in poor quality of life. This research also found that the recurring costs bother the patients; the medicines are expensive and have to be taken on a continuous basis.

This research uncovered some more aspects that may also deteriorate the patients` quality of life. Fear of side effects was common among the respondents (patients). The fear originated from the realization that too many medications are not good for bodies. Although medications provide benefits, they can be harmful to bodies. Moreover, polypharmacy may cause unhappiness. The patients communicate unhappiness emerged from the obligation to accept their life with multiple medications. One of the respondents, PA2, illustrated the glimpse of unhappiness, communicating the obligation and advising on how to lessen the burden. She said:

My medical condition [breast cancer] is chronic. I am taking those medicines for almost six years. It…[medicines] does not bother me. I think if you need to take, you have to take. Don't look at the supplements information on the label...it can make you more worried. ...trusts your doctors and follows their recommendations.

Furthermore, there is an unpleasant feeling associated with multiple medicines. One respondent, PA3, explained that she felt uncomfortable when her doctor prescribed too many medicines. She described:

....she prescribed many medications. I felt uncomfortable. I think it is not necessary to take so many medications. Our health can be managed without pills because medications are complementary. Medications can interfere with one`s personality, how one` think, how one` talk, and have side effects.

Figure:1.1 (revisit) summarizes the consequences of polypharmacy found this research. In the figure, the findings that conform to the literature have been italicized and that were not communicated in the literature have been presented in bold text.

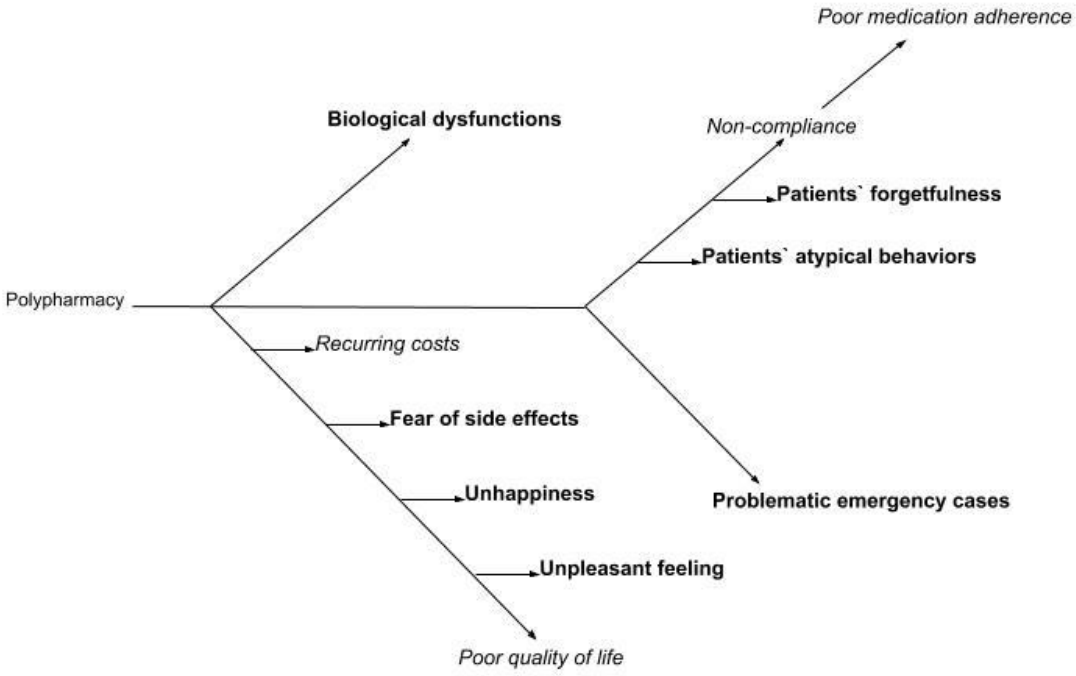

Figure-1.1(revisit): Consequence of polypharmacy

Source: Elaborated by the author, inspired by Ishikawa, Kaoru (1968). *Guide to Quality Control*. Tokyo: JUSE.

5.1.2. The Causes of Polypharmacy

Several factors induce polypharmacy. Visiting multiple providers is common to cause polypharmacy. Anthierens et al. (2010) also confirm this finding. They argued that specialization increases the number of medicines and the patients are more likely to experience polypharmacy.

This research found that specialization may generate redundancy in the patients' medication intake. The patients who lack explanations remain unaware of the duplication. Consequently, they take more medicines than is necessary. Different hours of doses might strengthen the redundancy. The physicians may set a different time for doses. Now, the same medicines are disguised in different hours. Because of this incognito, the patients will likely believe that the medicines are different. The physicians might find that redundant medicines have been prescribed and try to correct the mistake. This corrective behavior may represent the physicians' lack of expertise, which contributes to the patients' lack of confidence. The lack of confidence might induce the patients to resist other cases in which the physicians try to reduce doses or ask to discontinue medications.

