Psychosocial Risk in the Nursing Personnel of a Health Care Provider

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***Abstract*— In the services of a health care entity, the nursing personnel faces stressing situations during the performance of their labor functions as a consequence of the psychosocial factors they daily face. For being an evident risk in a health care institution, it requires an appropriate management. Psychosocial risk factors and their consequences are studied through a system dynamics model in order to understand their behavior and determine the policies that contribute to the psychosocial risk management. Within the discoveries we found that Health Care Providers (known in Colombia as IPS) shall pay attention to the Burnout Syndrome and implement good practices for the psychosocial risk in order to reduce the costs associated with the personnel, increase the profits and enhance the patient care.**

***Keywords*— Systems Dynamics, psychosocial factors, nursing personnel, good psychosocial risk practices, Burnout syndrome.**

I. INTRODUCTION

A transformation process on the work and companies is currently taking place. The organizations are increasingly complex and aim to adapt into a changing environment; this transformation leads to new labor requirements that turn into psychosocial factors affecting all the levels in the organization.

These factors are one of the problems with greater impact on the labor field by causing absenteeism for common disease and occupational accidents and diseases which alters the productivity and quality in the provision of services; in addition, it generates high costs and affectations in the life quality of the workers.

In the services of a heath care entity, the nursing personnel faces stressing situations during the performance of their labor functions since their work requires great responsibility for having a permanent control with diseases and facing suffering and dead which causes tension, anxiety and depression. In addition, they must work under pressure, comply with demanding schedules that include night shifts, journeys of 12 hours and work on Sundays, holidays and special dates, which interferes with their social and family life (Martinez, 2008).

All these risk factors combined with the labor conditions and life style, bad compensation, delayed payments, disabilities and labor dissatisfaction, specific from the nursing personnel, create discomforts, diseases and physical and emotional exhaustion (Bustillo et al., 2015). This affects the quality of services, security on patients, increases the staff turnover and generates an increment on the costs for health care institutions.

Given this problem and since the risks are complex on their own, it is necessary to use a methodology allowing the performance of a holistic study of the psychosocial factors and their consequences, such as the system dynamics. The concept of psychosocial risk or factor and the more relevant risks in the nursing personnel are explained below; then, some studies on the issue are shown and the system dynamics model and the variation on their behavior are exposed and discussed when including the policy of good psychosocial risk practices.

II. PSYCHOSOCIAL RISK

International Labor Organization (ILO, 1986) has defined the psychosocial risk as:

> "The interactions between the content, organization and labor management and environmental conditions on one part and the functions and needs of the workers on the other. These interactions might exercise a harmful influence on worker's health through their perception and experience".

Furthermore, Martinez (2008) quoting Cox & Griffiths, provides the following definition for psychosocial risk: "those aspects of the conception, organization and management of work as well as of their social and environmental context which have the potentiality to cause physical social or psychological damages on workers".

Taub & Olivares (2009) define the psychosocial factors as the conditions present on a labor situation that are directly related with the organization of the work, its content and the realization of the task, which occur with the capacity to positively or negatively affect the development of the work and the physical, psychological and/or social health of the worker.

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When these psychosocial factors are negatively perceived by the workers, they become on risks factors and can produce work stress by causing a psychological, physiological or social damages on people. This phenomenon has increased over the last decades to the point it constitutes a work and social problem similar to the problem of other type of risks such as the physical, chemical or biological risks (Mijana, 2012).

According to Charria, Sarsosa and Arenas (2011), the psychosocial risk factors must be evaluated in a systematic manner due to the social, political and legislative transformations that accentuate the interest to promote the health on workers. The intervention of public bodies, such as Ministry of Health and Social Protection in Colombia with Resolution 2646/2008 is highlighted, which establishes responsibilities for the identification, evaluation, intervention and monitoring of the psychosocial risk factors (Ministry of Social Protection, 2008).

Table 1 details the psychosocial risk factors that have been more identified in the nursing personnel during the last years. The Burnout syndrome is the most outstanding, followed by work stress, social support (human resources that a person has to overcome a crisis (Gallar, 2006)) and interpersonal relationships. The other factors such as workload, interest for worker and physical pain have been also considered in the nursing personnel by some authors.

Table 1
Most common psychosocial risk factors in nursing personnel

	Psychosocial Factors	Labor stress	Burnout	Social Support	Labor load	Working time	Interest for worker	Physical pain	Interpersonal relationships
Authors	Abenza et al. 2014	x	x						
	Ortiz et al. 2015		x						
	Carugnol et al. 2012	x	x	x					
	Ceballos et al. 2014				x				
	Demir & Rodwell 2012			x		x	x		
	Gao et al. 2012					x		x	
	Khamisa et al. 2013			x			x		x
	Manrique et al. 2014	x	x					x	x
	Pulido et al. 2012				x				x

According to the foregoing, the factor studied under this investigation is the Burnout Syndrome or Occupational Burnout Syndrome which according to Maslach (2009), is a psychological syndrome that implies an extended response to chronic interpersonal stressors at work. The key dimensions of this response are a strenuous exhaustion, cynicism feeling and disregard for work and a sense of inefficiency and lack of achievements.

Table 2 shows some consequences and effects of the psychosocial risks in the nursing personnel regarding problems related with health, attitudes before the company, working times and economic costs in the Health Care Providers (IPS).

Table 2
Consequences and effects of psychosocial risks

Consequences and effects of psychosocial risks	
Consequences	**Effects**
Health-related problems	Physical health
	Mental Health
	Substance use
	Psychosomatic disorders
Attitudes before the company	Job satisfaction
	Work involvement
	Counterproductive behaviors
Working times	Staff turnover
	Presentism
	Time off work
	Duration of leaves
Economic costs	Occupational accidents
	Loss of materials
	Performance
	Loss of personnel
	Productivity

(Moreno and Baez, 2010).

