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Dynamic Analysis and Reorganisation Measures in Hospitals Using the Clinical Pathway Approach

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Contents

1. Process Orientation in Hospitals

Situation at Hospitals in Germany WTC - 1856144

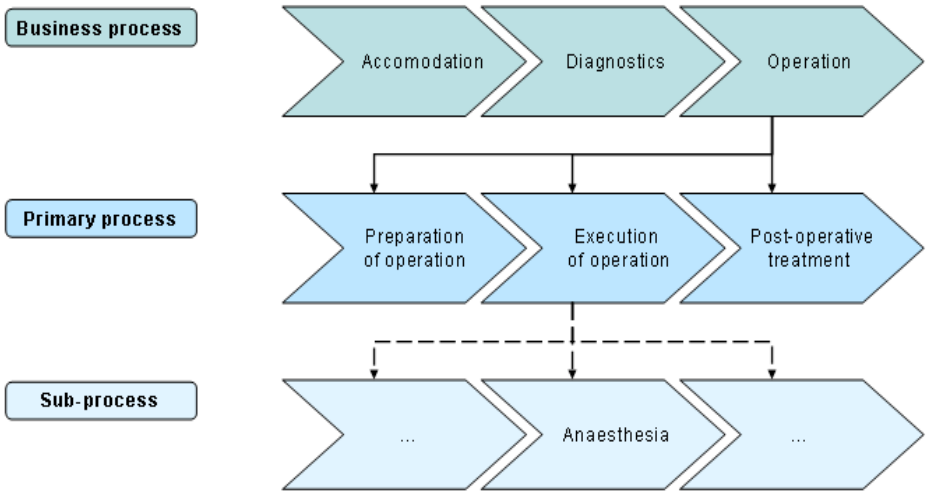
- Judgement of the European Court of Justice concerning the stand-by duty
  - → stand-by duty of a doctor represents in its entirety working time
  - → German Working Time Law (ArbZG) no longer corresponds with the EU judgement
  - → workforce deficit of at least 20,300 doctors and 12,900 other positions (all full-time)
- Fixed-price system declined by the German Diagnosis Related Groups (G-DRG)
  - → increasing cost pressure and transparency
  - → decrease of the retention times of the patients
  - → aggregation of work
  - → problems with communication and cooperation within hospitals

Quality management based on legal regulation
- → increasing quality pressure
- → internal and external quality assurance
- → implementation of quality management systems, e.g. for risc management, environmental protection and occupational health and safety

→ Urgent need for process reorganisation and new working time models

transl. from Greiling, Hofstetter 2002

Process Structure in Hospitals DAR - 1857349



2. The Clinical Pathway Approach

transl. from Küttner 2004

Historical Development of the Clinical Pathway Approach DAR - 1857351

- Origin in the methods of project management
  (so-called "critical path method - CPM")
- First discussion of a concept for the health care related to CPM/PERT
  in the early 70ies in the USA
  ➔ Introduction of the concept failed due to the inexistend cost pressure
- Introduction of a compensation system based on flate-rate values
  (so called "Diagnosis Related Groups – DRG) in the early 80ies in the USA
  ➔ Arising cost pressure results in the introduction of the concept
- First drafts of clinical pathways only deal with the activities of the nurses
  ➔ Afterwards development of multi disciplinary clinical pathways
- Development and introduction of clinical pathways normally following the Deming cycle
  (also called the PDCA cycle)
- Introduction of the "German Diagnosis Related Groups – G-DRG) in 2004 in Germany
  ➔ Development of clinical pathways

Concepts of the Clinical Pathway Approach DAR - 1857350

"A clinical path defines an optimal sequencing and timing of interventions by physicians, nurses, and other staff for a particular diagnosis or procedure, designed to better utilize resources, maximize quality of care, and minimize delays." (Source: Coffey et al. 1992; transl. from Küttner 2004)

"A clinical pathway is defined as a 'clear outline of the usual pattern of care for a group of patients with a given diagnosis or procedure performed'. For each patient in the group, the staff can quickly see the expected time frame for delivery of care." (Source: Zander 1992; transl. from Küttner 2004)

"... Pathways are defined as multi-disciplinary plans that describe the course of events in the treatment of patients with similar problems. These events must be specified on a timeline, and all incidents, actions and interventions must be identified, together with an identification of the resources required to achieve the expected outcome." (Source: Reinhard 1995; transl. from Küttner 2004)

