

Simulation-based decisions and management tools for home care activities

Supervisors:

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Subject:

Home care is healthcare provided in patient's home by professionals. In this context, and contrarily to classical hospitalization, it is not the patients who move to professionals and resources, but the professionals who move to patients. Currently, this specificity causes new logistical and organizational issues with many non-deterministic aspects to take into account: care process established with the evolution of patient's condition, uncertainty in the length of activities, delay between activities due to transport or coordination between professional and material...

Additionally, a professional caregiver could be either an employee or a self-employed healthcare professional (district nurse, private doctor...). The use of one or another type of caregiver becomes a strategic issue for the home care structures. This "insourcing or outsourcing" question is not limited to staff but has to be extended to all activities, such as: drugs sourcing and delivery, care material providing and maintenance, information system management. Because of a multi-criteria objective (quality of care, costs, environmental impact, working conditions, etc.), these issues are not commonplace problems.

This thesis aims to use simulation-based approaches to propose advanced tools in order to help managers, (1) choosing a best sizing, districting and distribution for in-sourcing or out-sourcing activities and professionals, (2) organizing logistic flows in multi-criteria and non-deterministic context.

Skills:

The applicants for the position should have demonstrated a strong potential for performing high quality work in: Operation Research, Logistic Management and Operation Management.

Skills on Discrete-event Simulation and Programming (C, C++ or Python) are required.

Preliminary experience in health care collaborations would be highly appreciated.

References:

1. Téllez O., Vercaene S., Léhuéde F., Péton O. & Monteiro, T. (2018), The fleet size and mix dial-a-ride problem with reconfigurable vehicle capacity, *Transportation Research Part C*, Elsevier, vol. 91, pp. 99–123. <https://doi.org/10.1016/j.trc.2018.03.020>
2. Chen, L., Monteiro, T., Wang, T. & Marcon, E. (2018), Design of shared unit-dose drug distribution network using multi-level particle swarm optimization, *Health Care Management Science*, Springer, , ISI, <https://doi.org/10.1007/s10729-018-9438-6>
4. Osorio-Montoya, G., Monteiro, T., Trilling, L. & Albert, F. (2017), Multi-criteria assignment policies to improve global effectiveness of medico-social service sector, *Engineering Applications of Artificial Intelligence*, Elsevier, vol. 61, pp. 21–34, ISI. <https://doi.org/10.1016/j.engappai.2017.02.009>
5. Monteiro, T., Meskens, N., & Wang, T. (2015). Surgical scheduling with antagonistic human resource objectives, *International Journal of Production Research*, Taylor & Francis, vol. 53, n°24, Special Issue: Operations Research in Healthcare, pp. 7434–37449. <https://doi.org/10.1080/00207543.2015.1082040>

Research Grants for Phd students from the China Scholarship Council

基于仿真和优化的家庭医疗服务决策和管理

博士导师:

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研究课题:

人口老龄化是中法两国面临的共同问题。医疗资源的紧缺给医疗服务多样化带来了新的机遇和挑战。家庭医疗服务是专业医护人员在患者家中提供的高质量医疗和护理服务。在传统的住院治疗框架下，患者移动靠近专业医护人员寻求服务，而家庭医疗服务中专业医护人员移动靠近患者提供服务。家庭医疗服务的这个特点带来了药品器材物流和服务组织管理方面的新挑战，这些挑战包含了很多非确定性问题：比如医疗服务流程需要适应患者动态变化的身体和家庭情况，医疗服务时间长度的不确定性，由交通状况和人员协调带来的服务间隔时间的不确定性等。此外提供的专业人员包含来自公立医院和社会医疗机构的医护人员，合理安排不同类型医护人员协同工作也是各医疗单位需要面对的决策问题。这种“**自营还是外包**”形式的问题不仅限于医护人员安排，也涉及药品采购和配送，医疗器械供给和维护，信息系统管理等多个领域。因此，我们面对的是一个多目标多准则优化问题，需要考虑医疗服务质量，环境保护，医护人员的工作条件等。这个博士课题的目标是借助基于仿真和优化的一系列先进方法，为医疗机构管理者提供高效的决策工具，来应对（1）医疗资源和医疗服务“**自营还是外包**”的问题，（2）**非确定性多目标多准则背景下的物流优化问题**。

技能要求:

候选人需要掌握和清楚展现运筹学，物流管理和运营管理领域的学识，掌握和应用离散事件仿真方法，拥有 C, C++ 或 Python 语言编程能力，有医疗领域相关研究工作的更好。

相关文献:

1. Téllez O., Vercaene S., Léhuède F., Péton O. & Monteiro, T. (2018), The fleet size and mix dial-a-ride problem with reconfigurable vehicle capacity, *Transportation Research Part C, Elsevier*, vol. 91, pp. 99–123. <https://doi.org/10.1016/j.trc.2018.03.020>
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5. Monteiro, T., Meskens, N., & Wang, T. (2015). Surgical scheduling with antagonistic human resource objectives, *International Journal of Production Research, Taylor & Francis*, vol. 53, n°24, Special Issue: Operations Research in Healthcare, pp. 7434–37449. <https://doi.org/10.1080/00207543.2015.1082040>