Some forms of lifestyle are common to induce polypharmacy. Smoking, poor diet, and a lack of exercise are prominent. Similar accounts have been found in the literature. Pappa et al. (2011) reasoned that smokers are more likely to suffer from multiple diseases that necessitate multiple medications. This research found that smoking is likely to degrade the lung and causes anxiety. These conditions expose the persons to multiple diseases. Pappa et al. (2011) also associated polypharmacy with obesity, which is a common consequence of poor diet and the lack of exercise. They have reasoned that obesity deteriorates patients' quality of life and trigger many chronic diseases that necessitate multiple medications (Pappa et al., 2011). This is finding is also apparent in this research.

This research revealed that some factors may induce smoking, poor diet, and the lack of exercise. Some culture may influence in adopting these lifestyles. The country perspectives may influence as well. The government may lack the initiatives that motivate people to follow a healthy lifestyle.

A person's family background may contribute to adopting these lifestyles. If parents are exposed to smoking, poor diet or the lack of exercise, they will unlikely to advise their children to abstain. Consequently, the children may face less barrier in adopting these lifestyles.

This research also revealed that the accumulated multiple chronic conditions may trigger other medical conditions. Therefore, collateral medical effects, in which one dysfunction caused by a medical condition weakens other physiological functions and triggers other medical conditions, are common among those individuals. The patients need multiple medications to treat the individual cases and the cases caused by the collateral effects. PH1 described:

> *...so each pillar of this leads almost to a pathology. And one pathology leads to another...so each pathology of this you can treat each of them with a single medicine. Sometimes you have to treat a pathology like this with 2 or 3 medications for a single pathology.*

Anthierens et al. (2010) mentioned that self-medication may induce polypharmacy. This research identified some forms of self-medication such as discontinuing prescriptions, continuing expired prescriptions, skipping doses, and overdosing. One of the causes of self-medication is recommendations from persons other than the physician. Anthierens et al. (2010) also confirmed this finding. They mentioned that patients received medications not only from their physicians but also from their well-wishers such as friends, relatives or neighbors. This research added that sometimes patients also recommend their neighbors on medications. This mutual relationship intensifies the cases of self-medication. This research found another factor, hypochondriacs, that may induce self-medication. Patients who are hypochondriacs are abnormally anxious about their health. They feel insecure in the prolonged gap and assure themselves by increasing the doses. Moreover, they doubt the efficacy of the medication and increase the doses to compensate.

Figure: 2.1 (revisit) summarizes the causes of polypharmacy found in this research. In the figure, the findings that conform to the literature have been italicized and that were covered have been presented in bold text.