"An integrated clinical pathway is an instrument of control. The clinical pathway describes the optimal treatment of a specific patient type including its critical diagnostic and therapeutic activities as well as the chronology of those. Therefore, interdisciplinary and interprofessional aspects as well as elements for the execution, control and economical evaluation are taken into account." (acc. to Eckardt 2003)

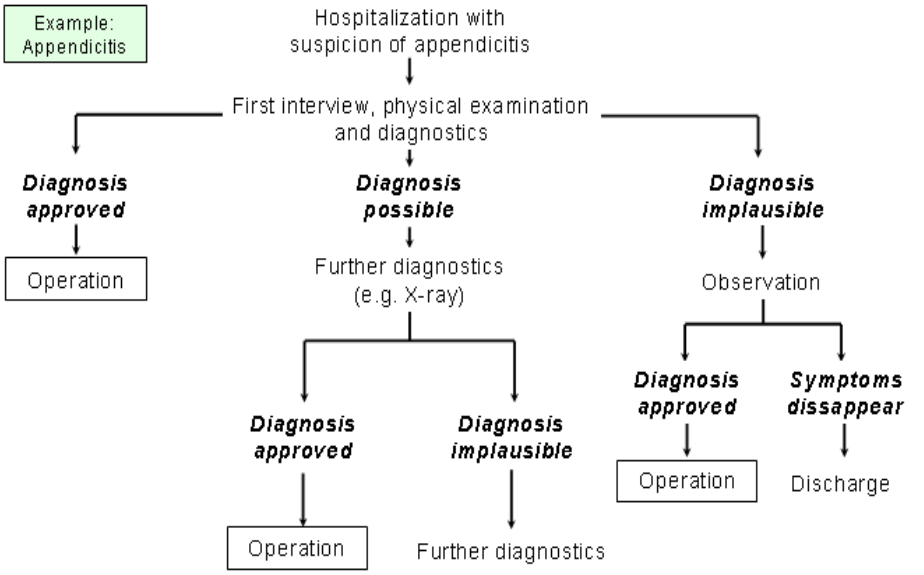
➡ Not a well-defined procedure

➡ Application always specific to the hospital

