Simulation of changes on the psychosocial risk in the nursing personnel after implementing the policy of good practices on the risk treatment

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Objective. Evaluate the change over time of psychosocial risk management for the nursing personnel of an intermediate complexity clinic of Bogota (Colombia). **Methods.** Descriptive and correlational research performed under the approach of risk management (identification, analysis, assessment and treatment). The psychosocial risk of the nursing personnel was studied through 10-year system dynamics models (with and without the implementation of the policy of good practices on the risk treatment) in two scenarios: when the nursing personnel works shifts of 6 hours (morning or afternoon) and when they work over 12 hours (double shift or night shift). **Results.** When implementing a policy of good practices on the risk treatment, the double shift scenario shows an

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improvement among 25% to 88% in the variables of: *health, labor motivation, burnout, service level and productivity*; as well as in the variables of the organization associated to number of patients, nursing personnel and profit. Likewise, the single shift scenario with good practices improves in all the above-mentioned variables and generates stability on the variables of absenteeism and resignations. **Conclusion.** The best scenario is the single shift scenario with the application of good practices of risk treatment in comparison with the double shift scenario with good practices, which allows concluding that the good practices have a positive effect on the variables of nursing personnel and on those associated to the organization.

Descriptors: occupational risks; burnout, profesional; health services administration; nursing staff; risk management.

Simulación del cambio en el riesgo psicosocial en personal de enfermería después de implementación de política de buenas prácticas en el tratamiento del riesgo

Objetivo. Evaluar el cambio en el tiempo de la gestión del riesgo psicosocial para el personal de enfermería de una clínica de tercer nivel de complejidad de Bogotá (Colombia). **Métodos.** Estudio descriptivo y correlacional realizado bajo el enfoque de la gestión del riesgo (identificación, análisis, evaluación y tratamiento). Se estudia el riesgo psicosocial del personal de enfermería mediante modelos de dinámica de sistemas a 10 años (con y sin implementación de política de buenas prácticas en el tratamiento del riesgo) en dos escenarios: cuando el personal de enfermería trabaja turnos de 6 horas (mañana o tarde), y cuando se laboran 12 horas (doble turno o turno de noche). **Resultados.** Al implementar una política de buenas prácticas en el tratamiento del riesgo, el escenario de doble turno evidencia mejora entre el 25% al 88% en las variables de: *salud, motivación laboral, burnout, nivel de servicio y productividad*; así como en las variables de la organización asociadas a número de pacientes, personal de enfermería, y utilidad. Así mismo, el escenario de un solo turno con buenas prácticas genera mejora en todas las variables mencionadas y estabilidad en las variables ausentismo y renuncias. **Conclusión.** El mejor escenario es el de un solo turno, con aplicación de buenas prácticas de tratamiento del riesgo,

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con relación al escenario de doble turno con buenas prácticas, lo que permite concluir que las buenas prácticas tienen efecto positivo en las variables del personal de enfermería y en las asociadas a la organización.

Descriptores: riesgos laborales; agotamiento profesional; administración de los servicios de salud; personal de enfermería; gestión de riesgos.

Simulação do impacto de políticas de boas práticas no tratamento do risco psicossocial no pessoal de enfermagem

Objetivo. Avaliar a mudança no tempo da gestão do risco psicossocial para o pessoal de enfermagem de uma clínica de terceiro nível de complexidade de Bogotá (Colômbia). **Métodos.** Estudo descritivo e de correlação realizado sob o enfoque da gestão do risco (identificação, análise, avaliação e tratamento). Se estuda o risco psicossocial do pessoal de enfermagem mediante modelos de dinâmica de sistemas a 10 anos (com e sem implementação de política de boas práticas no tratamento do risco) e nos dois cenários: quando o pessoal de enfermagem trabalha turnos de 6 horas (manhã ou tarde), e quando se trabalham 12 horas (duplo turno ou turno de noturno). **Resultados**. Ao implementar uma política de boas práticas no tratamento do risco, o cenário de duplo turno se evidência melhoria entre 25% a 88% das variáveis de: *saúde, motivação laboral, burnout, nível de serviço e produtividade*; assim como nas variáveis da organização associadas a número de pacientes, pessoal de enfermagem, e utilidade. Assim mesmo, o cenário de um só turno com boas práticas gera melhora em todas as variáveis mencionadas e estabilidade nas variáveis ausentíssimo e renúncias. **Conclusão.** O melhor cenário é o de um só turno, com aplicação de boas práticas de tratamento do risco, com relação ao cenário de duplo turno com boas práticas, o que permite concluir que as boas práticas tem efeito positivo nas variáveis do pessoal de enfermagem e nas associadas à organização.

