

Table 4. Action plan for affected standards

Elements	Action	Execute (n)	Responsible (s)	Date of compliance
Rotation of staff in key tasks	Periodically employ care workers in various functions, as long as this is possible	GRH specialist	Head of DRH	Permanent
Performance and performance indicators	Define the performance and performance indicators according to their size, service process and competence level	Head of Areas	Managing Director Subdirectors	June 2017
	Conduct the evaluation of institutional performance	Head of Areas	Managing Director Subdirectors	Permanent (everymonth)

Source. Own elaboration

Discussion

In recent times the activities of control of internal control in hospitals is carried out in Cuba through the Self-Control Guide issued by the Comptroller General of the Republic, which, although it is a good control mechanism, becomes a bit subjective when marking compliance with the requirement or not by internal or external auditors^{1,2} The control in hospitals has been demonstrated in these from other edges such as the quality, effectiveness in students and human resources, leaving the gaps from the point of view of internal control. This research reduces these deficiencies by using multicriteria modeling through Fuzzy Compensatory Logic, providing a greater contribution to decision making in the hospital management.

The study carried out has an important impact on the entity. Regarding the social part, it provides top management with an instrument that gives a global view of the behavior of control activities. It makes it possible to achieve a superior management and operational status by helping the decision-making process. In addition, with application of Compensatory Fuzzy Logic, it contributes to defining critical elements of this component in the organization, while the action plan constitutes a guide to carry out the improvement of these unfavorable elements. The applied tool is based on the Cuban legislation in force for internal control (Resolution 60/2011) and does not contradict the opinions that govern the organic life of the sector.

The economic component is favored from the perspective that links it to improve control activities, which allows properly use the material and financial resources, from planning, organizing and controlling them. Finally, in relation to the environment or the work done, or the proposed improvement actions cause negative impacts on the environment, but they do help to prevent and limit risks in this regard.

Conclusions

Architecture of a mode for the evaluation of control activities through the compound compensatory diffuse logic was designed. The proposed model was applied in a hospital entity, which allowed contributing to the improvement of its evaluation, allowing to identify the incidence in the implementation of the control activities in this hospital with a category of something true and where to direct a greater control according to the most unfavorable results, emphasizing in the rotation of the care personnel and the indicators of performance and performance.

