

The influence of an environment at the Central operating theatres in the University Hospital Brno on a body temperature of the surgical patient.

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EORNA CONGRESS
ROMA 2015



Why are we concerned with patients' body temperature at the operating theatre?

University Hospital Brno 2014

Beds	Operating rooms	Surgeries	Nurses	Doctors
1 913	26	30 101	2 036	837

Thermoregulation

Factors determining body temperature

- Hormones, nervous regulation
- Metabolic activity, muscle activity, nutritional disorders
- Level of immunity
- Age and sex
- Circadian rhythms
- Emotions, stress
- Environment (temperature, humidity)
- Illness
- Drugs, alcohol etc.

Effector mechanisms of thermoregulation

Factors determining heat loss from human body

- heat radiation
- evaporation of sweat and water
- heat convection
- heat conduction

Thermoregulatory response to cold environment

MUSCLE SHIVERING

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graph TD; A[MUSCLE SHIVERING] --> B[ACCELERATION OF METABOLISM]; B --> C[INCREASED OXYGEN CONSUMPTION]; C --> D[INCREASED BLOOD PRESSURE];
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ACCELERATION OF METABOLISM

INCREASED OXYGEN CONSUMPTION

INCREASED BLOOD PRESSURE

Risks of hypothermia to surgical patients

- metabolic

 - increase of glycaemia, lipolysis, lactate

- endocrine

- cardiovascular

- renal

- hematologic

 - thrombocytopenia, coagulopathy, bleeding

- gastrointestinal

- overall patient weakening, healing disorders, etc.

Classification of body temperature

Low - HYPOTHERMIA	below 36 °C
Normal - NORMOTHERMIA	36 – 36,9 °C
Elevated - SUBFEBRILE	37 – 38 °C
Mild fever - HYPERTHERMIA	above 38 °C
Fever - FEBRIS	above 39 (40, 41) °C
Extreme fever - HYPERPYREXIA	42 °C

Ref.: Miksova, Z.; Fronkova, M.; Hernova, R.; Zajickova, M. *Chapters from nursing care I. Prague: Grada, 2006, 248 s.*

AIM OF OUR EXPLORATORY INVESTIGATION

OBJECTIVE ASSESSMENT OF PATIENTS' FEELINGS

VERIFICATION OF EFFETIVNESS OF AIDS AND DEVICES

Hypotheses

□ H₁

Without any warming aids patients will present hypothermia.

□ H₂

Hypothermia will not occur with use of available heating aids.

Method

- Quantitative exploratory investigation
- Determination of types of surgeries for objective assessment
- Determination of measurement method
- Unified measuring instrument - thermometer
- Investigation period February 2014 - January 2015

Types of surgical procedures

- Total knee or hip arthroplasty
- Spinal disk surgery
- Digestive surgery (> 1 hour)