3. Clinical Pathways in Practice

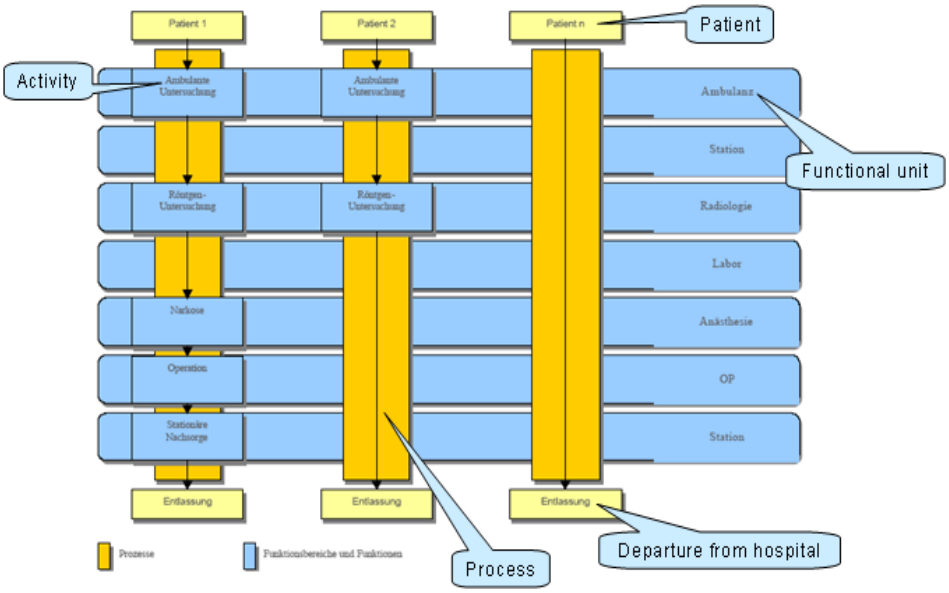
Simplified Clinical Pathway

acc. Conen 2003
DAR - 1857354



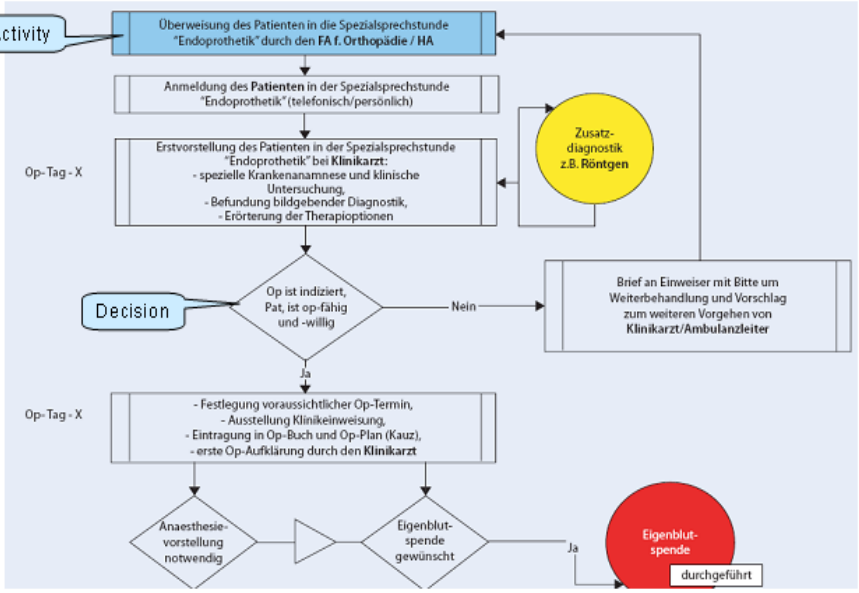
Functional View of a Clinical Pathway

Source: Picot, Schwartz 1995
DAR - 1857355



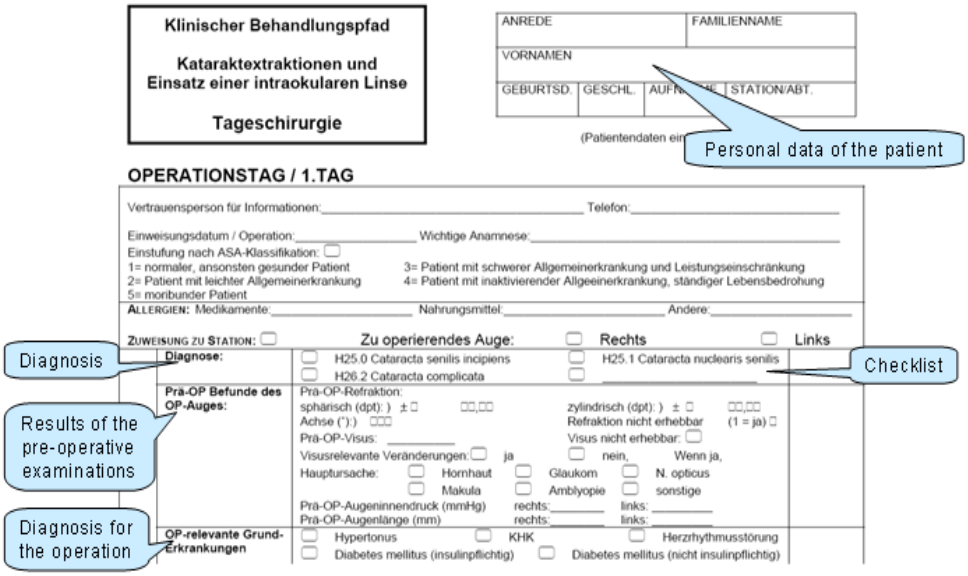
Clinical Pathway of the Orthopaedy: Admission to the Hospital (Excerpt)

Source: Kirschner et al. 2007
DAR - 1857368



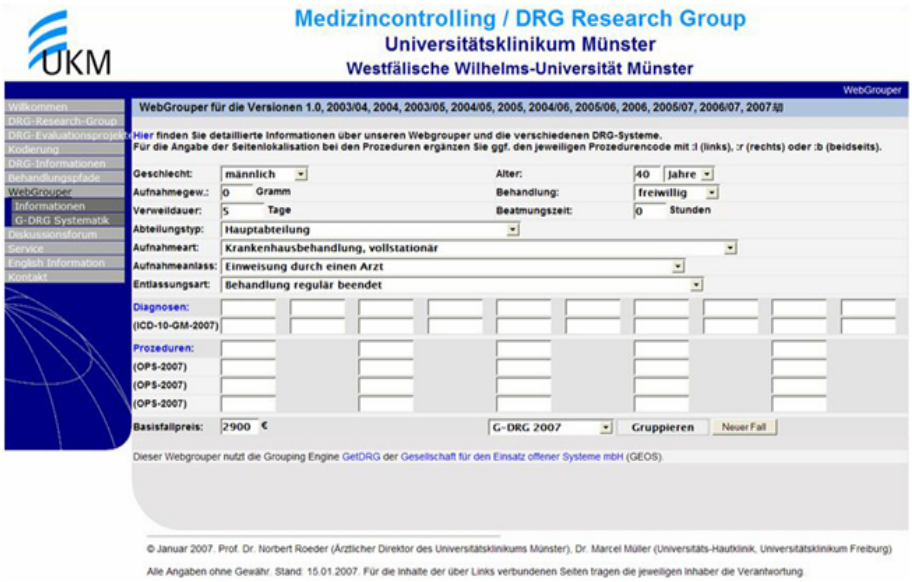
Clinical Pathway of the Ophthalmology (Excerpt)