Descritores: riscos ocupacionais; esgotamento profissional; administração de serviços de saúde; recursos humanos de enfermagem; gestão de riscos.

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Introduction

Psychosocial risks and labor stress are some of the problems raising more difficulties in the occupational safety and health field[1] and considerably affect people's health, organizations and national economies. For the International Labor Organization,[2] psychosocial risks consist on the interactions between the work, satisfaction and organizational behavior on one part and on the other, the skills of the worker, its needs, its culture and its personal situation outside the work. These factors are one of the problems with greater impact on the labor field causing absenteeism for common disease, labor accidents and occupational diseases, which alters the productivity and quality in the provision of services;[3] in addition, it generates high costs and affectations on the life quality of the workers.

According to Peinador,[4] in the services of a health service provider (IPS), the nursing personnel faces several stressing situations during the performance of their labor functions since their work requires of great responsibility, they have a permanent contact with diseases, they face suffering and death, which causes so many tension, anxiety and depression. Likewise, they must work under pressure, comply with difficult schedules including night shifts, 12-hours shifts and working on Sundays, holidays and special dates, which interferes with their social and family life. The psychosocial risk means the interactions given between the content, organization and management of work and the environmental conditions, in conjunction with the functions and needs of the workers.[2,5,6] The psychosocial risk management is important because these interactions can exercise a harmful influence on the worker's health through its perceptions and experience.[7,8]

Organizations manage the risk through an architecture implying principles, structure and processes and comprising the identification, analysis and assessment of risk, which is denominated as risk valuation.[9,10] Throughout this process, the organizations communicate and consult with the stakeholders in the company and review the risk and the means to reduce it in order to determine which risks require of treatment for its mitigation and control.[11] The identification of risk is made in accordance with the bibliographic review and some of the factors evaluating the set of psychosocial risk factors. This set is a series of surveys created by the Ministry of Social Protection by taking into account Resolution 2646/2008, which allow identifying if there is a psychosocial risk on an institution.[12,13] The risk factors commonly identified are: Burnout Syndrome, [14-16] labor motivation,[17,18] work overload,[19,20] time off work,[17,21] satisfying work environment[16,18,20] and personal life quality.[17,21]

In view of the foregoing, the objective of this research is to assess the psychosocial risk management of nursing personnel of an intermediate level clinic located in the Savanna of Bogota through a system dynamics approach.

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Methods

This research has a quantitative nature under the descriptive and correlational approach. It is descriptive because it takes into account primary information, meaning, interviews made to the nursing direction and the nursing personnel of the clinic under study and it is correlational since it proposes to study the relation of the variables intervening in the psychosocial risk management in a health entity through a system dynamics model.

An adaptation of the risk management methodology of standard ISO 31000:2011[11] was used for carrying out this study, which was performed during the first semester of 2017, using a system dynamic to study the clinic as a system, identify the relations between the different risk factors and take control measures that contribute with the improvement of the life quality of nurses and therefore, the patients care. The system dynamics is a tool that allows the construction of simulation models of this research based on the study of the causal relations existing between the parties of the system, in this case, the actors of the clinic, in order to make decisions in complex environments such as health sector.[22] The methodology used for this research comprises two stages: *(i) Identification and analysis of risk:* it comprises the process to find, recognize and describe the risk[11] and thus understanding its nature by considering the risk causes, its positive and negative consequences and the likelihood of its occurrence. It is performed through the problem identification, the development of dynamic hypotheses explaining the problem roots and the construction of a causal diagram or causal cycles.

The causal diagram allows the visualization of the structure and causal relations of the system in order to understand its feedback mechanisms in a temporary scale.[23] It identifies balance feedback cycles to characterize the balance behaviors or search of goals. It also identifies the reinforcement feedback cycles for growth or exponential increment behaviors. This causal model is built using Vensim software; and *(ii) Risk assessment:* it aims at facilitating the decision-making based on the first stage results, it determines the risks needing for treatment and the priority for its implementation.[11] A simulation model of the system is constructed to analyze the root causes of the problem in a quantitative manner, which must be validated to demonstrate that it satisfactorily reproduces the behavior observed in the reality. This model is denominated as Forrester diagram and is a diagram f levels, flows and variables that performs a simulation of its behavior over the time.[22] This model allows evaluating the scenarios and policies of intervention of the system. It is designed by taking into account the cycles identified in the causal diagram and it is also developed by using the Vensim software. The data for the simulation is obtained through interviews performed in the clinic under study.