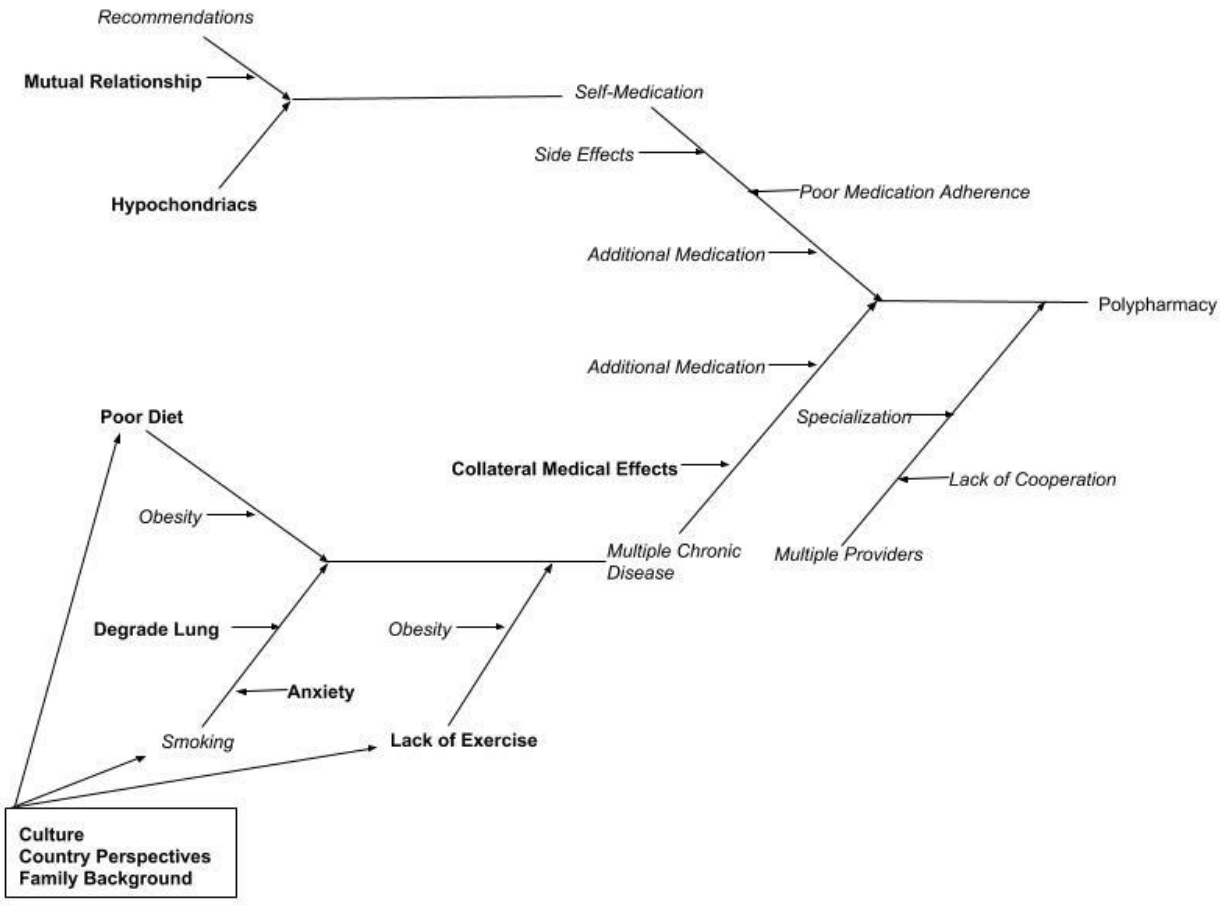

Figure-2.1(revisit): Causes of polypharmacy

Source: Elaborated by the author, inspired by Ishikawa, Kaoru (1968). *Guide to Quality Control*. Tokyo: JUSE.

5.1.3. What Are the Appropriate Initiatives to Manage Polypharmacy?

Several initiatives, which were not discussed in the literature, may be taken to manage polypharmacy. Patients` consciousness and knowledge should be helpful in preventing self-medication. Moreover, patients` trust over their doctors' will likely avoid circumstances that trigger hypochondriacs. Furthermore, specific recommendations regarding lifestyle may encourage patients to adopt a healthy lifestyle. Additionally, physicians should educate patients about medication intakes. Physicians should also individualize treatments, understanding how patients adopt treatments.

Combined pills will likely reduce excessive pills, which induce poor quality of life and medication adherence. Combined pills are not unrealistic. Some medicines have already been supplied, combined several substances. One challenge of combined pills is that pharmaceutical companies might resist extensive proliferation of combined pills because combined pills will likely reduce such companies` turnovers. However, some factors might overshadow the resistance. Combined pills will position a company as a unique provider in the market. The company can even command a premium price. Those market advantages will likely compensate for the potential losses. Other than pharmaceuticals companies, manipulation pharmacies can also provide combined pills. However, such a case on a big scale is unlikely. The reasons are a lack of expertise, and legislation and enforcement. Manipulation pharmacies do not have large scale research initiatives or research expertise to maintain the efficacy of several active substances when those substances will be combined. Also, it is often the case that manipulation pharmacies lack legal standing and lack strict enforcement of the legislation. Appointing a coordinator, when patients visit multiple physicians,

should be a useful approach. This finding is also reported by Anthierens et al. (2010) and Guthrie et al. (2015). They added the coordinator will look after patients' all medication prescribed by different providers.

Figure: 1.2 (revisit) and 2.2 (revisit) summarize the suggested initiatives. In the figure, the findings that conform to the literature have been italicized and that were uncovered have been presented in bold text.