Source: Roeder, Müller 2007
DAR - 1857356



German Diagnosis Related Groups:
Internet Portal

DAR – 0037366



4. Configuration of Working Times Using Clinical Pathways

4.1 Development of Clinical Pathways

General Surgery:
Development of Clinical Pathways Using Questionnaires

DAR - 1857359

Data collection

Number of duly completed questionnaires:		1022	(additionally 6 invalid)		
thereof	In-patient emergency:	96			
	In-patient scheduled:	63			
	Ambulant operation:	32			
	Ambulant treatment:	831	thereof 1	Consultation:	728
			2	Consultations:	65
			3	Consultations:	25
			4	Consultations:	5
			> 4	Consultations:	8

Data analysis

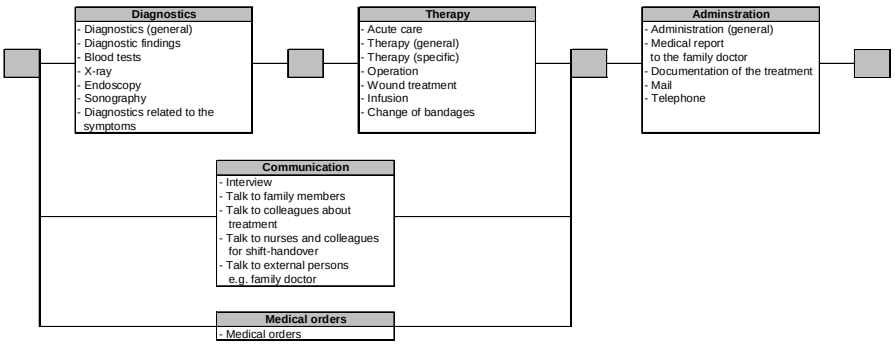
- Clearly assignment of patients with an ambulant treatment and one consultation to 14 patient types
- Groups of patients with an ambulant treatment and two or more consultations are highly heterogeneous
- Groups of patients with stationary treatment are highly heterogeneously

→ Derivation of patient types for the group of ambulant patients with one consultation
Stochastic modelling of the other patients (for simulation purposes)

General Surgery:
Treatment of the In-patients and the 2+ Outpatients

DAR - 1857361

Basic activity scheme for single consultation



Mean times etc. are different for each patient type

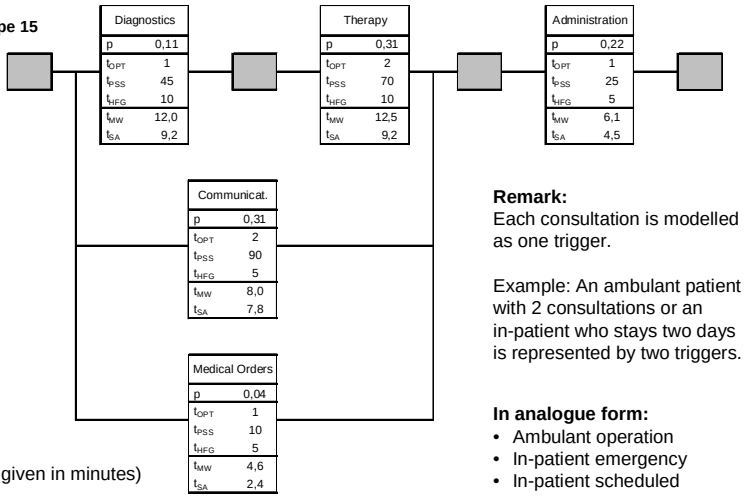
i.e. in-patient emergency, in-patient regular,
ambulant operation, and ambulant patients with 2+ consultations

General Surgery:
Ambulant Patient Type with Two or More Consultations

DAR - 1857362

Aggregated activity network

Patient type 15



(Times are given in minutes)

Remark:
Each consultation is modelled as one trigger.

Example: An ambulant patient with 2 consultations or an in-patient who stays two days is represented by two triggers.

