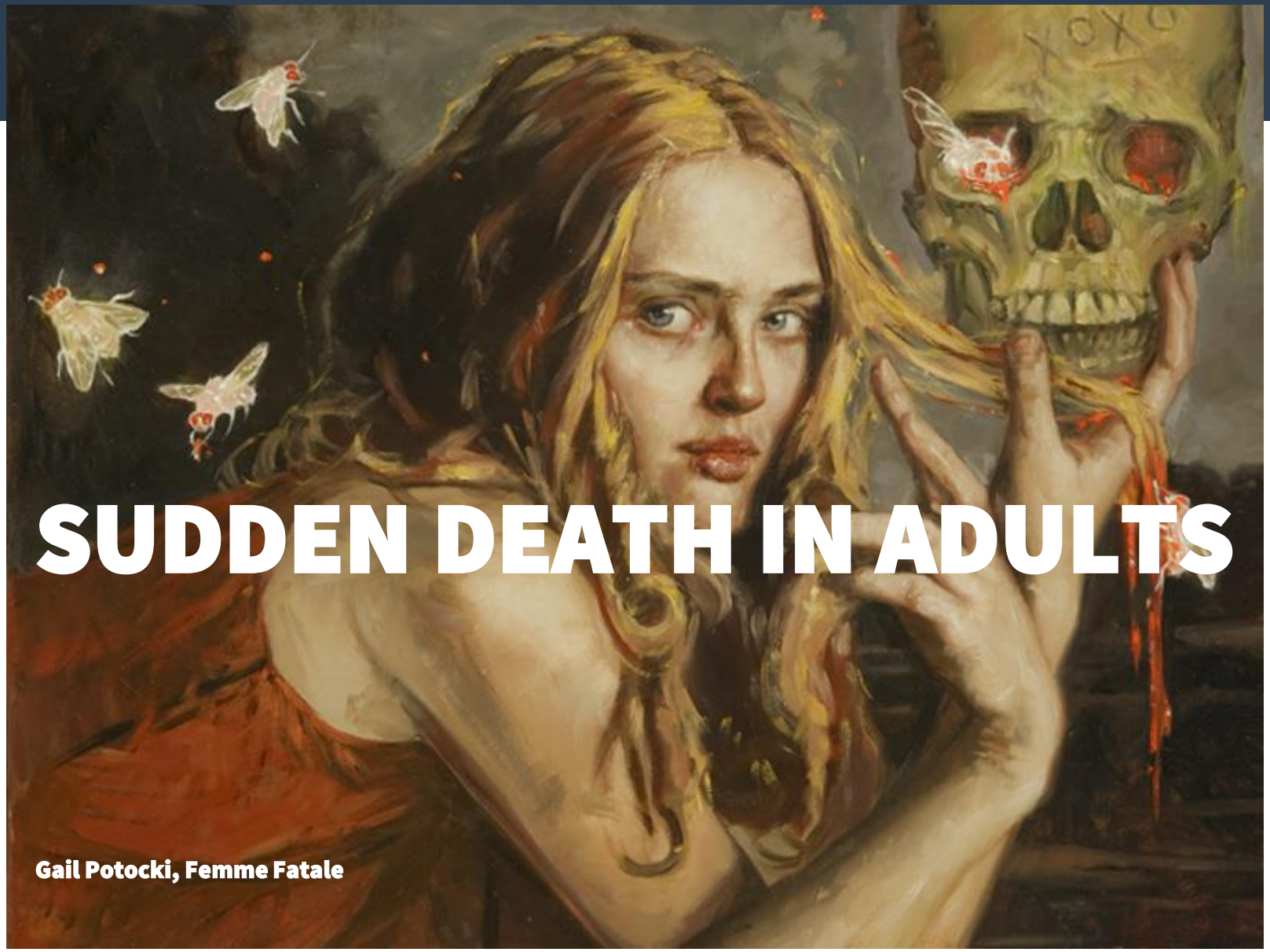

Dohnalová Petra, MD Dep. of Forensic Medicine

Global Statistics

- WHO, 2016

Leading causes of death

- 1. ischaemic heart disease
- 2. stroke
- 3. COPD

- low-income countries No.1 - lower respiratory infections
- high-income countries No.1 - ischaemic heart disease

Mortality Statistics I

- Mortality (CZ, 2017):

111 173 total number (rate = 10,5:1000 inhabitants)

M 55 934

F 55 239

Mean Life Expectancy

M 75,8

F 81,5

Mortality Statistics II

- CZ, 2015

- natural death – more than 2/3 of all deaths
- sudden death 15-20% of all deaths
- violent death app. 3,5 (F)– 7 (M) %
- other - app. 12 - 15 %

Oncological Diagnoses

No.1 skin cancer, (non-)melanoma

M

- Ca prostate
- CRC (colorectal ca)
- Ca respiratory system
- RCC (renal cell ca)

F

- BrCa (breast ca)
- CRC
- Ca respiratory system
- Ca uterus

Definition

- Sudden death (SD) =

unexpected natural death in an individual during 1hr (6, 24, 48 hrs ...early) after onset of symptoms

Death: natural x traumatic (violent)

SD: unexpected (in a seemingly healthy individual) x expected (terminal illness = end-stage disease)

Sudden Death

a.) 1st sign (and the last sign at the same time) of an unknown disease (typically sudden coronary death), or

b.) result of a chronic disease decompensation (chronic heart failure, COPD, DM, chronic renal/liver failure …)

Autopsy in forensic pathology – WHY?

