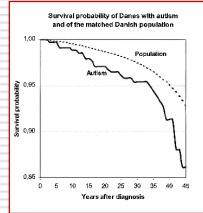


Mortality and causes of death in Autism Spectrum Disorders

Meeting of Minds
Herning
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Aspects of long term outcome in autism

- Education
- Employment
- Friendships
- Sexual relationships, marriage and family
- Psychiatric comorbidity
- Somatic comorbidity
- Old age
- Death

A police report and a death certificate

- Woman
- Age 24
- Diagnoses
 - infantile autism
 - severe mental retardation
 - epilepsy

"...the deceased, who lived in a residential institution, at night the ...1987 had fever with symptoms of influenza. A visiting doctor could at 23 o'clock find no sign of meningitis. The next morning the patient was found dead with extensive hemorrhagic spots in the skin."

The cause of death was recorded as **Meningitis purulenta**.

Methodological requirements in studies of mortality

- When expected mortality is low, you need relatively large samples to catch trustworthy figures
- All probands should be traced in comprehensive registers
- To validate figures for probands you need comparison data from the background population matched for (at least) age, sex and time period
- To elucidate causes of death you need access to death certificates for deceased individuals

Studies fulfilling methodological requirements

	Time period	Age at follow-up	Number of probands	SMR
Shavelle et al. 2001 California	1983-1997	12-18? (10-35?)	13,111	2.4
Mouridsen et al. 2008 Denmark	1960 - 2006	43 (26-60)	341	1.9.

Subjects in Danish sample

- All patients from the University Clinics of CaAP of Copenhagen and Aarhus with an autistic-like diagnosis
- Admitted 1960-1984
- Age 2 – 17 years
- Rediagnosed from clinic records in 1985 according to mostly ICD-9 criteria

Process of rediagnosis – Autism

- ICD-9 (1978)
- Infantile autism

...There is generally an impairment in the **social** use of both verbal and gestural language. Problems in social relationships are most severe before the age of five years and include an impairment in the development of eye-to-eye gaze, social attachments and cooperative play...

Process of rediagnosis – Autism

- ICD-10 (1992)
- Childhood autism

...Qualitative impairments in **social** interaction are manifest in....failure to use eye-to-eye gaze, facial expression, body postures and gestures to regulate social interaction....stereotyped and repetitive use of language or idiosyncratic use of words or phrases...lack of social imitative play...

Characteristics at admission of 341 persons with ASD

	Childhood autism	Atypical autism	Dis-integrative disorder	"Asperger syndrome"
Number	118	89	13	121
Age at admission	5 (2-15)	9 (3-17)	6 (3-8)	10 (3-17)
Gender: Male	85	58	9	104
Intelligence: Ment. retard.	70%	39 %	69 %	13 %

"Borderline childhood psychosis"

- A long lasting psychiatric disorder in the **borderland** between autism/psychosis and normality
- The disorder is characterised by weak capacity for **social interaction** and empathy for the feelings of others
- **Reality testing** is insecure
- The behaviour and contents of fantasy may be **bizarre**, evt. with **narrow interests**

Methods and results of follow-up

- All probands could be traced in the Danish Central Persons Registry (CPR)(2 had emigrated, 1 "disappeared")
- Census date 18th april 2006
- Mean age at f-u was 43 (26 – 61) years, mean f-u time 36 years
- 26 (8 %) had died
- All deceased were traced in the Danish Cause of Death Registry

Characteristics at follow-up of 341 persons with ASD

	Childhood autism	Atypical autism	Disintegrative disorder	"Asperger syndrome"
Number	118	89	13	121
Age at follow-up	42 (26 - 56)	45 (27 - 61)	41 (27 - 52)	44 (28 - 60)
Deceased	7 (6 %)	7 (8 %)	2 (15 %)	10 (8 %)

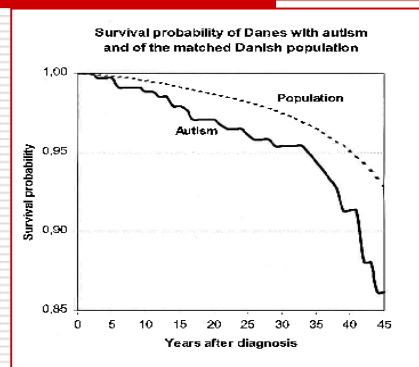
Standardised Mortality Ratio

- $SMR = \text{Observed number of deaths} / \text{Expected number of deaths}$
- Expected number of deaths calculated from mortality rates for same age-, sex- and period cohort from the general population
- $SMR > 1$ means higher mortality among probands