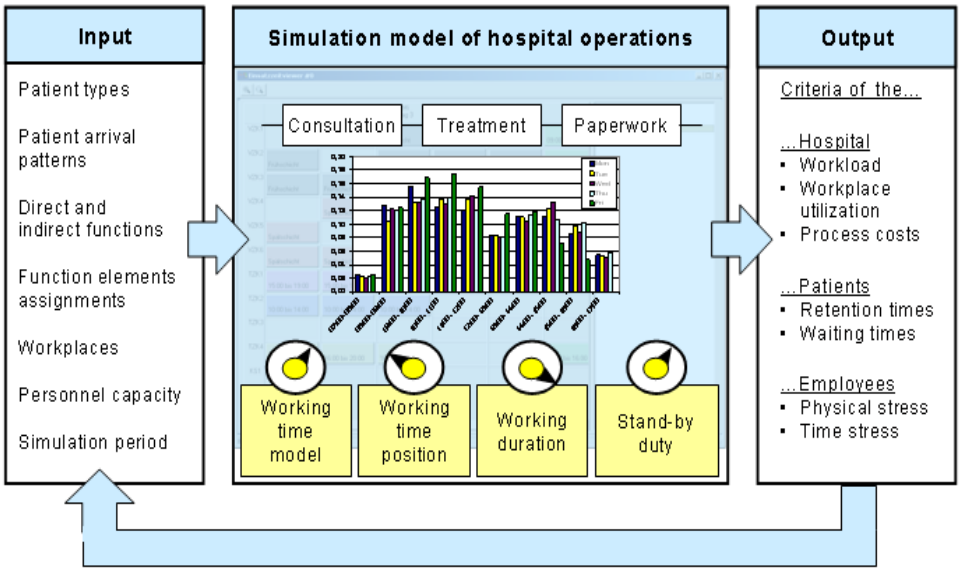
In analogue form:
- Ambulant operation
- In-patient emergency
- In-patient scheduled

4.2 Simulation Study on Working Times

General Surgery:
Overview over the Simulation Study DAR - 1857363

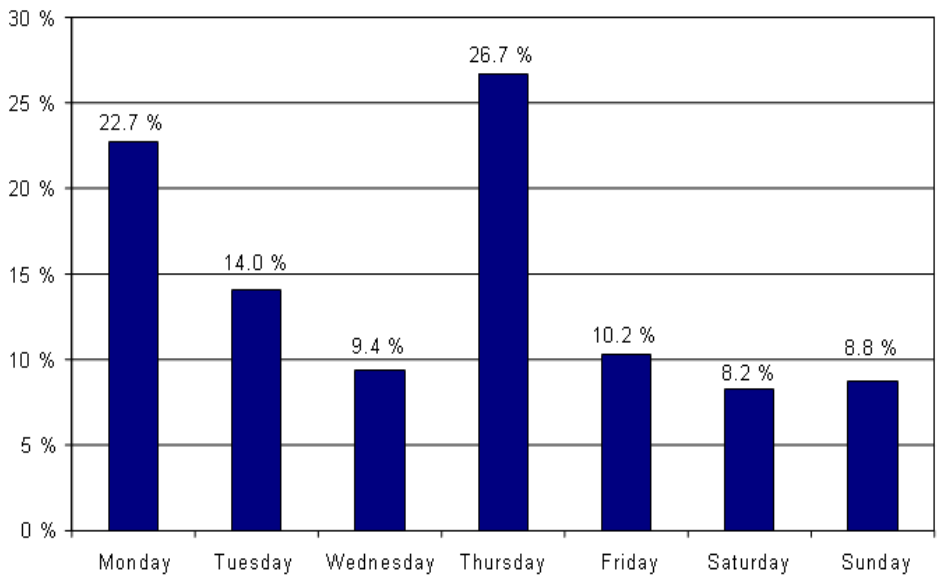
Activity networks	18 Activity networks for direct activties (i.e. patient types) 3 Activity networks for indirect activites
Trigger	1,865 triggers (thereof 117 initiated more than once)
Analysed period	1 month
Personnel	2 Head physicians 2 Senior physicians 6 Assistant physicians 1 Physician for ambulance
Qualification	Generalists
Working times	Initial situation: 3-shift model with stand-by duty Alternative: Highly flexible working times
Simulation duration	59 seconds

following Zülch 1989
Simulation of Working Time Models for a Hospital WTC - 1856042