There are some techniques and instruments for the prevention, reduction and elimination of the psychosocial risks that the IPs should take into account when making the psychosocial risk management, which are shown in table 3.

These good practices are divided into two levels: on the organizations (IPS) and the individual (nursing personnel) (CEM, 2013).

Table 3.
Good psychosocial risk practices

Good practices at the IPS level
Burnout information and prevention campaigns
Labor Recognition
Opportunity for advancement in the IPS
Training for improving the productivity
Active breaks
Job design
Economic benefits for personnel
Good practices at the nursing personnel level
Meditation and relaxation
Physical Exercise
Self-control
Eating habits
Sleeping, resting habits
Active breaks

(CEM, 2013), (Herrera D. & Bleijenbergh I, 2016).

Therefore, a system dynamics model that allows seeing in a holistic manner the behavior of the psychosocial risk variable and their effect on the nursing personnel of an IPS.

III. SYSTEM DYNAMICS MODEL OF THE PSYCHOSOCIAL RISK IN THE NURSING PERSONNEL

For Homer & Hirsch (2006) the system dynamics is an adequate methodology to address dynamic complexity that characterizes so many public health problems. A realistic image of the causes of the diseases and the risks faced by the actors intervening in the process is reached through the systems dynamic. In addition, it aims to find policies for which the health care providers prevent diseases and safeguard the health of its personnel.

Causal diagram of psychosocial risk in the nursing personnel

The model proposed in Figure 1 shows the relations between the psychosocial risk factors such as; Burnout syndrome, work overload, labor motivation, time off from work, personal life quality and satisfaction of working environment.

Consequently to these factors and specifically to Burnout Syndrome, the following is derived: absenteeism, occupational diseases, low productivity of personnel due to physical and mental tiredness and dissatisfaction of working environment. The above leads to an increment on staff turnover by generating an increase of the costs related with the personnel within which we have: liquidation, recruitment and new personnel training costs, which directly affects the profits of the organization or IPS.

The behavior of some feedback loops comprising the model is described below:

If the burnout syndrome of the nurses in an IPS increases, there would be more absenteeism and therefore the staff turnover index and the costs associated to the personnel will increment by reducing the profits of the IPS. Which causes that the institution does not have the sufficient budget to provide economic benefits to the nursing personnel, which generates again an increment of the syndrome. This loop corresponds to a positive feedback of the mode where the generation of the Burnout Syndrome is reinforced.

If the nursing personnel has work overload, an increment both in occupational diseases and accidents occurs, which generates more absenteeism by increasing again the work overload of the nurses covering the shifts of the disabled partners. In turn, this overload causes less time off the work, the staff life quality is affected by the lack of familiar life and personal relationships by causing the waiver to their job and increasing the staff turnover index and therefore the work overload. These loops also reinforce the unwanted behavior of this system.

Again, the increment of the Burnout Syndrome in the personnel of an IPS decreases its productivity index which is reflected on the service level towards the patients and relatives and which will cause an increment on complaints regarding the patient care. This makes that the IPS is bound to dismiss the personnel which increases the nursing staff turnover index and the costs associated with new personnel training. This reduces the profit and the economic benefits and reinforces the increment of the Burnout Syndrome.

Another consequence of the increment on Burnout Syndrome is the dissatisfaction with the labor environment since the relationships between doctors and nurses is affected by the lack of commitment and labor motivation of the persons suffering this syndrome which generates interpersonal conflicts leading to the increment of waivers and nursing staff turnover index that will trigger a greater increase of Burnout Syndrome. Again, this loop shows a reinforcement behavior in the system.

When incorporating the good practices mentioned above, a new causal diagram (Figure 2) is obtained, which include two variables: Good practices on psychosocial risks at the nursing staff level and good practices on the psychosocial risks at the IPS level.