Quantitative method of measurement

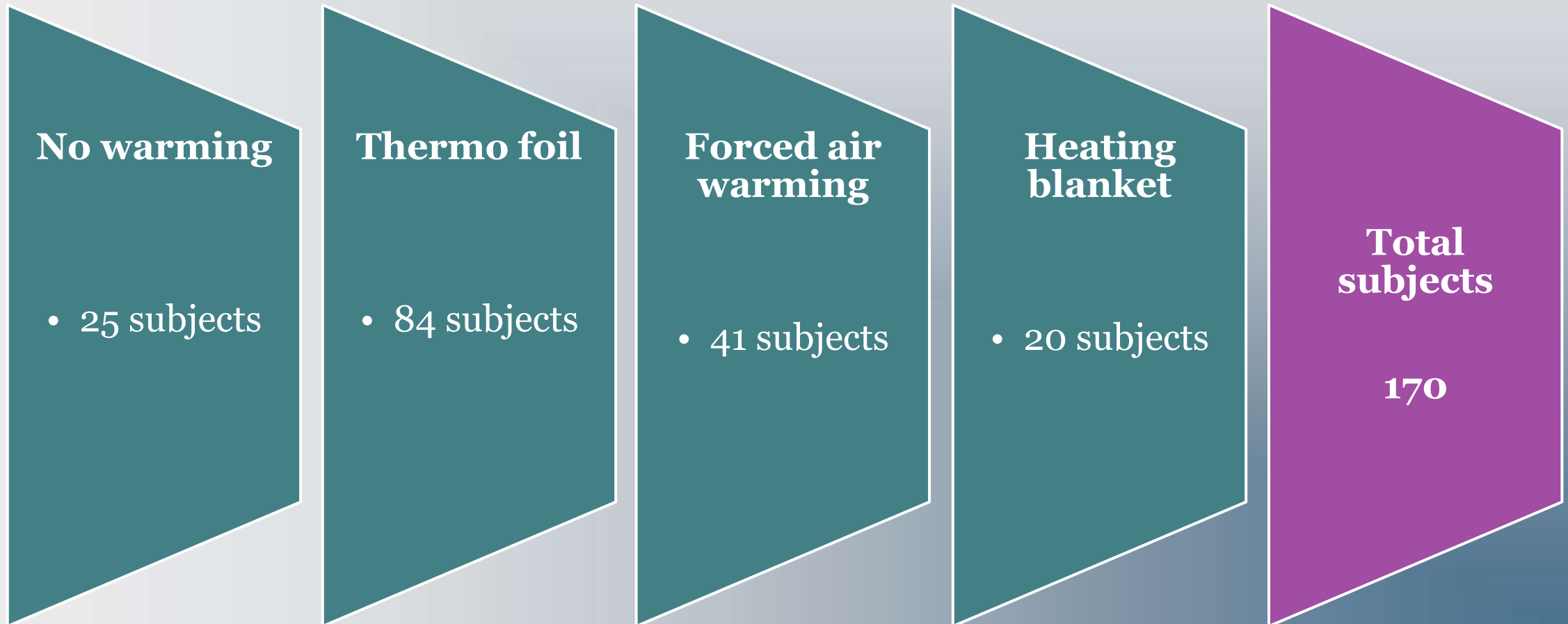
Measurement method

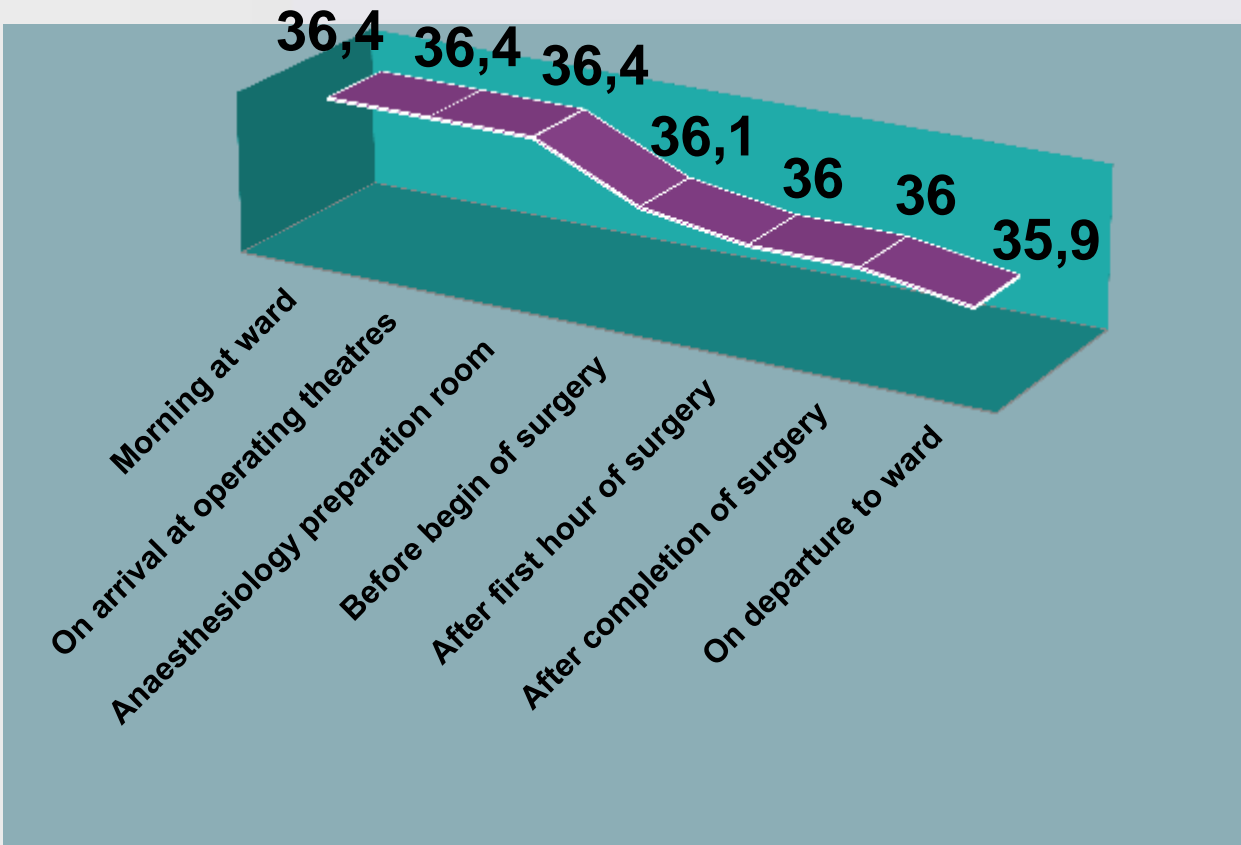
- Superficial measurement
- No-touch thermometer
- Forehead area