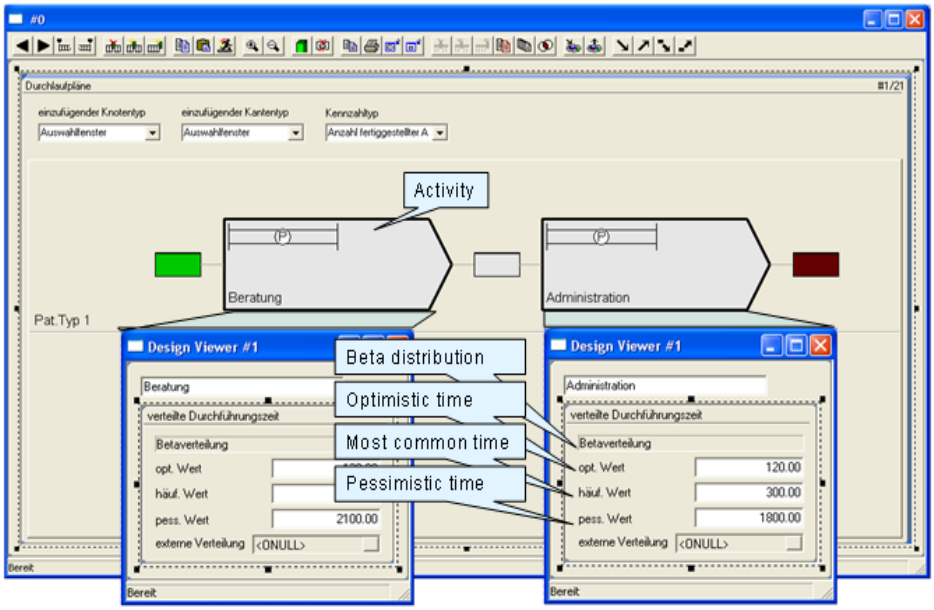
General Surgery:
Distribution of Patient Arrivals during a Week

DAR – 1857369



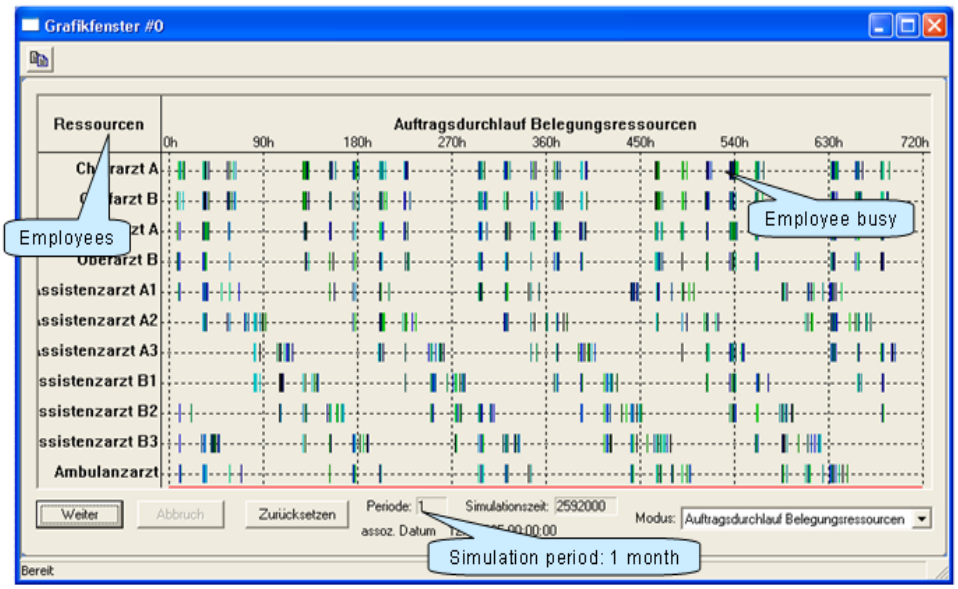
General Surgery:
Activity Network for Patient Type 1