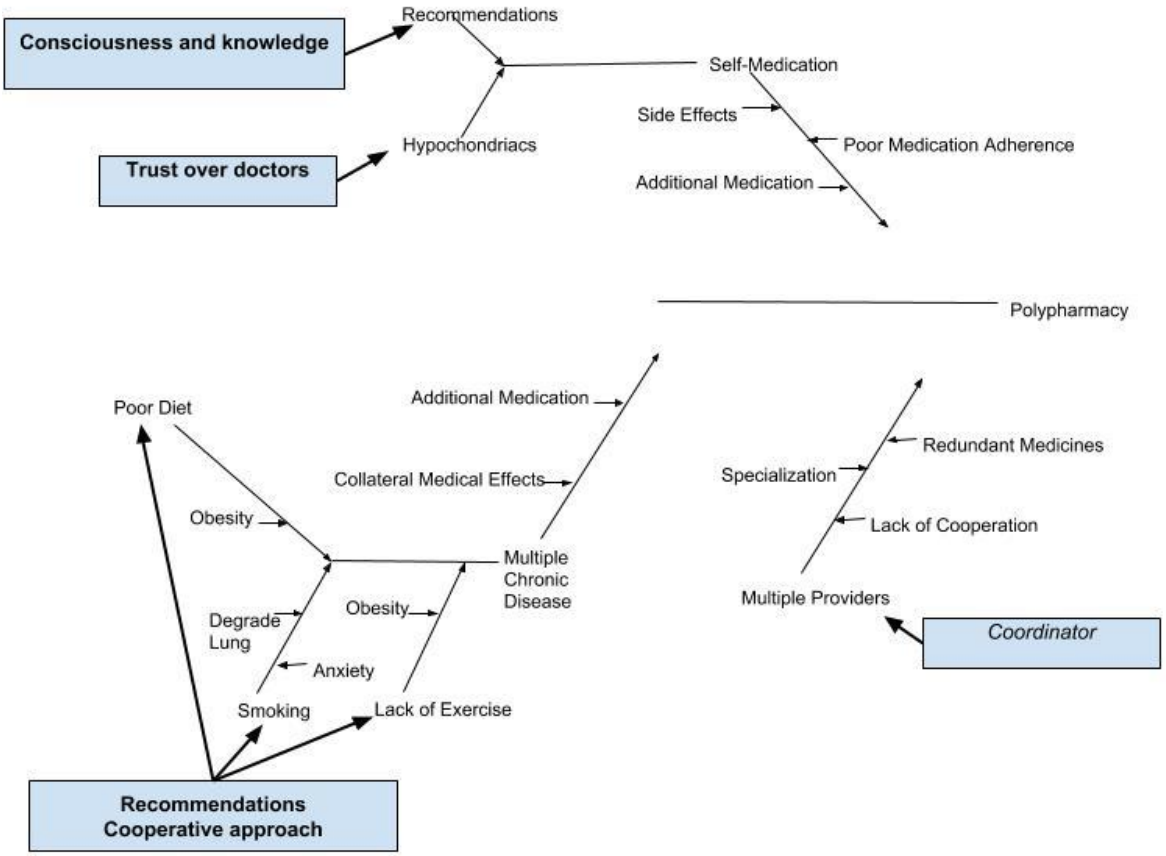

Figure-2.2 (revisit): Suggested initiatives to target the causes of polypharmacy

Source: Elaborated by the author.

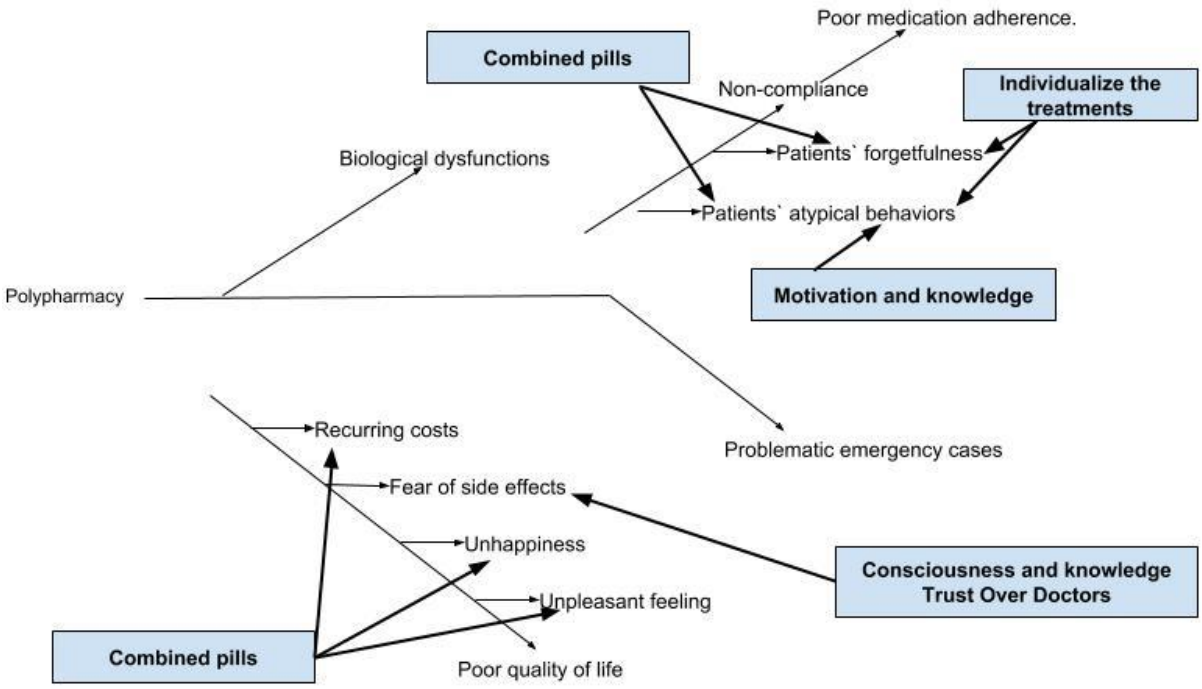

Figure-1.2 (revisit): Suggested initiatives to lessen the consequences of polypharmacy

Source: Elaborated by the author.

5.2. What Opposes Literature

This research found some aspect that contradicts the literature. Polypharmacy has been associated with several adverse consequences such as adverse drug events, drug-drug interactions (Herr et al., 2017) and poor medication adherence (Bjerrum, Rosholm, Hallas, & Krogstrup, 1997; Colley & Lucas, 1993). The association between polypharmacy and those adverse consequences are not inherently linear. It is possible that some patients who experience or who are likely to experience

polypharmacy may not suffer the adverse consequences of polypharmacy. The adverse effects of polypharmacy are context specific; the effects depend on the patient's physiology, health status and medical condition(s).

A popular view is that polypharmacy is an elderly people phenomena (65+) (Anthierens et al., 2010; Hovstadius et al., 2010 Pappa et al., 2011). However, this research found that some respondents who are below 65 experienced polypharmacy. Therefore, polypharmacy may not be elderly people phenomena. Another study supports this view. Guthrie et al. (2015) argued that multimorbidity is a significant predictor of polypharmacy and multimorbidity is also common among people who are less than 65 years.