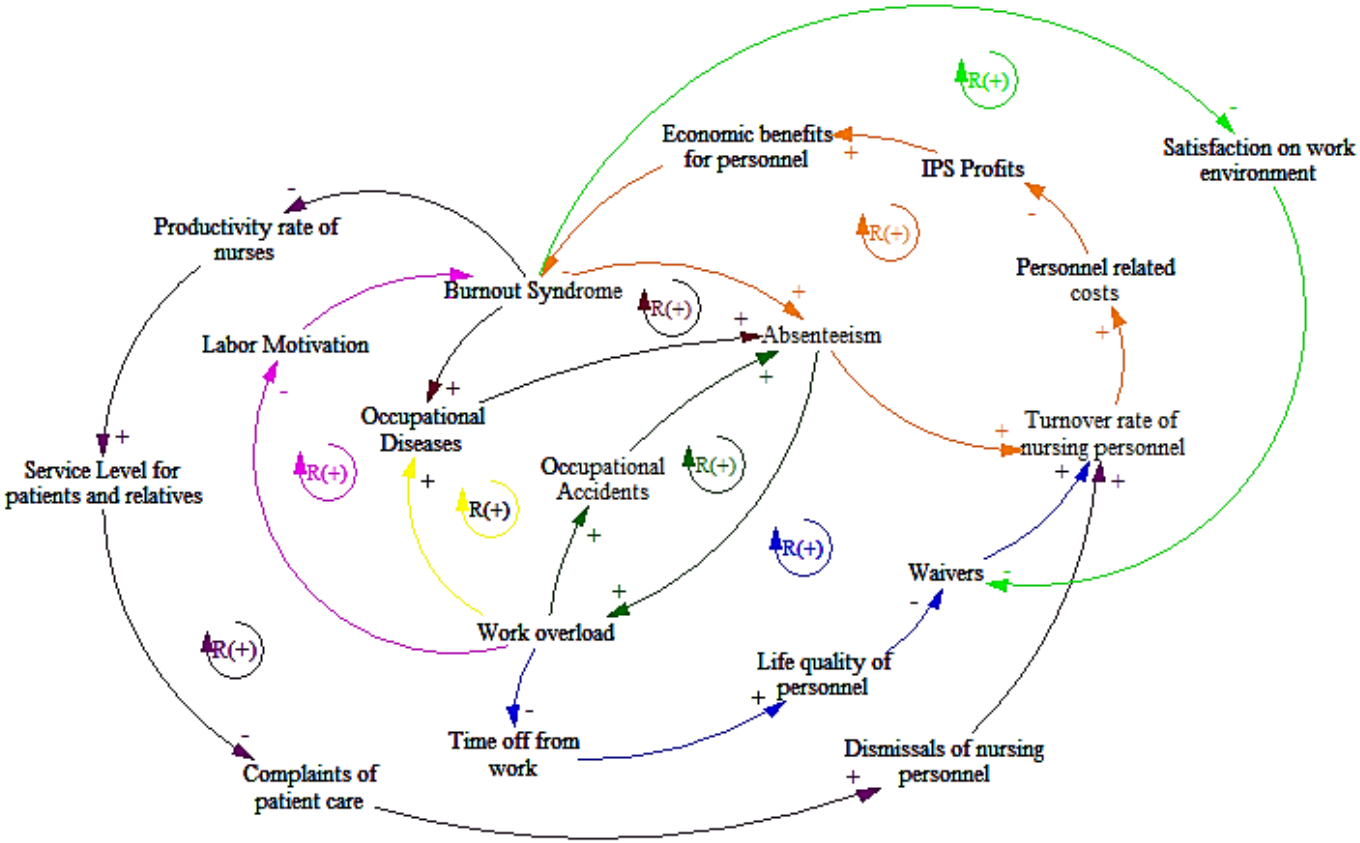

Figure 1. Causal diagram of psychosocial risk in nursing personnel of an IPS. Own elaboration.

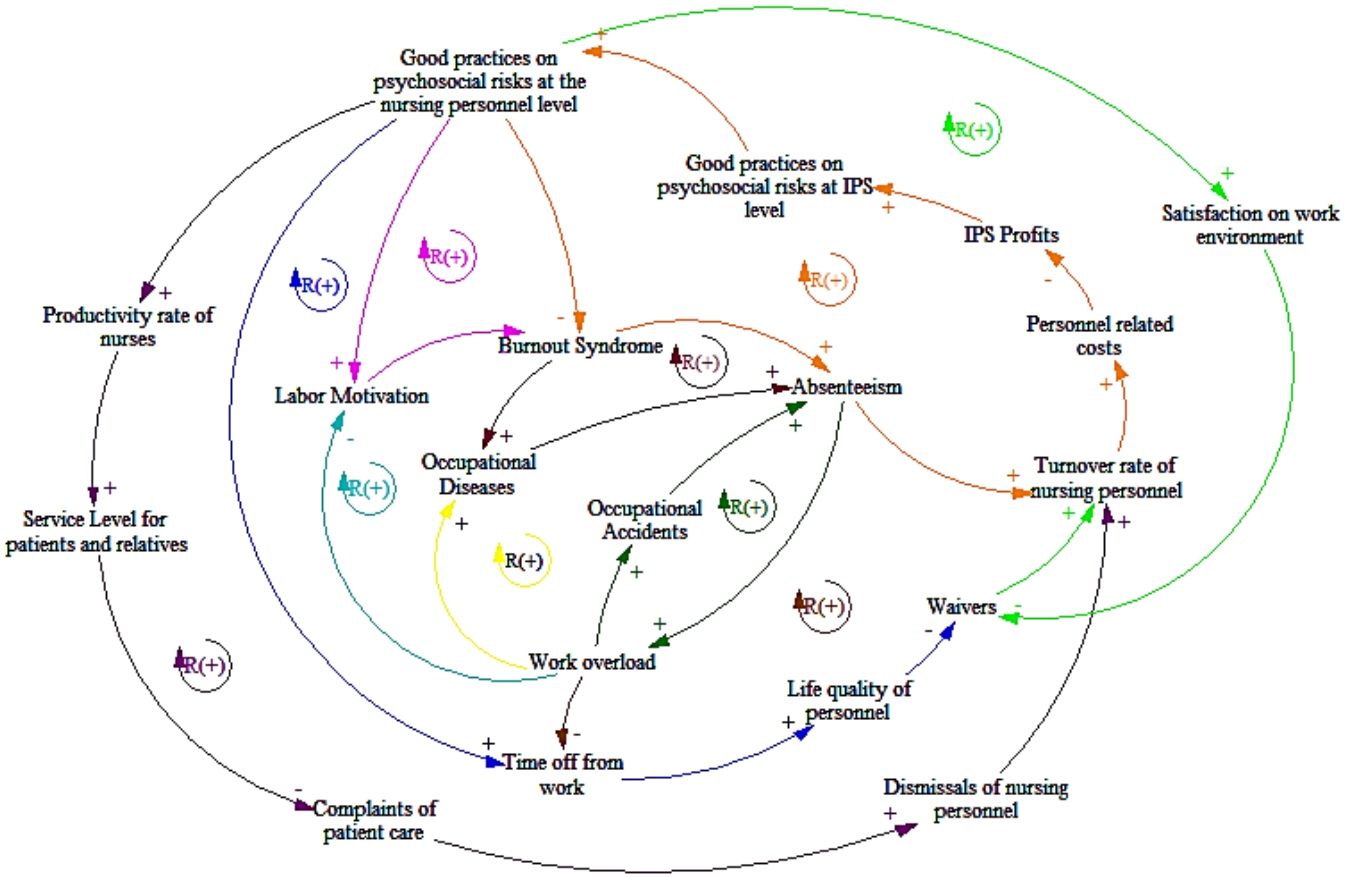

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Figure 2. Causal diagram good psychosocial risk on nursing personnel of an IPS. Own elaboration.