The gathering of information necessary for the development of the model was performed in 2017 in an intermediate complexity clinic located in the Savanna of Bogota (Colombia). The nursing personnel of this institution was comprised by: 143 assistants, 73 head nurses, 7 coordinators, 1 nursing director and 1 advisor of external unit, for a total of 225 persons.

The calculation of variables and some assumptions of the model are made based on the following: a) health was calculated on a scale from 0 to 100, where 0 is bad health condition and 100 is an optimal health condition. There is an initial value of 50 which indicates a normal health condition, b) labor motivation is also calculated from 0 to 100, where 100 indicates that health care personnel is very motivated and 0 that it is not, and c) Burnout Syndrome is measured from 0 to 20. It begins with a Burnout value of 0 and in the extent the syndrome increases, the value tends to the higher limit.[24]

The calculation of *lookups table*, which are output data in accordance with predetermined input values necessary for the simulation, is made by determining the behavior of the variables to be detailed, whether these are directly or inversely proportional. For the case of the burnout impact

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lookup 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))). Values x represent the Burnout Syndrome and values y represent the impact that the burnout would have on the labor motivation. Since these are inversely proportional variables, the higher the value of the Burnout Syndrome is, the higher the negative impact on the labor motivation since this lookup is a variable that affects the decrease flow of labor motivation. In the calculation equation, when the burnout has a value of 10, the impact on the motivation will be high, meaning of 0.9 resulting on a considerably reduction on the motivation level. The same calculation is performed for the other flows with similar characteristics and in different proportions.

The simulation is made in two scenarios: when the nursing personnel only works in a shift of 6 hours (morning or afternoon) and when it works 12 hours (double shift or night shift). The validation of the model is made by using the techniques of the system dynamics methodology in order to verify that it is consistent and coherent on its results. [22] In addition, the model, causality relations and results obtained are evaluated by the nursing leader of the clinic in order to confirm that the structure of the system at her charge corresponds to that shown in the models as diagram.

The selection of one or more options is involved in the Risk Treatment stage for amending the risks and assessing them in the light of the model built. The treatment provides controls or allows the modification of risks. The model built is used for assessing them and different alternatives or policies improving the problematic situation are designed and incorporated. [22]

In the risk treatment stage, the implementation of a policy of good psychosocial risk practices of nursing personnel (meditation and relaxing, physical exercise, work breaks, sleep and rest habits, self-control and eating habits) is proposed in the health care entity[25,26] and good psychosocial risk practices at the IPS level (burnout information and prevention campaigns, training for improving the productivity, work recognition, progress opportunity in the organization, work breaks, economic benefits)[25,26] in both scenarios established in the simulation. The above in order to evaluate changes on the behavior of the system and compare those results between scenarios.

Results

According to each of the stages described in the methodology, the results obtained in this research are as follows:

Identification and Analysis of Risk

The model of causal cycles proposed in Figure 1 shows the relations between the psychosocial risk factors such as: Burnout Syndrome, work overload, labor motivation, time off work, personal life quality and satisfaction of working environment. Consequently to these factors and specifically to Burnout, the following derives: 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 on the costs related to the personnel.

The behavior of some feedback cycles comprising the model is described below as well as the findings resulting from the analysis:

R (+) If the Burnout Syndrome of nurses in an IPS increases, there would be more absenteeism and therefore, the nursing personnel turnover index and the costs associated to the personnel increase by reducing the profits of the IPS causing that the institution does not have sufficient budget to provide economic benefits to the nursing personnel which generates again an increment of the syndrome. This cycle corresponds to a positive feedback of the model where the generation of the Burnout Syndrome is reinforced.