6. Conclusion

This research aimed to illustrate how physicians can reduce cases of polypharmacy or help patients in dealing with the adverse effects of this condition by focusing on non-clinical perspectives of

polypharmacy. In this context, this research answered three specific questions: how patients experience consequences of polypharmacy; what causes polypharmacy; and what interventions should be appropriate to manage polypharmacy.

This research suggests that increased patients` consciousness and knowledge may minimize cases of recommendations and hypochondriacs and thereby self-medication, a cause of polypharmacy. Moreover, a cooperative approach and physicians` recommendations can encourage the patients to adopt a healthier lifestyle by refraining from poor diet, smoking, and lack of exercise that trigger cases of polypharmacy. Furthermore, the role of a coordinator, when multiple providers are involved, may optimize the patients` medication intake and will less likely expose patients toward polypharmacy. The reduced cases of polypharmacy will invariably reduce the adverse effects such as adverse drug events, drug-drug interactions, poor medication adherence and thereby improve the patients` outcomes.

The improved outcomes might result in an additional benefit. The adverse effects of polypharmacy may require additional treatments, which necessitate additional health services. If the adverse effects are less likely, the patients will be less likely to utilize additional health services. Consequently, the potential costs related to the utilization of health services can be saved. In this regard, this research should be relevant for some Governments who bear their citizens' health care costs, and for insurance companies who are responsible for their clients` health care costs. Both carriers can save some potential costs if their beneficiaries are in polypharmacy. However, it is possible that some patients who experience or who are likely to experience polypharmacy may not suffer the adverse consequences of polypharmacy. The adverse effects of polypharmacy are

context specific; the effects depend on the patient's physiology, health status and medical condition(s) (Stargrove & Stargrove, 2012). Therefore, every simulation of the initiatives on polypharmacy may not result in cost savings. Insurance companies and Governments should review their beneficiaries` profiles and adopt initiatives for those who are likely to suffer the adverse consequences of polypharmacy. Otherwise, insurance companies might find their profit plummeted because the return of the initiatives did not cover the costs of the initiatives. Governments might spend its scarce resources in less productive ventures.

The research also suggests that combined pills can reduce excessive pills, which, triggering recurring costs, unhappiness, unpleasant feelings, and patients' forgetfulness and atypical behaviors, turns polypharmacy into problematic phenomena. Moreover, patients consciousness and knowledge may prevent cases of patients` atypical behaviors. Furthermore, individualizing the treatments will reduce cases such as forgetfulness and atypical behaviors that induce poor medication adherence. Such instances to minimize problematic phenomena in polypharmacy will provide less burdensome life to the patients who are obliged to be in polypharmacy. In this regard, this research should be relevant for the care centers that are dedicated to accommodating patients who experience or who are likely to experience polypharmacy and that strive to manage polypharmacy by minimizing the problematic phenomena that are likely to emerge in the future. Insights from this research may provide guidelines to those care centers on how to improve their care management process and thereby, increase their efficiency and service outcomes.

The finding of this research can also benefit pharmaceutical companies. Combined pills, which is one of the interventions proposed in this research, can broaden pharmaceutical companies` product

categories. Combined pills have already been explored; companies supply many medicines, combining several substances. However, the focus of combined pills is limited to provide clinical necessities. Prospects of combined pills as a market advantage have not been explored. Combined pills can be a useful product for patients on polypharmacy. The resulting need can position a pharmaceuticals company as a unique provider in the market. The uniqueness will likely increase the turnover and enable the company to command a premium price. Pharmaceutical companies can introduce combined pills as an additional product. Patients who do not need all the combined substances can buy the individual pills while patients who need multiple substances can buy the combined pill. This initiative will help companies in keeping the existing market and avoiding plummeted sales because of the substitution.

In the academic field, researchers who want to explore non-clinical perspectives of polypharmacy may find this research useful. The literature on non-clinical perspectives of polypharmacy was scattered enough to make a holistic picture possible. This research has compiled the relevant literature on consequences, causes, and interventions of polypharmacy. Using this foundation, the researchers can get a holistic picture of non-clinical perspectives of the care processes relevant to manage polypharmacy and design their future scholarly works on polypharmacy.

7. Limitation of the Research

Some limitations are worthwhile to mention. The study was conducted using a qualitative approach and on a limited scale. Therefore, the findings can not be generalized. Moreover, the interviewees were selected based on their availability. This convenience selection might limit the breadth and

quality of the data. Furthermore, suggestive actions for some of the consequences could not be provided. Additionally, the suggested initiatives should be tested empirically to measure their effectiveness.

8. Recommendations for the Future Research

This research found several consequences that patients might experience in polypharmacy. However, the relationship between polypharmacy and those adverse consequences may not be linear. Some patients who experience or who are likely to experience polypharmacy may not suffer the adverse consequences of polypharmacy. Stargrove & Stargrove (2012) argued that the adverse effects of polypharmacy are context specific; the effects depend on the patient's physiology, health status and medical condition(s). In this context, a possible research idea is, among the patients in polypharmacy, who is more likely to experience the adverse effects of polypharmacy? The research should focus on exploring the patients' medical and sociodemographic profiles and determining the factors that make the consequences more likely. The findings of the research will help relevant stakeholders, some governments who bear their citizens' healthcare costs or insurance companies, to determine for what patients group they should take preventive measure to manage polypharmacy.