Time points

- Morning at ward
- On arrival at operating theatres
- Before begin of surgery
- After first hour of surgery
- After completion of surgery
- On departure to ward

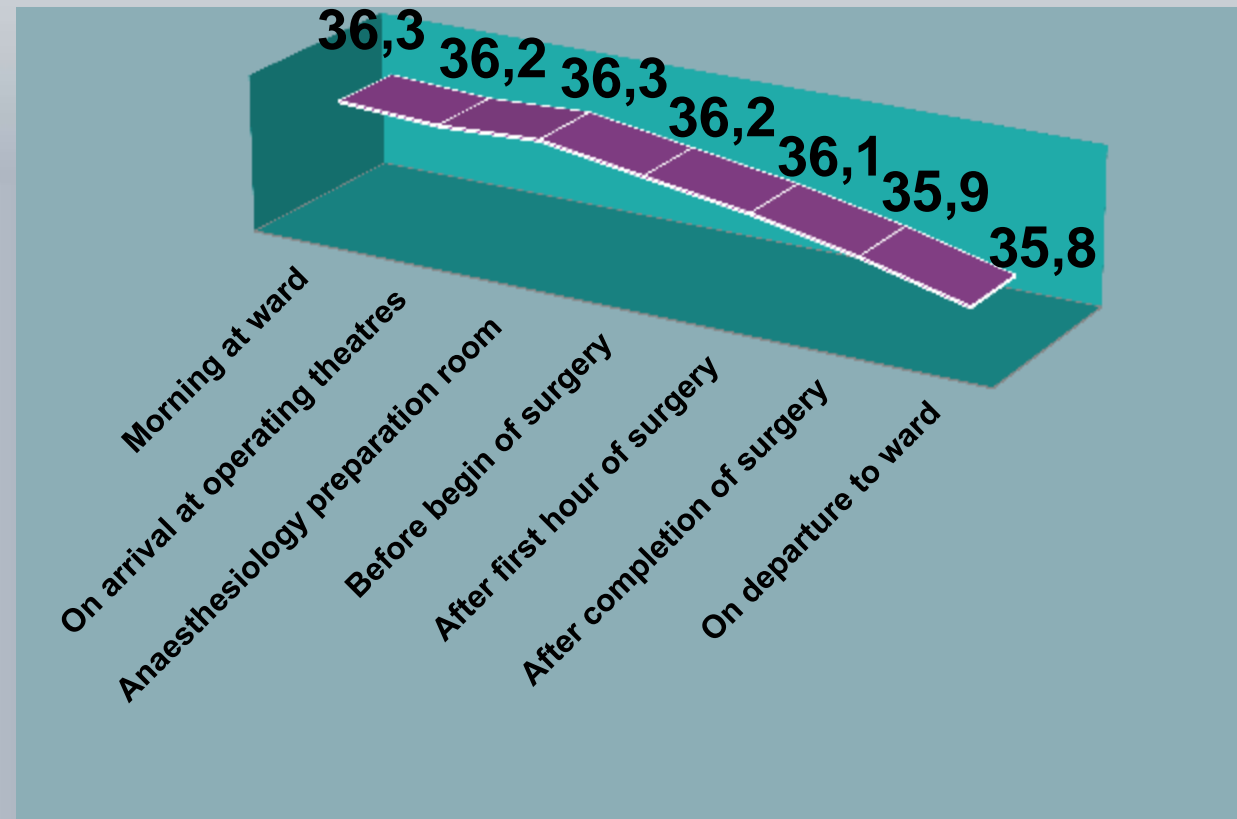
Measurement of body temperature

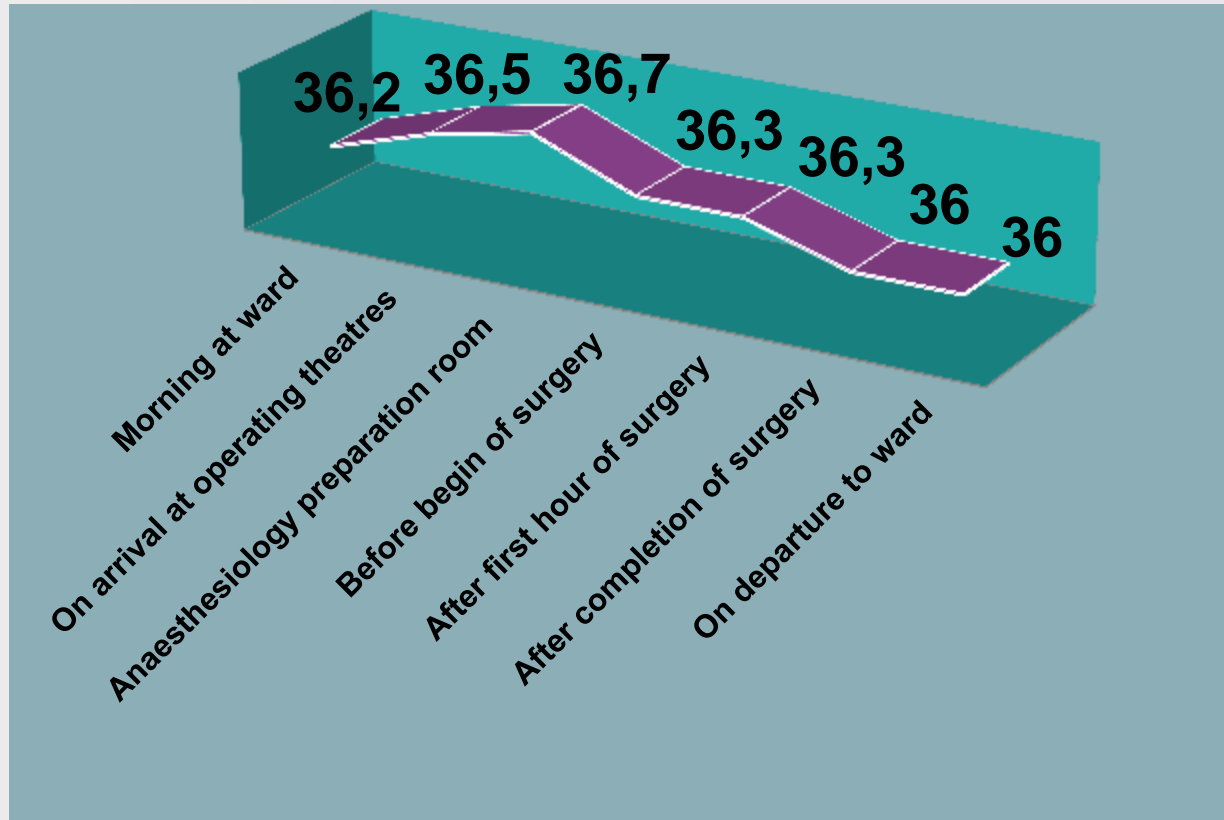




NO WARMING
Subjects: 25

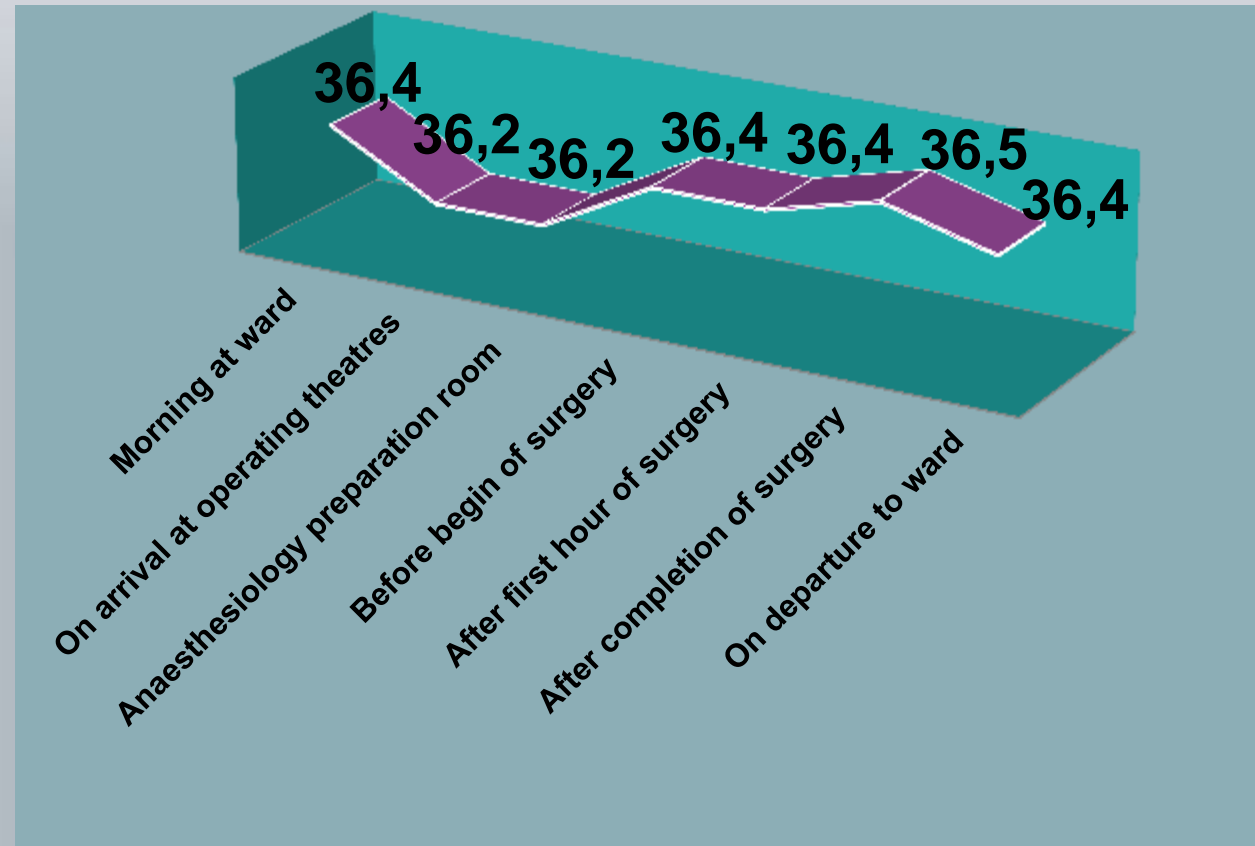
THERMO FOIL
Subjects: 84





FORCED AIR WARMING
Subjects: 41

HEATING BLANKET
Subjects: 20



Outcomes

H1 Without any warming aids patients will present hypothermia.

- The hypothesis was confirmed. In all subjects dropped values of body temperature were already measure before beginning of the surgery with the average drop of 0.3 °C. At discharge from the operating room the patients' body temperature was in average 0.5 °C below the values measured on admission. Interestingly during the surgical procedure the measured values of body temperature were stable.