References

- Vega de la Cruz Leudis, Herrera González Yisel, González Reyes Lisandra de la Luz, Cantero Cora Hidelvis. Construcción de futuros en una institución hospitalaria cubana. AMC [Internet]. 2017 Jun [citado 2017 Oct 16]; 21(3): 348-360. Disponible en: http://scielo.sld.cu/scielo.php?script=sci_arttext&pid=S1025-02552017000300006&lng=es.
- Vega de la Cruz Leudis Orlando, González Reyes Lisandra. Diagnóstico estadístico del control interno en una institución hospitalaria. Revhabancienméd [Internet]. 2017 Abr [citado 2017 Nov 13]; 16(2): 295-309. Disponible en: http://scielo.sld.cu/scielo.php?script=sci_arttext&pid=S1729-519X2017000200015&lng=es.
- Barrios Araya Silvia, Urrutia Egaña Marcela, Rubio Acuña Miriam. Impacto de la simulación en el desarrollo de la autoeficacia y del locus de control en estudiantes de enfermería. EducMedSuper [Internet]. 2017 Mar [citado 2017 Nov 19]; 31(1): 125-136. Disponible en: http://scielo.sld.cu/scielo.php?script=sci_arttext&pid=S0864-21412017000100012&lng=es.
- de Oliveira Adriana Cristina, Oliveira de Paula Adriana, Farnetano Rocha Rodrigo. Custoscom antimicrobianos no tratamento de pacientes com infecção. av.enferm. [Internet]. 2015 Set [citado 2017 Nov 19]; 33(3): 352-361. Disponible en: http://www.scielo.org.co/scielo.php?script=sci_arttext&pid=S0121-45002015000300003&lng=pt. <http://dx.doi.org/10.15446/av.enferm.v33n3.37356>.
- Contraloría General de la República de Cuba. Resolución 60. Normas del Control Interno. Gaceta Oficial de la República. 2011; CIX(13):39-50.
- González-Acevedo, Hernando, Arizmendi-Pereira, Carlos Julio, & Giraldo-Giraldo, Beatriz. (2015). Diseño de un clasificador para pacientes en proceso de extubación. *Iteckne*, 12(2), 131-137. Recuperado em 19 de novembro de 2017, de http://www.scielo.org.co/scielo.php?script=sci_arttext&pid=S1692-17982015000200004&lng=pt&tlng=es.
- Ospino Castro Adalberto, Robles Algarín Carlos y Duran Pabón Alejandro. (2014). Diseño de un sistema médico asistencial de autorregulación de oxígeno por monitoreo no invasivo, basado en lógica difusa. *Prospectiva*, 12(2), 57-64. <https://dx.doi.org/10.15665/rp.v12i2.289>
- Antelo-González Yaima Yiri y Alfonso Robaina Daniel. (2015). Análisis de la Responsabilidad Social Empresarial basado en un modelo de Lógica Difusa Compensatoria. *Ingeniería Industrial*, 36(1), 58-69. Recuperado em 19 de novembro de 2017, de http://scielo.sld.cu/scielo.php?script=sci_arttext&pid=S1815-59362015000100007&lng=pt&tlng=es.
- Huapaya, Constanza R, Lizarralde, Francisco A, & Arona, Graciela M. (2012). Modelo basado en Lógica Difusa para el Diagnóstico Cognitivo del Estudiante. *Formación universitaria*, 5(1), 13-20. <https://dx.doi.org/10.4067/S0718-50062012000100003>
- Jensen Rodrigo, Lopes Maria Helena Baena de Moraes. Nursing and fuzzy logic: an integrative review. Rev. Latino-Am. Enfermagem [Internet]. 2011 Fev [citado 2017 Nov 19]; 19(1): 195-202. Disponible en: http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0104-11692011000100026&lng=pt. <http://dx.doi.org/10.1590/S0104-11692011000100026>.

11. Martínez C Víctor Manuel, Aristizábal T Iván Darío, Moreno C Edilson León. Evaluation of the composition effect of harvested coffee in the organoleptic properties of coffee drink. *Vitae* [Internet]. 2017 Abr [citado 2017 Nov 19] ; 24(1): 47-58. Disponiblelem: http://www.scielo.org.co/scielo.php?script=sci_arttext&pid=S0121-40042017000100047&lng=pt. <http://dx.doi.org/10.17533/udea.vitae.v24n1a06>.
12. Yunda Leonardo, Pacheco David, Millan Jorge. A Web-based Fuzzy Inference System Based Tool for Cardiovascular Disease Risk Assessment. *Nova* [Internet]. 2015 Jul [citado 2017 Nov 19] ; 13(24): 7-16. Disponiblelem: http://www.scielo.org.co/scielo.php?script=sci_arttext&pid=S1794-24702015000200002&lng=pt.
13. BrandãoEuzeli da Silva, Santos Iraci dos, Lanzillotti Regina Serrão, Moreira Júnior Augusto. Proposal for recognition of the comfort pattern in clients with pemphigus vulgaris using Fuzzy Logic. *Rev. esc. enferm. USP* [Internet]. 2013 Ago [citado 2017 Nov 19] ; 47(4): 958-964. Disponiblelem: http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0080-62342013000400958&lng=pt. <http://dx.doi.org/10.1590/S0080-62342013000400026>.
14. González Caballero Erick. Elaboración de un modelo matemático parara la toma de decisiones en el proceso de concertación de un negocio, basado en lógica difusa compensatoria. [Tesis presentada en opción al grado científico de Doctor en Ciencias Técnicas]. Matanzas, Cuba: Instituto Superior Politécnico “José Antonio Echeverría” 2013.

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