This research proposed several interventions that physicians can use to manage polypharmacy. However, an empirical study is required to identify the effectiveness of those interventions. The possible research question is to what extent interventions proposed to manage polypharmacy is effective in care settings? The empirical study should include the proposed interventions in its

theoretical foundation and study a group of patients to generalize the findings. The study can explore care settings such as specialized care centers for elderly or care centers administered by governments or insurance companies if the proposed interventions are in practice. Alternatively, the study can implement the interventions in a care setting and then measure their effectiveness. The findings of the study will contribute to improve the interventions and be relevant for some stakeholders such as some governments who bear their citizens' healthcare costs or insurance companies because they spend their resources effectively on appropriate interventions.

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11. Appendix

11.1. Appendix A: Interview Protocol

[Note: Questions presented in this protocol are detailed and structured. The aim is to define the scope of the interview. Asterisks (*) introduce how questions emerge from the literature and why the questions have been asked. However, it is worthwhile to mention that this interview is a naturalistic inquiry and the researcher has no intention to influence the answers of the respondents by informing them what has already been found in the literature. The researcher desires to maintain flexibility during the interview; in other words, questions may be skipped or the sequencing may be changed]

Questions to the patients:

[This is a conversation to understand your experiences with multiple medicines intake; the challenges you faced and the things you and your physicians do to overcome and your message to the health care professionals to improve your experiences. During this conversation, if you find any questions difficult to answer or don't want to answer, please let me know. We will skip those questions.]

- **Feeling questions** [The aim is to elicit responses of the patients' experiences and thoughts]

  [In this first couple of minutes of our conversation, we will talk about your experience with your medical conditions and then, move to talk about your experience with multiple medicines intake; the problem you faced and the things you and your physicians do to improve. Okay?]

  1. What are the medical conditions that you currently have [19]
  2. What are the problems you experience with these medical conditions [19]
  3. How many medicines are you taking in a day
  4. When do you take those medicines

[*Questions 1-4 are introductory queries to understand the patients' medical regimen and introduce the discussion of their experiences with multiple medicines intake or polypharmacy*].

5. How would you describe your experience with multiple medicines intake?
    - *Probes:*
        - What problem do you face / if no problem, how do you manage
        - What has changed in your lifestyle?
        - How have changed?
        - Which problems/changes bother you most

*[Qualitative research indicates that many people consider that they have little control over whether and how they use their medicines (Duerden et al., 2013). Increasingly, it is recognized that many people find their medication regimens an unpleasant chore (Duerden et al., 2013). The medicines a person takes should be tailored to their needs but the focus tends to be on the optimal clinical regime for the person rather than the medicines that will best enhance life and wellbeing (Craig, 2015). Moreover, a number of health-related quality-of-life measures, including physical and social function, are lower in patients experiencing polypharmacy (Fincke et al., 1998). The demands their [the patient's'] regimen places on them is detrimental to their quality of life (Duerden et al., 2013).

**[Question-5 will reveal the patients' experiences with multiple medicines intake or polypharmacy.*]

6. How do you manage those problems/changes?*
    - *Probes:*

    - How your physicians have helped you to manage your experiences
    - How is the communication between you and your physicians?
        - How attentive he or she is in listening to all your problems
        - How effectively he or she communicates the prescription or other things that you need to follow
    - If you look back, what would you say would be the main things you would have liked to have been in contact with your health professionals?
- **Knowledge questions:** [The aim is to know about what the patients know about how to manage their experience with polypharmacy].
    - What extent the information given by your physicians have helped you.
        - what information did not help you
    - What do you do or have done personally to overcome those problems/changes?
        - What do you do or have learned personally
        - Using which sources (social media, personal contact, magazines...etc

*[It is not only medicines that matter. It is also the support that patients get from the healthcare professionals. The relationships people have with their physicians help them cope or leave them feeling alone and helpless (Craig, 2015). Moreover, known predictors for polypharmacy include medication disagreement between doctors and patients (Junius-Walker, 2007).

**[Question-6 will contribute to the understanding that to what extent the patients' relationships with their physicians help to manage the experiences with polypharmacy and to what extent the patients are known to manage their experience with polypharmacy*.]

- ***Behavioral* questions** [The aim is to know what the patients does or have done to influence their experience with polypharmacy]

  [Okay, so far, we have talked about your experiences and you and your physicians' efforts to manage these. Now, I want to ask a few questions about whether you have ever modified your prescribed treatments on your own. Is that okay with you?]