Causal diagram taking into account the good psychosocial risk practices

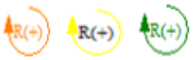
Model proposed on Figure 2 involves two new variables. The variable of good practices on psychosocial risks at the nursing personnel level has an influence on the psychosocial factors below: Burnout Syndrome (indirectly proportional), labor motivation, time off from work and labor satisfaction (directly proportional).

The variable of good practices on psychosocial risks at the IPS level is directly proportional with the variable of good practices on psychosocial risks at the nursing personnel level, meaning that the IPS must be in charge of providing the adequate training to the nursing personnel in order to perform the good practices of this risk. Reducing the psychosocial risk since it is not only the organization responsibility but also of the worker.

The behavior of some feedback loops comprising the model is detailed below, including the good practices:

If the good psychosocial risk practices are promoted on the nursing personnel, their productivity and the good service level towards patients and relatives will increase. This will reduce the complaints and avoid dismissals which leads to a decrease on the staff turnover index. If this index is reduced, the costs associated to the personnel will decrease and this will allow an increment on the profits for the IPS and therefore, an increment on the budget to develop the good psychosocial risk practices both at the IPS and the nursing personnel level. This loop is a positive feedback loop for the system.

If the nursing personnel performs good practices to prevent the psychosocial risk, it is going to have a greater labor satisfaction that is evidenced on the reduction of complaints and of the staff turnover index, which will contribute to the increment of the IPS budget for investing on the realization of good practices.



If the nursing personnel engages in physical exercise, has good eating and sleeping habits and performs the other good practices, the Burnout Syndrome will be reduced on the personnel. If this syndrome is reduced, the absenteeism, occupational diseases and accidents and the staff turnover index will be also reduced. This will contribute in an increment on the profit for the IPS and on resources to invest on these goods practices. Again, this loop shows a reinforcement behavior in the system.

When performing the good practices at a nursing personnel level and if they are appropriately carried out, the personnel will have more time off from work, will increase its personal life quality and will have fewer desires to waive. Therefore, the turnover index will not increase and the IPS will not be affected in an economic manner, so it may invest on the realization of the good practices to prevent the psychosocial risk, and the nursing personnel will be encouraged to perform the corresponding good practices. This loop is of positive feedback for the system.

After showing the relations of the variables and their behavior, the model is simulated through a Forrester Diagram. This model includes a policy that the IPS should take into account for the management of the psychosocial risk. This policy is the good psychosocial risk practices both of the IPS and the nursing personnel.

Forrester Diagram

The model proposed in Figure 5 simulates the behavior of the different variables affecting the psychosocial risk of the nursing personnel in the passage of 10 years. The Forrester diagram is comprised by 7 levels (Health, Burnout, Labor Motivation, IPS Patients, Revenues for Patients, Costs of Personnel and Nursing Personnel), 13 flows and 43 variables. It was designed by taking into account the loops analyzed on the causal diagram shown above.