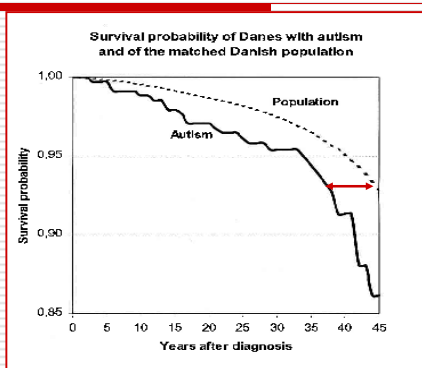
SMR

- Overall: 1.9
- Sex distribution:
 - Females 4.0, males 1.6
- IQ \leq 70 (mental retardation): no significant difference
- Years after diagnosis:
 - 0-15: 2.4
 - 15-30: 1.7
 - 30-45: 1.9

Survival probability



Survival probability



Conditions of death: Childhood autism (7/118)

Sex	IQ	Age at death	Physical disease	Cause of death
M	SMR	15	Epilepsy	Accident: suffocation
F	SMR	30	Epilepsy	Accident: suffocation
F	SMR	24	Epilepsy	Meningitis
M	SMR	45		Malignant lymphoma
F	SMR	45	Adrenal insufficiency	Cardiomyopathy
M	MMR	47	Emaciation	Pneumonia
M	A	20	Hodgkin's disease	Pneumonia

Conditions of death: Disintegrative disorder (2/9)

Sex	IQ	Age at death	Physical disease	Cause of death
M	SMR	31	Renal tumor	Urethral bleeding
M	A	9	SSPE	Pneumonia

Conditions of death: Atypical autism (7/89)

Sex	IQ	Age at death	Physical disease	Cause of death
F	SMR	18	Epilepsy	Epileptic attack?
F	SMR	38	Epilepsy	Epileptic attack?
M	MMR	53		Pulmonary neoplasm
M	A	20		Accident? (overdose)
M	A	18		Suicide (overdose)
M	A	51	Atherosclerosis	AMI
F	A	48	Cardiomyopathy	AMI

Conditions of death: Asperger s.

Sex	IQ	Age at death	Physical disease	Cause of death
M	MMR	36	Epilepsy	Epileptic attack
M	MMR	42	Muscular dystrophy	Pneumonia
M	A	25		Suicide (jump)
M	A	19	Epilepsy	Accident (drowning)
M	A	45		Acute heart disease
M	A	30		Unknown - found dead
M	A	30	Diverticle of Meckel	Appendicitis
M	A	47		AMI
F	A	47	Polycystic syndrome	Septicaemia
F	A	32	Epilepsy	Epileptic attack?

Patterns of causes of death

- 5/26 died from **accidents or suicide**, all relatively young: 15 – 30 years of age. This pattern resembles the background population.
- 8 deceased persons suffered from **epilepsy**, judged as causal in 4 deaths

Strengths and weaknesses of study

<ul style="list-style-type: none"> • Strengths • Long observation period • Systematic follow-up in registers of high standard • Matched background population for comparison 	<ul style="list-style-type: none"> • Weaknesses • Retrospective ICD-9 diagnoses • Overlap between concept of "borderline childhood psychosis" and Asperger syndrome not complete • Limited informations about single persons
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Shavelle et al. California study 2001

- 1983 -1997 (mean f-u time 10 years?)
- N = 13,111
- Age at inclusion: 2-8? (2-20?)
- Age at follow-up: 12-18? (10-35?)
- 48 % Mental Retardation
- Crude mortality: 202/13,111 = 1.5 %
- SMR 2.4 (females 5.5, males 1.7)
- SMR normal IQ + MiMR 1.4, MoMR and lower 3.1
- Marked excess mortality from **epilepsy**

SMR by age (Shavelle et al.)

- 2-5 years: 2.4
- 5-10 years: 5.4
- 10-20 years: 3.0
- 20+ years: 2.1
- **All:** **2.4**

Conclusions

- The excess mortality in ASD is limited, about double the background population
- Life expectancy seems reduced with about 5 years (Danish study)
- Moderate and severe mental retardation was a marked risk factor (US study), while persons with normal intelligence had an excess mortality of about 40 %
- Woman had a higher excess mortality than men, about 3-4 times greater risk
- Epilepsy was a marked risk factor

Thank you!



References

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