



# Plano de Trabalho de Dissertação

Ano Letivo 2024/2025

Universidade do Minho  
Escola de Engenharia

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Curso	Mestrado em Bioinformática
Título da Dissertação (em Português)	Otimização e Padronização de Processos de Gestão Medicamentosa em Ambiente Hospitalar
Título da Dissertação (em Inglês)	Optimization and Standardization of Medication Management Processes in Hospital Environments

## Enquadramento e Motivação (150 - 200 palavras)

Medication management in hospital environments is critical for patient safety, especially in cases of polypharmacy, where drug interactions can lead to serious adverse effects. The growing complexity of medical prescriptions and the increasing number of available medications place significant pressure on healthcare systems to operate efficiently and safely (1, 2). Despite advancements in technologies aimed at process automation, there are still significant gaps in integration among physicians, pharmacies, and nurses. (3, 4).

This thesis aims to address these gaps by focusing on the development of a solution based on backend integration and the automation of hospital processes. A critical aspect is the incorporation of stock management systems to ensure real-time inventory updates, prevent shortages, and support clinical decision-making (5). Additionally, the integration of surgical protocols into medication workflows will be explored to optimize perioperative drug management. These developments will consider pharmacy workflows as a central component, recognizing their vital role in dispensing, verifying, and monitoring medications. The initial implementation, improvement, and validation of this system will be carried out at the Hospital da Misericórdia in Vila Verde, ensuring its practical applicability and positive impact within the clinical environment.

## Objetivos e Resultados Esperados (150 - 200 palavras)

The main objective of this dissertation is to develop and improve a backend medication management system that integrates the processes of prescription, distribution, and administration of medications among physicians, pharmacies, and nurses. This system aims to automate medication management, providing a “single source” for prescriptions and ensuring that all staff and patients have access to real-time, verified information.

Expected main objectives include:

1. **Patient Safety:** Reducing the likelihood of medication errors by ensuring correct medication administration and incorporating surgical protocol guidelines.
2. **Workflow Optimization:** Improving the efficiency of healthcare professionals, allowing them to focus on direct patient care and streamlining pharmacy activities.
3. **Scalable Platform:** Validating the system’s applicability through tests conducted at the Hospital da Misericórdia in Vila Verde, adjusting it for a real clinical context.

O plano de trabalho deve ser preenchido *offline* e realizado o *upload* do mesmo, depois de assinado, no formulário do requerimento de pedido de admissão à dissertação, disponível em <http://dissertacao.eng.uminho.pt>

4. **Impact and Usability Assessment:** Validating the system's applicability through tests conducted at the Hospital da Misericórdia in Vila Verde, adjusting it for a real clinical context.
5. **Efficient Stock Management:** Ensuring real-time inventory updates to prevent shortages and reduce costs.

Additionally, the solution is expected to contribute to reducing hospital operational costs and improving the overall quality of services provided.

#### Calendarização

##### Months 1- 4: Literature Review

- Analyze state-of-the-art solutions related to medication management, focusing on Clinical Decision Support Systems (CDSS), Natural Language Processing (NLP), and backend technologies for hospital automation.
- Identify key gaps in current systems and define objectives for the proposed solution.
- Conduct interviews and process mapping at the Hospital da Misericórdia in Vila Verde to understand workflows, including pharmacy and stock management activities.

##### Months 3-4: Requirement Analysis and System Design

- Gathering of data and process mapping at the Hospital da Misericórdia in Vila Verde to understand current workflows.
- Define functional requirements for the backend system, ensuring compatibility with existing hospital systems.
- Define functional requirements for the backend system, ensuring compatibility with existing hospital systems.
- Evaluate and select appropriate tools and technologies based on initial testing.

##### Months 5-8: Backend Development

- Develop and optimization of modules for prescription management and pharmaceutical inventory integration.
- Implement security measures to ensure compliance with data protection regulations, such as GDPR.
- Develop and optimize current modules for prescription - automatic error detection and interaction prevention.

##### Months 7-9: System Testing and Optimization

- Conduct unit and integration tests using simulated data to evaluate system performance and reliability.
- Optimize system functionalities based on preliminary test results.

##### Months 9-10: Pilot Implementation

- Deploy of the system modules at the Hospital da Misericórdia in Vila Verde.
- Collect feedback from end-users, including physicians, pharmacists, and nurses, to identify areas for improvement.
- Refine the system based on real-world use cases.

##### Months 11-12: Final Adjustments, Dissertation Writing and Submission.

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- Perform final system adjustments and ensure its stability.
- Write and revise the dissertation, integrating results from the pilot implementation.
- Submit the dissertation and prepare for the defense.

#### **Referências Bibliográficas** (5 - 10 referências)

1. Bowles, J. K., Mendoza-Santana, J., Vermeulen, A. F., Webber, T., & Blackledge, E. (2020). Integrating healthcare data for enhanced citizen-centred care and analytics. In Integrated Citizen Centered Digital Health and Social Care (pp. 17-21). IOS Press.
2. Kallio, S., Eskola, T., Pohjanoksa-Mäntylä, M., Airaksinen, M. (2020). Medication risk management in routine dispensing in community pharmacies. *International Journal of Environmental Research and Public Health*, 17(21), 8186. doi:10.3390/ijerph17218186.
3. Belle, A., Kon, M. A., & Najarian, K. (2013). Biomedical Informatics for Computer-Aided Decision Support Systems: A Survey. *The Scientific World Journal*, 2013(1), 769639.
4. Hawley, C. E., Triantafylidis, L. K., Phillips, S. C., & Schwartz, A. W. (2019). Brown bag simulation to improve medication management in older adults. *MedEdPORTAL*, 15, 10857.
5. Nkenyereye, L., & Jang, J. W. (2016). Performance evaluation of server-side javascript for healthcare hub server in remote healthcare monitoring system. *Procedia Computer Science*, 98, 382-387.

#### **Justificação de Coorientação** (se aplicável)

The co-supervision of this dissertation is justified by the need to integrate complementary expertise in the field of informatics applied to hospital environments.

Ana Regina Sousa, with extensive practical experience in hospital information systems and direct access to relevant contacts in the sector, plays a crucial role in the practical implementation of the project at hospitals. His expertise will be essential in aligning the proposed solutions with real-world challenges faced in clinical contexts, critical for the successful development and validation of this dissertation."

## Assinaturas

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