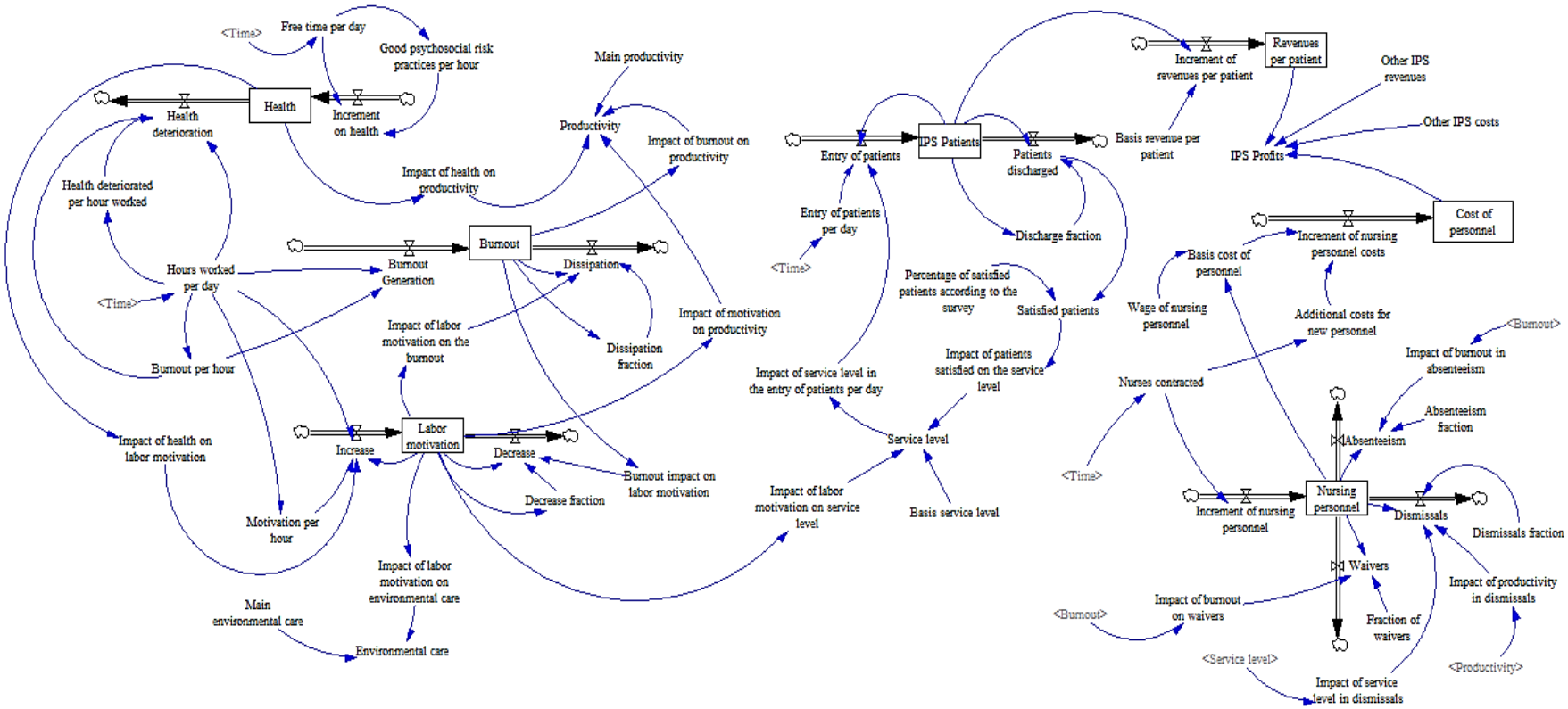


Figure 5. Forrester Diagram of the psychosocial risk in the nursing personnel of an IPS. Own elaboration.

Health level is directly proportional to the realization of the good psychosocial practices, but it is inversely proportional at the burnout level. In other words, if the health level increases, the burnout level will decrease.

The labor motivation level is directly proportional to the health level but is inversely proportional to the burnout level. If the motivation of the nursing personnel increases, the service level will also increase as well as the entry of patients to the IPS since it will have better references of care provided.

If the Burnout Syndrome decreases, the nursing personnel will not waive or will be constantly absent as well as there would be no need to dismiss personnel since it will be motivated and will provide a good service. The above causes that the nursing personnel is maintained in the IPS and the recruitment and training costs do not increase. Consequently, the IPS will have financial benefits because the revenues will increase and the costs will reduce.

The calculation of the qualitative variables and some assumptions of the model are made based on the following:

- The health variable, for being a qualitative variable, is calculated on a scale from 0 to 100, where 0 is extremely poor health condition and 100 is an optimal health condition. There is an initial value of 50, which indicates a normal health condition (Richmond B, 2013).
- Labor motivation, as well as health variable, is calculated from 0 to 100 where 100 indicates that the health personnel is very motivated and 0 that it is not (Richmond B, 2013).
- It is initiated with a Burnout value of 0. The Burnout Syndrome is measured from 0 to 20 (Richmond B, 2013).
- The initial number of patients of the IPS is 150 (Murcia, 2016).
- The number of nurses of the IPS in a shift is 70 (Murcia, 2016).
- The average wage of the nursing personnel is $1,200,000 Colombian pesos (Murcia, 2016).
- Base income per patient is $500,000 Colombian pesos (Murcia, 2016).

The calculation of the look ups of the model is made by determining the behavior of the variables to be related, if they are directly or inversely proportional.

For the case of the look up of the burnout impact on labor motivation, it is calculated as follows:

Burnout impact on labor motivation = WITH LOOKUP (Burnout), ([(0.0) - (100.10)], (1.0.1), (2.0.2), (3.0.3), (4.0.4), (5.0.5), (6.0.6), (7.0.7), (8.0.8), (9.0.9), (10.0.9)))

X values represent the Burnout Syndrome and the *y* values represent the impact that the burnout would have on the labor motivation.

Since they are inversely proportional variables, the higher value of the Burnout Syndrome, the greater negative impact on the labor motivation, since this look up is a variable affecting the reduction flow of the labor motivation. In the calculation equation, when the burnout has 10, the impact on the motivation will be high, meaning of 0.9 by considerably reducing the motivation level. The same calculation is made for the other flows with similar characteristics and in different proportions.

The simulation is made in two scenarios: firstly, when the nursing personnel only works a shift of 6 hours, whether in the morning or afternoon; secondly, when the nursing personnel makes a double shift or night shift of 12 hours. (The shift hours are defined in accordance with an interview made with the Head Nurse (Murcia, 2016) and each IPS agrees upon its needs).

Once the simulation of the two previous scenarios is made, each of them is simulated again by taking into account the good psychosocial risk practices policy.

IV. MODEL VALIDATION

The validation of the model is made by using extreme cases, when the hours worked per day are 0 (validation 1) and when the hours worked per day are 100 (validation 2). The model shows a result coherent with the expectations, as shown in the graphics below:

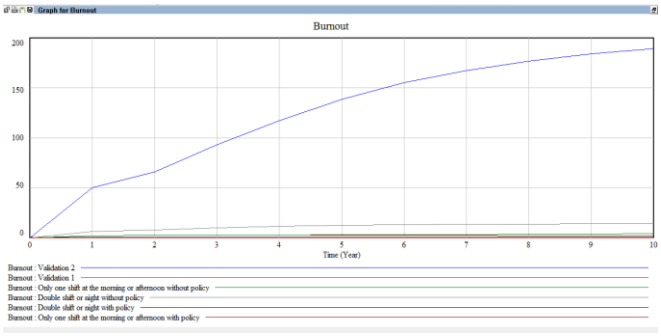


Figure 3: Validation of Burnout Variable

In the validation of Figure 3, when no work is made, the burnout is maintained in 0 throughout the time, instead, when 100 hours are worked, the burnout exceeds its maximum level, which is coherent with the expected behavior of the model.