H2 Hypothermia will not occur with use of available heating aids.

- The hypothesis was not confirmed for all aids used. The use of aids warming the patients' body surface showed to be most effective. In average the body temperature was increased by 0.2 during the entire course of the surgery. The temperature remained increased when the patient was discharge from the operating room. The use of other aids was associated with a drop of body temperature similar to the patients with no aids.

Recommendations for provision of patients' thermal comfort at Central Operating Theatres, University Hospital Brno

Standard Operating Procedure for provision of thermal comfort

- measures applicable to every patient (heated blankets)
- surgeries with obligatory monitoring of body temperature (procedures > 1 hour)
- measurement method of body temperature
- aids and devices to be used in patients at risk

Final assessment and outcomes

- Presentation of results to hospital management
- Recommendations for implementation
- Supplementation of technical and operational facilities

Thermal comfort at Central Operating Theatres I, University Hospital Brno

Standard Operating Procedure - done

**Monitoring of body temperature during defined
surgical procedures - done**

Heating wardrobes for bed sheets – in progress

Provision of appropriate heating aids – partly done

THE EXPLORATORY INVESTIGATION WAS SUCCESSFUL AND BROUGHT ALONG SOLUTIONS CONTRIBUTING TO PROVISION OF HIGH QUALITY AND SAFE PERIOPERATIVE CARE AT THE CENTRAL OPERATING THEATRES IN THE UNIVERSITY HOSPITAL BRNO.



References

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In case of additional questions, please do not hesitate to contact me.