Figure 1. Causal Diagram. Analysis of Psychosocial Risk

The work overload of nursing personnel shall cause the occurrence of an increment both in occupational diseases and accidents, which generates more absenteeism increasing again the work overload of the nurses covering the shifts of the disabled partners. In turn, this overload leads to less time off the work, the personnel life quality is affected by the lack of familiar life and personal relationships causing the resignation to their job and thus 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,

which will cause an increment of complaints regarding the patient care. This results on the IPS is bound to dismiss the personnel which increases the nursing staff turnover index and the costs associated to new personnel training. This reduces the profit and the economic benefits and reinforces the increment of 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, generating the increment of resignations and nursing personnel turnover index that will trigger a greater increase of Burnout Syndrome. Again, this cycle shows a reinforcement behavior in the system.

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Risk Assessment

The model proposed in Figure 2 simulates the behavior of the different variables affecting the psychosocial risk of nursing personnel over 10 years. Forrester diagram is comprised by 7 levels (health, burnout, labor motivation, IPS patients, revenues per patients, costs of personnel and nursing personnel), 13 flows and 43 variables. Nursing personnel works on shifts of 6 hours in the morning or afternoon and the night shift or weekend shift of 12 hours. In some cases, due to the labor absenteeism, some persons work double shifts of 12 daily hours or when they exchange a shift with any partner for covering personal issues.

The average monthly wage of nursing personnel is COP$ 1.2 millions (USD$ 400). Every year, 452 364 patients of all the areas enter into the clinic and 6 072 patients are discharged on hospitalization areas. The annual revenues of the IPS correspond to COP$ 61 824 millions (USD$ 20.6 millions) and costs to COP$ 69.996 millions (USD$ 23.3 millions). In average, the revenue per patient in one year corresponds to COP$ 10 181 millions (USD$ 3 394).

The annual percentage of resignations from nursing personnel is 3.6%, the absenteeism percentage is 1.13% and dismissals of 2.89%. Regarding the service quality, the indicator of the annual service level of nursing personnel corresponds to 78% and annual average percentage of satisfied patents according to the satisfaction survey corresponds to 98.43%.

Risk Treatment

This section shows the results of Forrester diagram when implementing the good psychosocial risk practices. The behavior that the different variables have when applying the good practice policies or before their absence is shown in Table 1. Initially, the variables associated to the nursing personnel such as: health, burnout, labor motivation, service level and productivity can be observed.

Regarding *health*, working only one shift, whether at morning or afternoon, health increases in year 10 with the policy of good psychosocial risk practices by 60% in comparison when working only one shift that does not include the policy. When working double shift or night shift, health significantly decreases in time and especially when the policy is not included. Regarding the *burnout*, it can be evidenced that the data of double shift with policy and without policy significantly increase over time with a difference of 88.5% in year 10, with respect to the data of only one shift with policy. In *labor motivation*, we can observe a difference of 91.1% in the data of only one shift with policy with respect to the data of only one shift without policy ibn year 10, which indicates that the implementation of the policy has a significant benefit. *Service level* as well as labor motivation in only one shift with policy increases over time in comparison with the other data that decrease. The data of double shift with and without policy remain constant in a level of 74 from year 4.

A decrease is evidenced in the *productivity* over the years when working on double shift with or without policy; in contrast when working only one shift, the productivity increases and in year 10 it reaches 24; for only one shift without policy it reaches only 11.

Other result variables associated to the organization are shown in Table 2. Those variables are: *IPS patients*, nursing personnel, resignations, dismissals, absenteeism and profit. IPS Patients, when working one shift with policy, significantly increases from year 5 with respect to the other data. If working on double shift with or without policy, the number of patients maintains in 700,000 approximately from year 3. An increment is evidenced on the nursing personnel for all the data over time due to the increment of patients every year; however, there is a difference of approximately 10% when working a double shift.