… clinical autopsy in Forensic Medicine department is performed in order to:

1. ASSESS the cause of the death
2. RULE OUT violent (unnatural, traumatic) death
3. EXCLUDE death at the hand of another individual

… clinical autopsy may rapidly change into medico-legal autopsy

Statistics of SD

- 2/3 of SD in adults = sudden cardiac death
- 2/3 older than 55 yrs
- SD in young adults 18-35 (40) yrs

SUD: sudden unexplained death … negative autopsy, negative toxicology, 1-3%

SUDEP: sudden unexplained death in epileptics

SUDAM: sudden unexplained death in alcohol misuse

How long does it take to die from natural cause?

- immediately - myocarditis, AMI

- minutes - acute heart valve insufficiency

- hrs - peritonitis, brain haemorrhage

Cardiovascular system I

- Ischaemic heart disease (IHD)

1. Angina pectoris
 - stable
 - unstable
 - Prinzmetal – arterial spasm
2. Acute myocardial infarction (AMI)
3. Sudden coronary death (SCD)
5. Chronic ischemic heart disease (congestive heart failure)

- coronary artery disease (CAD) – atherosclerosis and its complications ...

AMI

- Definition
- Etiology
- Pathogenesis
- Complications:

- arrythmia (fatal)
- pericarditis epistenocardiaca
- mural trombosis (stroke)
- heart wall aneurysm (cardiac failure)
- papillary muscle rupture (acute mitral valve insufficiency)
- heart wall rupture (cardiac tamponade)

AMI

- **Gross examination**

  18-24 h – pallor, boiled meat

  3-5 days – coagulation necrosis

  7-10 days – reparation

  >6 weeks – scar

- **Microscopy**

  20 min - electron microscopy

  4 – 8 hrs - tissue oedema

  up to 24 h - eosinophilia, karyolysis, pyknosis, loss of muscle striation

  > 24 h - neutrophils

Other possibly fatal cardiac diseases

- cardiomyopathy (primary – HCM, DCM, RCM, AC, secondary – alcoholism, obesity, drug abuse, pregnancy, amyloidosis, tako-tsubo, non-compact myocardium ...)
- myocarditis – viral, bacterial, toxic, idiopathic
- infectious endocarditis
- valvular diseases
- tumor (primary/metastases)
- conduction system disorders, chanellopathies, LQT

AC – SD in young

HCM – SD in athletes

Tako-tsubo = catecholamin dependent cardiomyopathy (feochromocytoma, stress)

RCM

- primary (endocardial fibroelastosis, Loeffler syndrom)
- secondary (amyloidosis, sarcoidosis, hemochromatosis,…)

How does it really end?

- CARDIAC FAILURE (acute/excerbated chronic)
- FATAL ARRHYTMIA (typical for sudden coronary death)

= ventricular fibrillation or ventricular tachycardia

or asystole – cardiac arrest

Cardiovascular system II

- Sudden (natural) aortic death

- aneurysm

- dissection

+ rupture – bleeding – haemorrhagic shock

- TAA – thoracic aorta aneurysm – aortic insufficiency, tamponade
- AAA – abdominal aorta aneurysm - male:female 6:1
- RF: aHT, ATS, male, age, CTDs
- operation mortality 50%

Cardiovascular system III

- thrombotic pulmonary embolism (PE from DVT)

prothrombotic state ...

- women
- immobilisation
- oncological patients
- other

CNS

- Stroke

- cerebral ischaemia / haemorrhage

results in brain oedema ...

- atherosclerosis – thrombosis of Circle of Willis´ arteries

- embolism

- rupture of berry aneurysm (SAH)

- decompensated hypertension – basal ganglia

Age-dependent aetiology of meningitis

AGE	Patogen
0-4 weeks	S. Agalactiae L. Monocytogenes, E. Coli
4-12 weeks	Dtto + H. Influenzae Pneumokok Meningokok
3 months – 18 y.o.	Meningokok Pneumokok H. Influenzae
> 50 y.o.	Pneumokok Meningokok

Respiratory System

- lung carcinoma – disemmination, paraneoplasticity (PE), artery erosion – hemoptoe, aspiration of blood
- COPD
- bronchopneumonia + other infections (TBC, influenza)
- asthma bronchiale (AB)
- retropharyngeal absces/phlegmona
- stomach content / blood / tumorous material

Gastrointestinal System

- liver cirrhosis and its comlications – oesophageal varices – bleeding – hematemesis/enterorrhagia/melena – hemoragic shock and/or aspiration of blood
- acute haemorrhagic pancreatitis – DIC – MODS
- peptic ulcer – penetration, perforation, bleeding
- stomach carcinoma (other tumour) – bleeding
- CRC – bleeding, ileus
- appendicitis, UC, hernial incarceration, ileus

Metabolic syndrome

- arterial hypertension
- IHD
- hypercholesterolaemia
- obesity (BMI over 30, morbid o. over 40, super o. over 50)
- DM II (insulin resistency) - hyper/hypoglycaemia
- male

… polymorbidity … smoking, lifestyle, genetics

Other causes of SD

- glomerulonephritis, pyelonephritis - uremia
- kidney tumour
- GEU rupture
- bilateral bleeding to suprarenal glands
- feochromocytoma

- infections - sepsis
- metabolic disruption

SD x trauma

- death caused by disease itself and would occur without trauma

- death was purely traumatic and would happen without an underlying disease

- traumatic death caused by previous sudden event - decompensation of underlying disease (death at the wheel, death at work, fall from height, drowning)

Extraz

Agony - vita minima/reducta … cooling, flaccidity, end-stage

Apparent death:

A anemia, anoxemia (CO), alcohol

E electricity (lightning), epilepsy

Thank you for your attention!

Marianne Stokes, Death and the Maiden