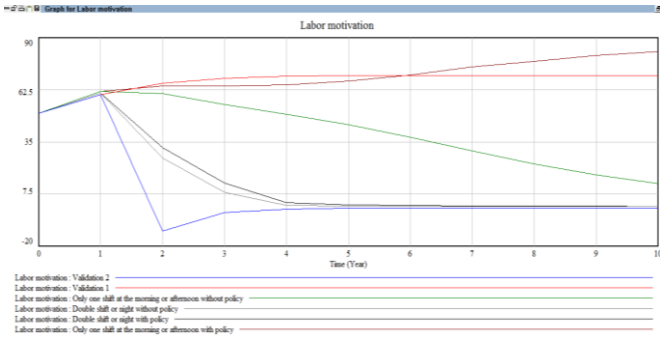


Figure 4: Validation of Labor Motivation Variable

In the validation of Figure 4, when no work is made the motivation reaches approximately 90 over 100 which is the maximum motivation level. When 100 hours are worked, the motivation is significantly reduced and is maintained in 0 over the time. This result is coherent with the expected behavior of the model.

V. RESULTS

When performing the simulation of the model in scenarios mentioned above, it can be noted that the behavior of the system when working on single shifts is more beneficial for the IPS (first scenario), which is reflected on the variables analyzed. In addition, the results for each scenario are shown including a comparison of the behavior of the system when including the policy of good psychosocial practices.

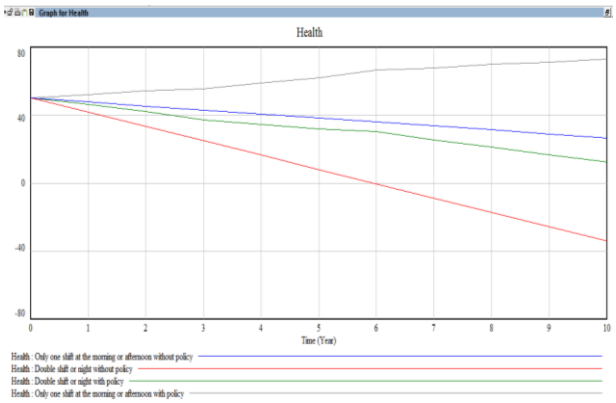


Figure 6: Behavior of Health Variable

In Figure 6 of health, in the case of double shift or night, a significant reduction on health can be observed from the third year; if the good psychosocial practices are not carried out, it will decrease rapidly as shown on red curve from year 2.

It can be observed that the health will not be significantly reduced with a single shift, but if the recommendations of the good practices policy are followed, the health will improve 84% in comparison with the double shift without policy.

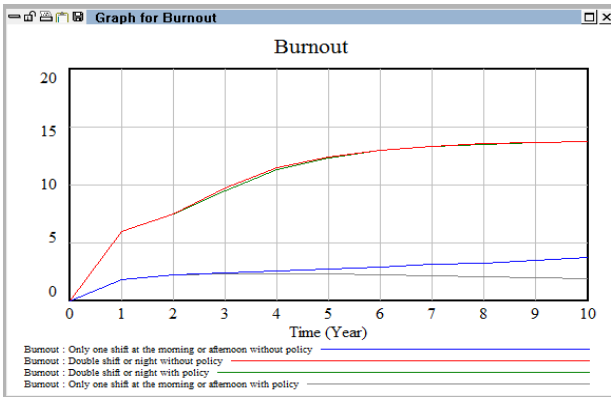


Figure 7: Behavior of Burnout Variable

In Figure 7 of the Burnout, we can evidence that when making a double shift or working at night, the Burnout Syndrome has a significant increment in 72% in comparison with a single shift, morning or afternoon, where it is maintained at a lowest level. With the implementation of the policy of good psychosocial risk practices, no significant change is observed in the syndrome in the case of the double shift, which means that it is recommendable to work only one shift, whether at the morning or afternoon or the double shift applying good practices.

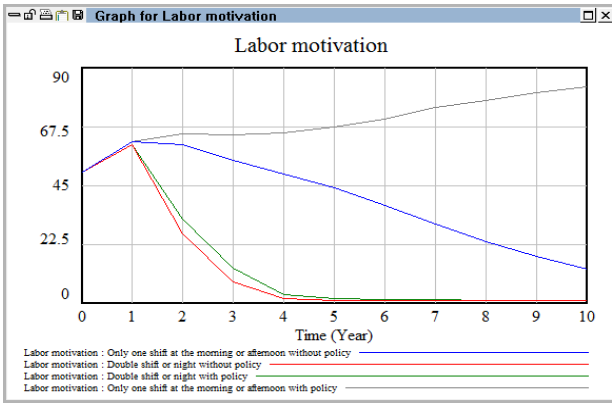


Figure 8: Behavior of Labor Motivation Variable

Figure 8 of labor motivation shows the significant difference in the curves when the nursing personnel only works one shift (blue curve) and double shift (red curve). If the recommendations of the psychosocial risk policy are followed when working a single shift, it can be observed that with the policy, the labor motivation tends to increment in the time; in contrast, when the work is performed without the policy, it tends to decrease. However, the policy is not able to compensate the motivation.

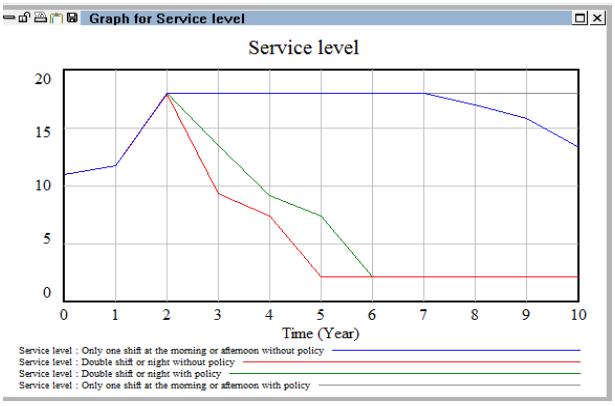


Figure 9: Behavior of Service Level Variable

Regarding the service level of the IPS (Figure 9), a significant difference can be observed when working a single shift and when working a double shift. With the implementation of the policy, a significant increment is not evidenced when working a single shift, which means that the service level improves when the nursing personnel only works one shift. The reduction of the service level in the time when working a double shift or one night is of 82% in the year 10.