Regarding the *resignations*, we can evidence that they increase over time because of the increment of nursing personnel every year. However, when working double shift with or without policy, year 10 reaches 26 resignations in comparison with 20 resignations in the same year when working only one shift with policy.
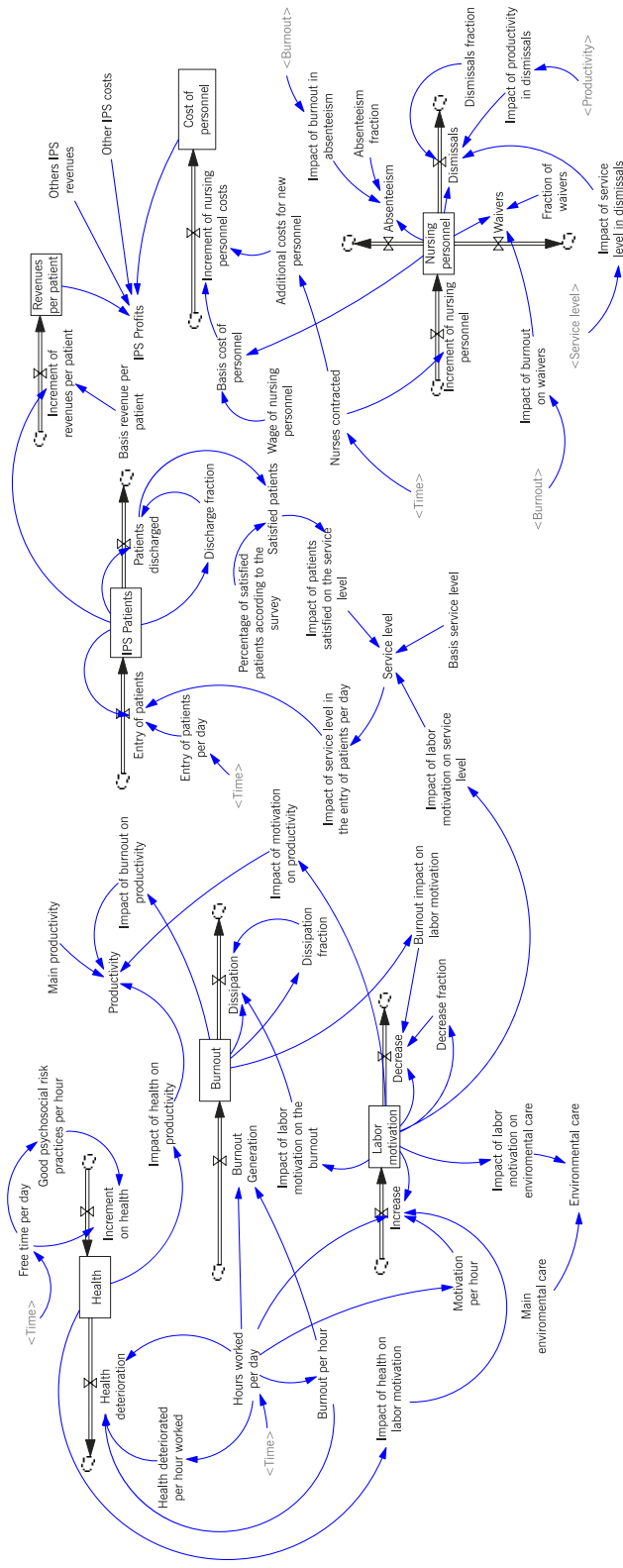
Figure 2. Forrester Diagram. Psychosocial Risk Treatment

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Table 1. Behavior of variables associated to Nursing Personnel during the simulation period

Result Variable	Year										
	0	1	2	3	4	5	6	7	8	9	10
Health											
Only one shift with policy	50.0	52.2	54.3	55.5	58.7	62.0	66.5	67.6	69.8	70.9	73.1
Double shift (or night) with policy	50.0	46.1	42.2	37.3	34.5	31.7	30.1	25.2	21.3	16.4	12.5
Double shift (or night) without policy	50.0	41.6	33.2	24.8	16.4	8.0	-0.4	-8.8	-17.2	-25.6	-34.0
Only one shift without policy	50.0	47.7	45.3	43.0	40.6	38.3	36.0	33.6	31.3	28.9	26.6
Burnout											
Only one shift with policy	0.0	1.8	2.2	2.3	2.4	2.4	2.3	2.3	2.2	2.1	2.0
Double shift (or night) with policy	0.0	6.0	7.5	9.3	11.8	13.8	15.2	16.1	16.7	17.2	17.5
Double shift (or night) without policy	0.0	6.0	7.5	9.6	12.4	14.2	15.4	16.3	16.9	17.3	17.5
Only one shift without policy	0.0	1.8	2.2	2.4	2.6	2.9	3.2	3.6	4.0	4.4	4.7
Labor motivation											
Only one shift with policy	50.0	51.5	51.3	51.2	51.5	53.2	55.8	59.6	62.1	64.8	66.8
Double shift (or night) with policy	50.0	50.7	31.9	13.3	3.0	1.8	1.4	1.2	1.1	1.0	1.0
Double shift (or night) without policy	50.0	50.7	27.3	8.4	1.5	1.1	0.9	0.9	0.9	0.9	0.9
Only one shift without policy	50.0	51.5	47.8	41.9	34.5	26.8	20.0	14.5	10.3	7.3	5.9
Service level											
Only one shift with policy	96.7	97.0	96.9	96.9	97.0	97.2	97.6	98.2	98.6	99.0	99.3
Double shift (or night) with policy	96.7	96.8	93.9	80.6	74.1	74.1	74.1	74.1	74.1	74.1	74.1
Double shift (or night) without policy	96.7	96.8	91.5	76.8	74.1	74.1	74.1	74.1	74.1	74.1	74.1
Only one shift without policy	96.7	97.0	96.4	95.5	94.3	91.1	85.8	81.5	78.2	75.9	74.8
Productivity											
Only one shift with policy	20.0	20.0	20.0	20.1	20.4	21.1	22.1	23.0	23.6	24.0	24.4
Double shift (or night) with policy	20.0	16.6	12.8	7.7	5.4	5.1	4.9	4.4	4.0	3.5	3.2
Double shift (or night) without policy	20.0	16.1	11.4	5.3	3.5	2.7	2.0	2.0	2.0	2.0	2.0
Only one shift without policy	20.0	19.6	18.6	17.7	16.6	15.5	14.4	13.4	12.4	11.9	11.4