DAR - 1857364



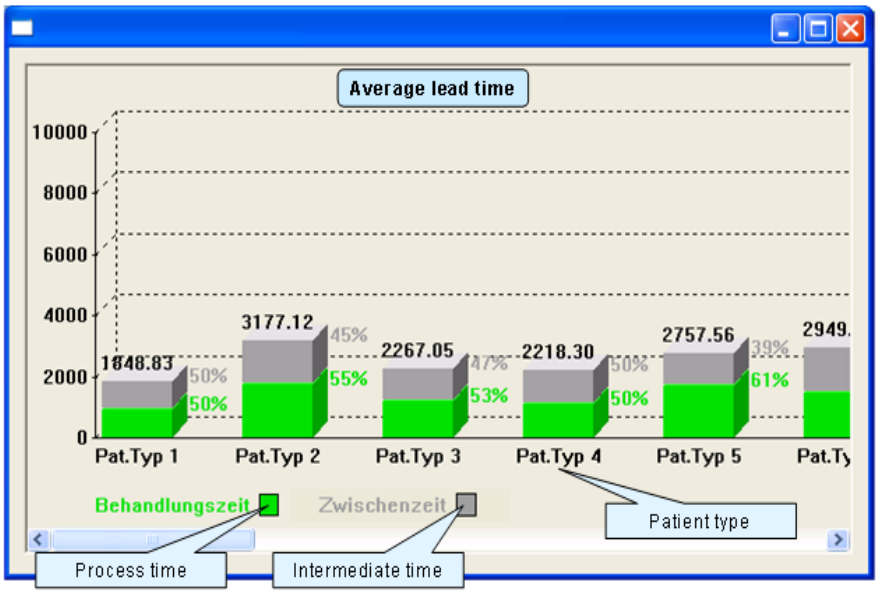
General Surgery:
Winding-up of Physicians' Tasks in the Initial Shift Model

DAR – 1857370



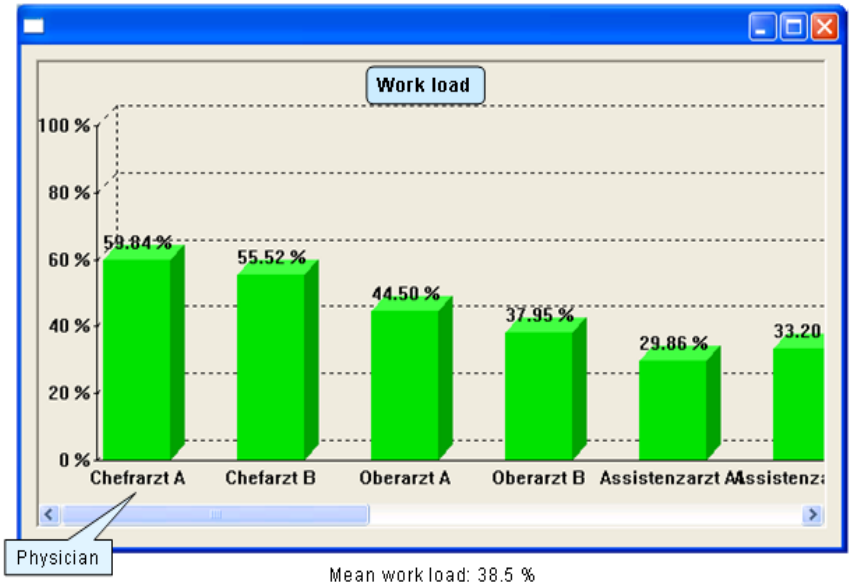
General Surgery:
Average Lead Times of the Initial Shift Model

DAR - 1857365



General Surgery:
Goal Achievement of Employees' Work Load in the Initial Shift Model