  7. Have you ever changed your prescribed dosages (for example, your physicians asked you to take one tablet but you took half of the tablet) or discontinued your prescription or continued already expired prescription without informing your physicians?
  8. If yes, would you please tell more about this?
     - *Probes:*
       - Did anybody advise you or you did this on your own
       - What convinced you to do that
       - Any bad experiences for doing so
       - Did you share this self-management or the bad experiences with your physicians
         - *Probes*:
           - If no, what stopped you to share this information
           - If yes, how did your physicians react

*[Self-medication are seen as important barriers in reducing the number of drugs taken (Anthierens et al., 2010). Self-medication means that physicians have a limited overview and control of adequate medication management (Köberlein et al., 2013). A study conducted by Anthierens et al. (2010) on GPs views found that the patients often receive medication from friends, relatives or from neighbors. Moreover, they change their own regimens by discontinuing them, lowering, increasing or skipping doses without consulting their GP. They do not perceive this as their prescribed medication and consequently, they do not take into account the possible side effects or interactions. The risk of this [self-medication] is that GPs prescribe additional drugs as it seems the previous doses are not having the expected effect (Anthierens et al., 2010).

**[Question-7-8 will contribute to the understanding over whether the patients practice self-medication and what are the reasons and the effects of their self-medication practices*.]

- **Opinion questions:** [The aim is to know what the patients think about how they need help to *improve their experience with polypharmacy]*

  [Okay, you have given a lot of information about your experiences with multiple medicine use. Now, I will be glad to know your recommendations on how the healthcare professionals can help to improve your experiences with multiple medicines use. Shall we move on ?]

  9. What would you like to happen at this stage that would make living with multiple medicine intake easier for you?
  10. Have you had any negative experiences with the services you have received from your physicians?
      - If you ticked 'Yes', please say how things could have been better

- If you could give a brief message to the physicians, what would it be?

- **Demographic questions:** [The aim is to to locate the respondents in relation to the other respondents and thus, make fruitful comparisons. However, these questions can be skipped].

  [We are at the end of our conversation. I just have a few more questions about you.]

  1. How older are you?
  2. Are you working?
     - What type

  [Okay. This is the end of our conversation. Is there anything you want to add? Thank you so much for your valuable time.]

Questions to the Physicians

[This is a conversation to understand your views about multiple medicines intake. Often you find patients who are taking multiple medicines for their medical conditions. I am concerned about those patients who are taking at least 5 medicines a day. I would like to understand from your viewpoint what do you see how the patients experience their multiple medicines intake. Your viewpoints will help to understand the what factors contribute, what are negative consequences, whether a collaborative approach exists to overcome and what should be done to overcome. During this conversation, if you find any questions difficult to answer or don't want to answer, please let me know. We will skip those questions.

- **Opinion questions** *[The aim is to understand what they think about the patients` experiences with polypharmacy]*

1. What are your views on polypharmacy in health care practice?* (Anthierens et al., 2010)
    a. *Probes:*
        i. When it is not bad
        ii. When it is bad
2. In your opinion, what are the negative things about polypharmacy?* (Anthierens et al., 2010)

*[Polypharmacy appears to be a rational drug therapy and is assumed to provide major health benefits (Hovstadius et al., 2010). However, it is well known that the simultaneous use of multiple drugs can produce noxious effects (Fuller, 2008). Polypharmacy can cause unfavorable adherence to medicine, incalculable and accumulated adverse drug reactions, increased risk of hospitalization, and increased risk of medication errors and medicine waste (Burkhardt, 2013).

**[Questions 1-2 will contribute to understanding whether the physicians acknowledge polypharmacy as a problematic phenenomenon and whether, like other countries, similar consequences prevail in Brazil or are there other consequences prevail in Brazilian healthcare?]*

3. What are the factors contributing to polypharmacy?* (Anthierens et al., 2010)
    - *Probes*:
        - How they contribute

*[Sociodemographic and health system factors are significant predictors of PP use or the adverse effects of PP (Pappa et al., 2011)]

[*Question-3 will reveal whether similar determinants are dominant or are there other factors active in Brazilian healthcare*?]

- **Behavioral questions** [*The aim is to understand what they do or have done to help the patients in managing the patients` experiences with polypharmacy*]

  [Okay, so far, we have talked about your viewpoints on multiple medicines intake. Now, I will be glad to know some of your experiences in managing multiple medicines intake. Is that okay with you?]

  4. How is your experiences in listening [/discussing] the patients' experiences of multiple medicines intake? For example, their views about what medicines mean to them, how medicines impact on their daily life, whether or not they are able to take their medicines?*

*[Patients feel confident enough to share openly their experiences of taking or not taking medicines, their views about what medicines mean to them, and how medicines impact on their daily life (Royal Pharmaceutical society, 2013). An important challenge in the area of polypharmacy is that of working alongside patients to empower them to make informed choices about treatments and the burden of pills they are expected to consume. Prescribers and other health care professionals may not recognize the significant demands placed on patients in managing the

use of multiple medicines, and they should endeavor to adopt a style that explores the patient's perceptions and concerns in routine consultations (Duerden et al., 2013)]

[Question-4 will reveal, apart from curing the illness, to what extent the physicians are encouraged to listen to the patients` experiences in managing multiple medications intake].

5. How do you advise the patients to manage multiple medicines intake*

*[Known predictors for polypharmacy include medication disagreement between doctors and patients (Anthierens et al., 2010). Compromised often need to be reached between the view of the prescriber in delivering interventions intended to improve outcome, and the choice made by the patient, based on the demands of the medication regimen. The alternative is the potentially wasteful process of prescribing where the patient does not take the medicines appropriately or does not take them at all, but the prescriber unwittingly continues to supply prescriptions (Duerden et al., 2013)]

[*Question-5 will reveal to what extent they practice the collaborative approach to help patients in managing multiple medicines intake]*.