With respect to the *dismissals*, we can evidence that when the nursing personnel only works one shift, the dismissals reach 20 in year 10 when the policy is implemented; in contrast, when working double shift with or without policy, these reach 30 in year 10. On the other part, if the policy is not implemented when working only one shift, the dismissals can exceed 30 in year 10, meaning, for the case of dismissals, that it is necessary to implement the policy when working only one shift.

Absenteeism shows an increment over time. Notwithstanding, when working double shift, 8 absenteeism cases can be reached in year 10 with or without policy, but when working only one shift with the policy, 6 absenteeism cases can be reached in year 10. *IPS profit* shows an increment over time, but when the work is only for one shift and the policy is implemented, the profit is 28% higher than when working double shift. Year 0 begins with loses due to the current condition of the clinic.

Table 2. Behavior of Variables Associated to the Organization

Result Variable	Año										
	0	1	2	3	4	5	6	7	8	9	10
IPS Patients											
Only one shift with policy	452 364	528 039	612 323	709 844	822 800	954 086	1.1E+10	1.3E+11	1.5E+11	1.8E+10	2.1E+10
Double shift (or night) with policy	452 364	528 039	611 680	677 745	692 663	695 250	697 849	700 460	70 3083	705718	708366
Double shift (or night) without policy	452 364	528 039	611 680	654 732	662 617	665 094	667 583	670 082	672 594	675118	677653
Only one shift without policy	452 364	528 039	612 323	706 479	804 725	898 223	956 345	993 979	1.0E+10	1.0E+11	1.0E+11
Nursing personnel											
Only one shift with policy	227	246	262	287	319	351	381	410	442	475	508
Double shift (or night) with policy	227	246	260	280	301	320	335	347	362	377	391
Double shift (or night) without policy	227	246	260	280	301	319	334	345	360	375	389
Only one shift without policy	227	246	262	286	318	349	375	395	417	438	457
Resignations											
Only one shift with policy	8	9	10	11	12	14	15	16	17	18	20
Double shift (or night) with policy	8	11	12	14	17	19	21	22	23	25	26
Double shift (or night) without policy	8	11	12	14	17	19	21	22	23	25	26
Only one shift without policy	8	9	10	11	12	14	15	16	17	19	20
Dismissals											
Only one shift with policy	11	12	12	14	15	16	16	17	18	19	20
Double shift (or night) with policy	11	12	14	21	22	24	25	26	28	29	30
Double shift (or night) without policy	11	12	14	21	23	24	26	26	28	29	30
Only one shift without policy	11	12	13	14	16	20	25	27	30	31	32
Absenteeism											
Only one shift with policy	2	3	3	3	4	4	4	5	5	5	6
Double shift (or night) with policy	2	3	4	4	5	6	6	7	7	7	8
Double shift (or night) without policy	2	3	4	4	5	6	6	7	7	7	8
Only one shift without policy	2	3	3	3	4	4	5	5	5	6	6
IPS Profit											
Only one shift with policy	-7.0E+14	-8.5E+14	6.3E+15	1.5E+16	2.4E+15	3.6E+16	4.9E+16	6.4E+16	8.1E+15	1.0E+17	1.3E+17
Double shift (or night) with policy	-7.0E+14	-8.5E+14	6.3E+15	1.5E+16	2.4E+16	3.3E+16	4.3E+16	5.2E+16	6.2E+16	7.1E+16	8.1E+16
Double shift (or night) without policy	-7.0E+14	-8.5E+14	6.3E+15	1.5E+16	2.4E+15	3.3E+16	4.2E+16	5.1E+16	6.0E+16	6.9E+16	7.8E+16
Only one shift without policy	-7.0E+14	-8.5E+14	6.3E+15	1.5E+16	2.4E+16	3.5E+16	4.7E+16	6.0E+16	7.4E+16	8.8E+16	1.0E+17