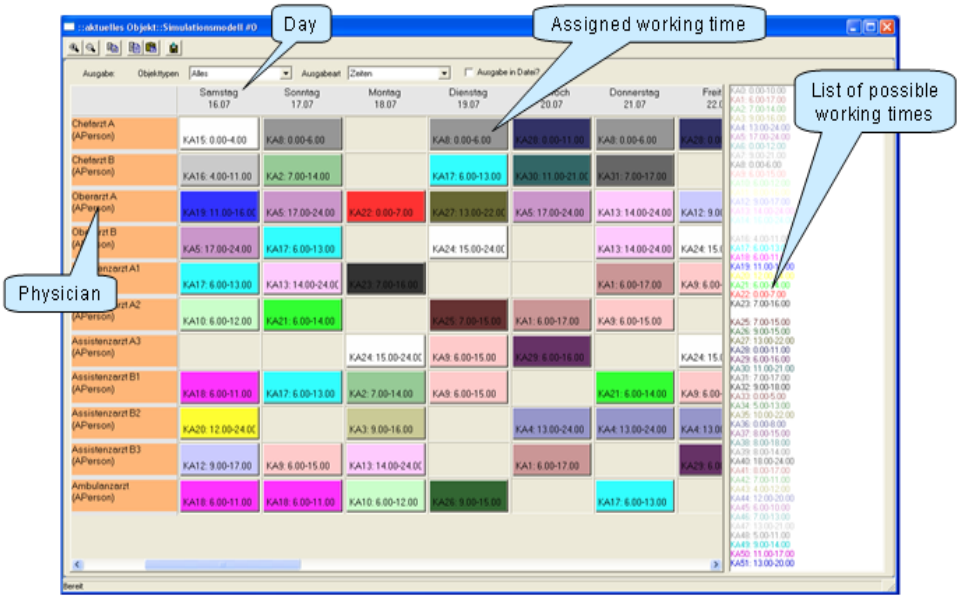
DAR - 1857366



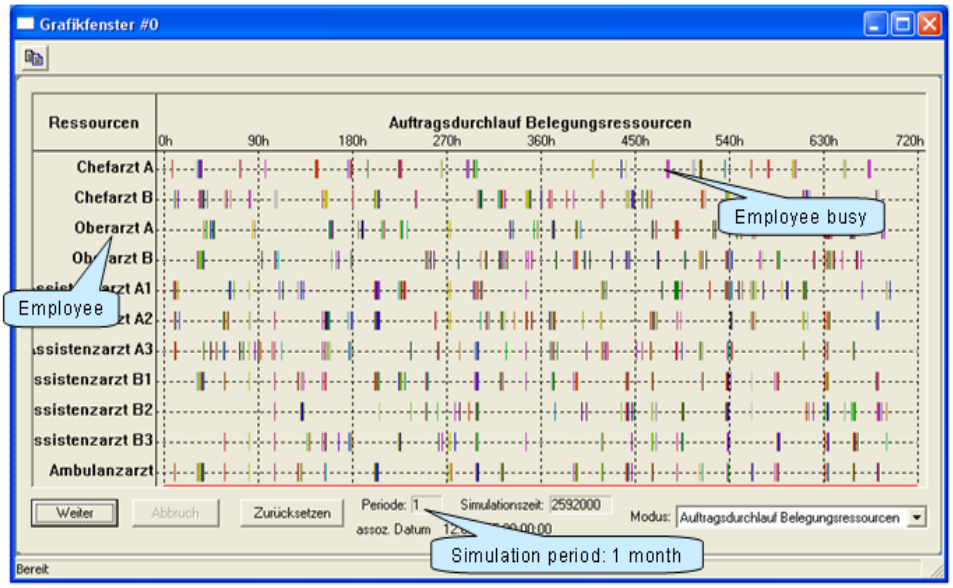
Mean work load: 38.5 %

General Surgery:
Flexible Working Times of the Physicians

DAR – 1857371



General Surgery:
Winding-up of Physicians' Tasks in the Flexible Working Time Model DAR – 1857372



General Surgery:
Simulation Results of Shift Model and Flexible Working Times DAR - 1857367

Key figure	Shift model	Flexible working times	Tendency
Average process costs	4,808 MU	6,520 MU	↘
Average lead time	4,117 TU	3,808 TU	↗
DGA work load	38.5 %	32.6 %	↘
DGA lead time	50.5 %	53.6 %	↗
DGA costs	38.6 %	30.3 %	↘
DGA physical stress	82.6 %	82.6 %	→
DGA time stress	85.5 %	89.2 %	↗

DGA Degree of goal achievement

5. Summary and Further Research

Summing-up the Clinical Pathway Approaches

acc. Küttner 2004
DAR - 1857358

- Method for optimisation of processes and for risc management
- No replacement for medical sagacity, but tool for the control of the medical treatment
- No one single measure, but continual process of learning and changing
- Improvement of retention time, treatment costs and treatment quality possible (but not coercive)
- Improvement of the communication and cooperation presumable
- Reduction of the effort for documentation (after the implementation!)
- Additional expenses during the development and the implementation of the clinical pathways
- Typically 70-80 % of the cases can be modelled with clinical pathways

Further Research Centred around the Clinical Pathway Approach

DAR – 1857373

- Further data acquisition in hospitals in order to derive from it time an capacity data for clinical pathways
- Derivation of a simulation-based approach for process optimization using the clinical pathway approach
- Derivation of configuration recommendations for working time models in hospitals
- Agent-based approach for the disposition of the actual working times of the employees
- Human performance management with respect to the aging workforce
- Inclusion of the social environment of employees into the simulation-based investigation
- Further simulation studies in other application areas using the clinical pathway approach (e.g. rescue service, ambulant emergency service of regular doctors)

AIM Conference, Bari, October 4-7, 2007:
Acknowledgement and Contact Address

DAR – 0037360

Actual project

Process Optimization and Efficient Personnel Employment in Hospitals

Prozessoptimierung und effizienter Personaleinsatz im Krankenhausbereich

Promoter

German Research Association

(Deutsche Forschungsgemeinschaft)

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