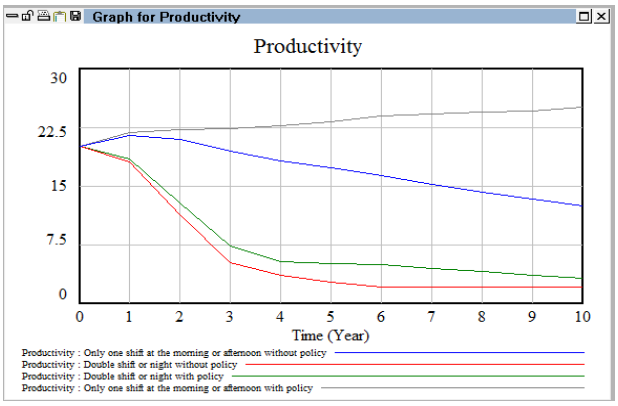


Figure 10: Behavior of Productivity Variable

It could be observed in Figure 10 that productivity tends to increase in time only when one shift is worked and if the recommendations of the psychosocial risk policy are followed, since on year 10 the productivity reaches 24 and without the policy 13, which means a difference of 11. The productivity decreases in 66.7% in year 10 with a double shift with respect to a single shift.

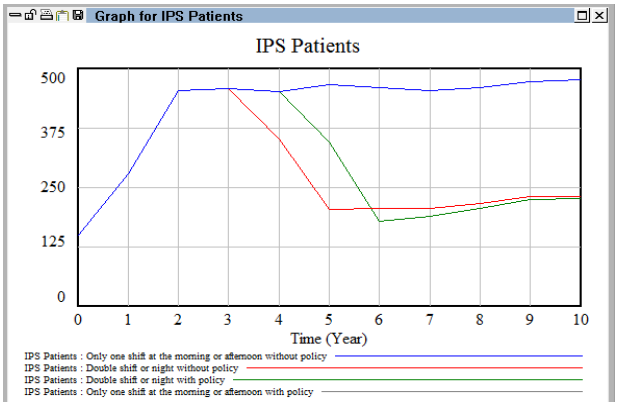


Figure 11: Behavior of IPS Patients Variable

With reference to the entry of patients to the IPS (Figure 11), it can be observed that with the work on double shift or at night, the entry of patients is reduced in approximately 50% in comparison with a single shift with or without policy. It can be evidenced that when the policy is not included in a work of double shift, the entry of patients starts to significantly reduce from year 3, while when including the policy it is reduced from year 4.

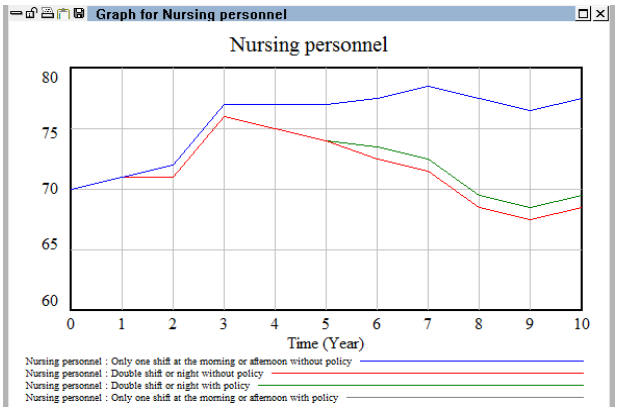


Figure 12: Behavior of Nursing Personnel Variable

Regarding the nursing personnel (Figure 12), it can be evidenced that when working only one shift, the blue curve tends to increase with time, which means that the absenteeism, waivers and dismissals of nursing personnel are reduced. But, when working a double shift without implementing the good practices policy, the personnel decreases in 13% as evidenced from year 5.

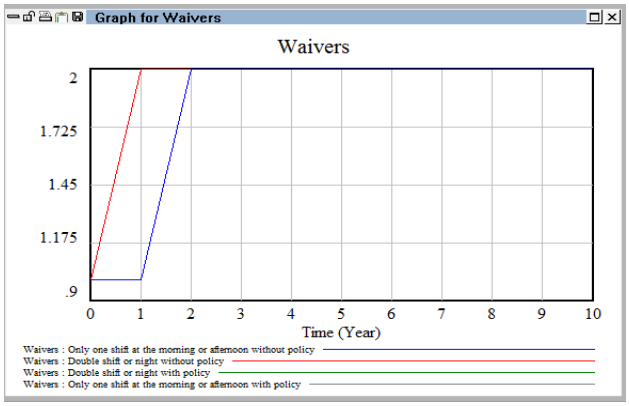


Figure 13: Behavior of Waiver Variable

Figure 13 of waivers shows that the number of nursing personnel that waives when implementing or not the policy remains the same. However, it is evidenced that when the personnel works a double shift or at night, the decision to waive is taken faster than when it works only one shift.