6. Have you encountered a situation when the patients do not incline to stop using medicines that they have used for a long time or the patients become demanding and resist any attempt to change their prescriptions? (Anthierens et al., 2010)

7. If yes, can you please tell more about this situation?
    - *Probes:*
        - How problematic are those situations for you
        - what aspects you find problematic
        - How do you manage those situations

*[Patients are not always inclined to stop using drugs that they have used for a long time. Some patients can be demanding and difficult when their use of medication is questioned and resist any attempt to change their prescriptions (Anthierens et al., 2010).

[Question 6-7 will reveal to what extent the physicians find a collaborative approach a difficult job to do and what contributes to this difficulty].

8. If you encounter a patient who has multiple diseases and receives services from multiple prescribers, do you consider it important to communicate with these prescribers to optimize the patient's medicines in order to minimize his or her burdens of pills or avoid unintended consequences such as drug-drug interactions.*
    - *Probes:*
        - if not, what difficulty you face to pursue such a collaborative approach
        - If yes, what benefit you get from this collaborative approach

*[One of the reasons why GPs find polypharmacy a complicated issue is that often more than one prescriber is involved. Inappropriate prescribing can arise from the absence of communication between doctors practicing in different settings or even between specialists practicing in the same setting (Anthierens et al., 2010). Moreover, the reluctance of GPs to interfere with treatment prescribed by a colleague as one of the reasons mentioned for polypharmacy this has also been found in previous research (Larson, 2001).

[*Question-8 will contribute to the understanding to what extent multiple providers are working in a collaborative manner]*

9. Did you try the brown bag approach-asking patients to bring all the medicines they are using *

*[GPs find it important to have a coordinating role. This is in contrast to a specialist who only looks at the patient from his or her own discipline (Anthierens et al., 2010).

[Question-9 will reveal to what extent the physicians try to manage multiple prescribers effects on polypharmacy when liaison among multiple prescribers are virtually impossible]

- **Opinion questions** [*The aim is to understand what they think should be done to help the patients in managing the patients` experiences with polypharmacy.*]

  [Okay, you have given a lot of information about your viewpoints and practices to manage multiple medicines intake. Now, I want to ask you about your recommendations on how to improve the patients experiences with multiple medicines intake. Shall we move on ?]

10. Are there specific barriers that you can think of in order to reduce the adverse effects of polypharmacy?* (Anthierens et al., 2010)
11. In your opinion, can something (interventions, education, training on pharmacotherapy...) be done in order to overcome the adverse effects of polypharmacy, mitigating those barriers? *
    - *Probes*:
        - On what area should be specifically mentioned

*[GPs also experience shortcomings in their pharmacological knowledge (Anthierens et al., 2010). There is a lack of adequate training of doctors in geriatric pharmacotherapy (Larson, 2001). GPs do not have a readymade solution for polypharmacy. The limited set of options for addressing polypharmacy leave GPs feeling powerless to tackle the problem (Anthierens et al., 2010).

- **Demographic questions:** [The aim is to locate the respondents in relation to the other respondents and thus, make fruitful comparisons. However, these questions can be skipped].

  [We are at the end of our conversation. I just have a few more questions about you.]

  12. Are you a specialist or a general practitioner?
      - *Probes:*
          - If a specialist, in which area
  13. How long you have been working in this profession?

  [Okay. This is the end of our conversation. Is there anything you want to add? Thank you so much for your valuable time

11.2. Appendix B: The List of Codes

Code: PAB (patients' atypical behaviors)

Code: PAB_NC (patients' atypical behaviors_non-compliance)

Code: PAC (patients' adverse consequences)

Code: PHCB_PLC (physicians' corrective behaviors_ patients' lack of confidence)

Code: CSM (cause of Self-medication)

Code: C_I (challenged to Interventions)

Code: C_P (causes of polypharmacy)

Code: CoA (cooperative Approach)

Code: Com (communication)

Code: Coo (coordinator)

Code: DbyH (duplication by hours)

Code: PF_NC (patients' forgetfulness_ non-compliance)

Code: PFear (patients' fear)

Code: PHLC (physicians' lack of cooperation)

Code: PCMA (pharmaceuticals companies' market advantage)

Code: ML (multiple providers)

Code: PMR (patients' mutual relation)

Code: PL (possible interventions)

Code: PPQL (patients' poor quality of life)

Code: R_DFP (redundancy_ difficult to understand for patients)

Code: PSPC (patients' special cases)

Code: UC (unlikely case)

Code: PUF (patients' unpleasant feeling)

Code: PUn (patients' unhappiness)

Code: PHNUP (physicians' need to understand patients)

Note: These codes have been generated by the author for field notes and transcripts obtained conducting interviews to explore Non-Clinical Perspectives of Polypharmacy. The shorthand codes (abbreviations) have been written directly on the relevant data passages or quotations. The full labels in parentheses describe the code and have used to organize and analyze the data.