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Discussion

This research evaluated psychosocial risk management in the personnel of an intermediate level clinic located in the Savanna of Bogota using a systems dynamics approach in order to have information to improve the decision making of the clinic under study.

According to the results obtained, if the health institutions invest in the implementation of good practices to prevent psychosocial risk, the nursing personnel will be positively influenced by increasing good habits to make their work more satisfactory. The above, besides being beneficial for the personnel, increases over time the profits in the institutions as well as the level of care to patients and relatives. By implementing the policy of good practices in the double shift scenario there is evidence of improvement in the following variables: health, labor motivation, burnout, service level and productivity and no changes are generated in absenteeism, resignations and dismissals. Likewise, in the scenario of a single shift of 6 hours considerable improvements are presented. In relation to the double shift, it is improved between 25% and 88% in all variables except for absenteeism and resignations that remain stable. Although working double shift or night shift is not the best option from the organizational point of view, good practices reduce their negative impact on staff.

The above reinforces what has been stated by several authors[1,3,7,8] who affirm that psychosocial risks are one of the most difficult problems in the field of occupational safety and health, generating absenteeism due to common illness, accidents at work and occupational diseases, which alters productivity and quality in the provision of services; It also generates high costs and changes in the life quality of workers.

The results of the behavior of the variables over time allow us to conclude that working only one shift, either in the morning or in the afternoon, is the best alternative that the Management of the intermediate clinic of the Savanna of Bogota

can take when performing the shift assignment of the nursing personnel. This decision benefits the IPS in terms of its profits, productivity, service level and personnel satisfaction. In the future this is reflected in lower personnel turnover and, therefore, in lower hiring and training costs. Making these changes at the administrative level may not be feasible for all health entities, so the change of shifts time can be an alternative; for example, 3 shifts per day of 8 hours can be established. Another alternative is the increment in the frequency of good practices, which can guarantee adequate results for the nursing personnel and the organization.

As researchers we found that modeling the behavior of psychosocial risk management of nursing personnel in the Integrated Management System of a health entity through systems dynamics is a successful and innovative methodology, which allows viewing the factors and consequences of these risks in a holistic manner, helping to make managerial decisions and to create strategic policies in an IPS.

Other authors[23,26] use this methodology to simulate the risk management of other types of risks, but not specifically of psychosocial risk or of the nursing personnel. The studies of psychosocial risk of the nursing personnel and its different factors and consequences[3,4] are carried out through different descriptive tools, but do not use a methodology that allows to see in a holistic way how this psychosocial risk can affect the nursing personnel and IPS through simulation. This research work is relevant for the sector since, according to the bibliographic review and interviews with the nursing personnel of the intermediate clinic of the Savanna of Bogota, no study with these characteristics was carried out, which makes possible to improve the management decision making in health entities.

Finally, the authors acknowledge that it is important to carry out studies in the future that explore 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 practices separately to identify the particular effects they may have on personnel and risk management, the evaluation of other scenarios that distinguish additional alternatives to shift changes and the number of working hours, among others. Although some of these alternatives can be considered as limitations to the built model, the development achieved in this research is an innovative and relevant progress for the field of health that opens the doors to continue exploring and generating knowledge in the branch of psychosocial risk management and system dynamics as a tool to improve the decision making of health entities.

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Simulation of changes on the psychosocial risk in the nursing personnel
after implementing the policy of good practices on the risk treatment