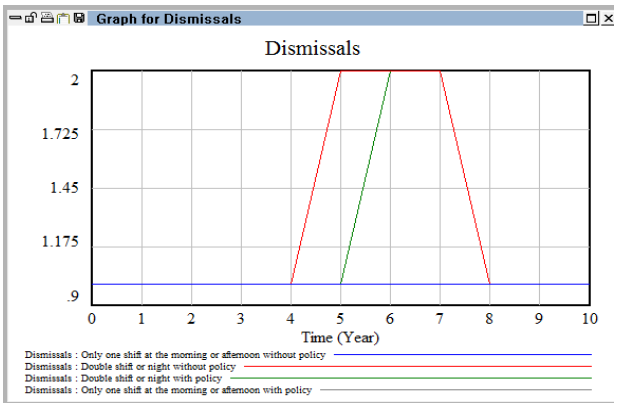


Figure 14: Behavior of Dismissals Variable

Figure 14 of dismissals shows that the number of nursing personnel dismissed when implementing or not the policy is the same number for one shift. When the work is for double shift or at night the increment of dismissals doubles and if the policy is implemented, the increment of dismissals is one year later and falls to one in year 7 in comparison with the curve without policy that is maintained in two dismissals to year 7.

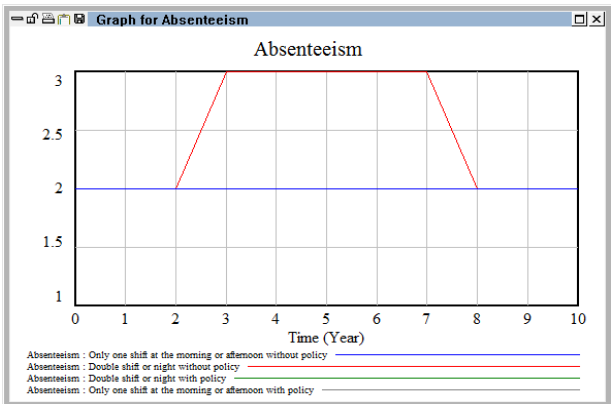


Figure 15: Behavior of Absenteeism Variable

In Figure 15 of absenteeism, it can be seen that the number of absenteeism of nursing personnel when working double shift without policy begins to increase from year 2 and that is maintained in 3 to year 7. If nurses work only one shift, absences remain constant over time.

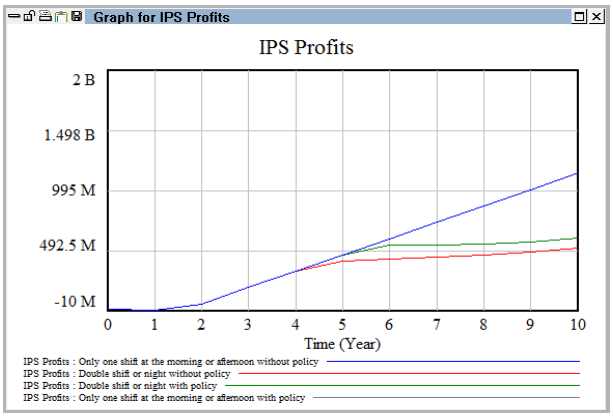


Figure 16: Behavior of IPS Profit Variable

Finally, the behavior of profits in Figure 16 shows that when working only one shift with or without the policy of good psychosocial risk practices, the profits of the IPS are increasing over the time in comparison with the work on double shift or at night, which starts to remain constant from year 5. The profit on the first year has losses due to the initial conditions of the model regarding the number of patients, number of nurses and wage of the nursing personnel.

VI. CONCLUSIONS

This article evidences how the behavior of the different variables related with the psychosocial risk of the nursing personnel is, which vary in accordance with the hours worked (only one shift of 6 hours or double shift/shift at night of 12 hours). A significant reduction can be evidenced on the following variables when doubling a shift: health, labor motivation, productivity, service level and profit. Furthermore, the increment in variables such as the following is observed: Burnout, dismissals, waivers and absenteeism. It is possible to analyze this behavior thanks to the system dynamics approach, which is useful to study a problematic situation as the situation exposed; since it allows to see the variables affecting the behavior of the system in a holistic manner by helping the management decision-making and the creation of strategic policies in an organization, in this case an IPS.

When implementing the good practices policy in the double shift scenario, an improvement can be evidenced in the following variables: health, labor motivation, Burnout, service level and productivity. In contrast, the scenario of a single shift not only evidenced an improvement as shown in the variables: nursing personnel, IPS patients, waivers, dismissals, IPS profit and absenteeism. However, it is evident that the work on double shift or at night is not the best option for the IPS.

The results of the behavior of variables over the time can evidence that working only one shift, either in the morning or in the afternoon is the best alternative that the management can take when making the assignation of shifts for the nursing personnel since it benefits the IPS in terms of profit, productivity, service level and personnel satisfaction.

Although not considered in this model, for night shifts, the IPS can explore shifts of 6 hours instead of 12 to minimize the impacts of the model.

The IPS must pay sufficient attention to the Burnout Syndrome generated on the nursing personnel, because for reducing the costs associated to the personnel and for incrementing the profits, the nursing personnel must be kept motivated and satisfied with its work. In addition, it can have an influence on the quality of service provided to the patient.

VII. FUTURE STUDIES

It is necessary to continue exploring alternatives of the good practice policy since there are some variables that do not show any improvement with the work on one shift. The above is due to the initial conditions of the model or to other factors that can be analyzed in future studies.

Also it is possible to use information of a real IPS to analyze the behavior of the variables, which will be the next step on this research.

Finally, the authors recognize as future studies the exploration of other variables that may influence psychosocial risk, such as the relationship between co-workers and between superiors and subordinates, the sense of belonging or passion towards the profession, the study of good Separate practices to identify the particular effects they may have on staff and risk management, the evaluation of other scenarios that distinguish additional alternatives to shift shifts and number of hours of work, among others. Although some of these alternatives may be considered as limitations to the model built, the development achieved in this research is an innovative and relevant advance in the field of health that opens the doors to continue exploring and generating knowledge in the branch of risk management Psychosocial and system dynamics as a tool to improve the decision making of health entities.

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