Overview of new PhDs in the Nordic Countries

Title: Individual perspectives on outcomes in Diabetes
Candidate: Sixten Borg
University: Health Economics Unit, Department of Clinical Science in Malmö, Lund University, Sweden.

Abstract:
Purpose: The purpose was to promote an individual perspective in diabetes care through developing how patient-reported measurements are used in the evaluation of the situation of an individual with diabetes, how diabetes care works together with the individual, and in the improvement of diabetes care.

Methods and results: In study I, we identified procedures for developing measurement scales for a questionnaire, examine their measurement properties and compute scale scores. In study II, we used these procedures on an updated version of the questionnaire. We obtained scales for quantifying wellbeing, abilities, freedom from worries and barriers, and judgments of experience of diabetes care were developed. They had acceptable measurement properties and could be used to describe our study populations, compare groups, and identify vulnerable individuals. In study III we examined a method for estimating the quality of life in type 1 diabetes, based on our scales together with risk factors for diabetes complications, e.g. HbA1c. We could measure the quality of life, and the measure allowed every individual to use their own importance weights for the variables involved. The method also estimated the individual's improvement potential. In study IV, we tried to identify predictors of future costs and future risk factors, among our scales. Ability to manage diabetes predicted HbA1c in type 1 diabetes. Satisfaction with treatment predicted HbA1c in type 2 diabetes.

Conclusions: We have contributed to the individual perspective in diabetes in several ways. We could quantify patient-reported outcomes and experience measures. They could be used with risk factors for diabetes complications, to describe an individual's situation, to estimate the quality of life, and for predicting future HbA1c. Taken together, this could be used for developing and improving diabetes care and the situation for an individual with diabetes, with regards to clinical practice, relevant outcomes and their valuation.

Title: Determinants of Health and Labor Market Outcomes
Candidate: Anne-Lise Breivik
University: Department of Economics, University of Bergen, Norway

Abstract:
This thesis consists of four chapters: One introductory chapter and three chapters that each includes the three papers that are the main part of this thesis. The introductory chapter provides an overview of the determinants health and labor market outcomes, both in a theoretical framework and an overview of the relevant empirical literature. The chapter also provides a discussion on the concept of causality, and the empirical methods used in
the three papers, before it concludes with a discussion on the contribution of the thesis with an emphasis on the internal and external validity of the three studies.

The first paper studies the effects of experiencing that a child has a negative health shock on parents' health and labor market outcomes. This paper shows that parents experiencing that their child has a severe health shock between age 5 and 18, have significant and persistent reductions in labor income and employment, and increased use of social security benefits. The underlying health problems are psychological disorders. Heterogeneity analysis by age of the child and type of health shock reveals larger effects of health shocks related to injury, poisoning and other consequences of external causes, such as traumatic head injury, when the children are between age 5 and 12. The results are found using high-quality Norwegian register data and an event study approach.

The second paper examines the impact of increased access to universal childcare on adult health. The results show that affected women increase their use of pregnancy-related healthcare services and sickness absence. However, there is no increase in fertility and no effects on the second generation's birth outcomes, indicating that the women's health is unchanged, but that they have increased their demand for healthcare services. Second, there is a reduction in the use of mental healthcare services, and services related to injuries and social problems, pointing toward improved mental health. Finally, children of employed mothers are driving the effects.

The third paper studies the relationship between short-term air pollution increases and indicators of health and worker productivity. Estimating two-way fixed effects models using geographical and time variation in exposure to particulate matter (PM10) and nitrogen dioxide (NO2), we find that the number of GP consultations, certified sickness absences, and hospital visits increases in periods with high(er) pollution levels. There is substantial heterogeneity in this relationship. We find some support for previous results showing that pollution affects vulnerable groups like children and elderly negatively. Importantly, however, the largest effects are on school-age children and the working-age population.

---

**Title:** Will diabetes care move closer to rural patients in China? Assessing the impact of an educational intervention for type 2 diabetes among patients and health care professionals in rural China

**Candidate:** Shaofan Chen

**University:** Department of Learning, Informatics, Management and Ethics, Karolinska Institutet, Sweden

**Abstract:**

Aim: To increase knowledge on the feasibility and impact of an educational intervention to shift the management of type 2 diabetes from hospitals to primary health care (PHC) institutions in rural China.

Study population and Methods: The project was conducted in Jiangsu province, China. The educational intervention intended to improve collaboration between the hospital and PHC level, which strengthen the knowledge and management of diabetes among PHC professionals and in turn lead to improved diabetes knowledge and improved fasting blood glucose (FBG) level among patients. Three counties were selected from Jiangsu Province. The intervention for health care professionals in the intervention areas consisted of: team communication, regular meetings, and professional skills training sessions. Patient in the intervention areas received health education lectures, periodical
follow-up interviews with an annual physical examination, and special medical services. Baseline data were collected in November 2015, the two follow-up data collections were in October 2016 and July 2017, respectively. Questionnaires were used for patient participants and staff. Study I and II evaluated the one-year impact on the patients’ diabetes knowledge, FBG level, and health-related quality of life (HRQoL). Study III concentrated on the impact among health care professionals in PHC institutions for one year. Study IV assessed the two-year impact on patients’ diabetes knowledge and FBG level.

Results: The intervention had a positive impact in improving diabetes knowledge, lowering FBG levels and improving HRQoL among patients at one-year follow-up. A two-year positive impact was also found on diabetes knowledge and FBG level. The intervention had a differential impact on FBG level for patients in different counties, both at the two follow-ups, and a two-year positive impact was found only in Gaochun county. The impact was also greater among females, married persons, low educated persons, and those in farming or house working. The intervention had a positive impact among health care professionals in PHC on their professional diabetes knowledge, attitudes and practices regarding the intervention, and types of services they were able to provide.

Conclusions: The educational intervention, with improved collaboration between county hospitals and PHC institutions, and health education to patients, resulted in improved diabetes knowledge and FBG levels and improved some aspects of HRQoL among patient participants. The impact of the intervention was greater among certain patient groups and differed between the counties. The intervention had a positive impact among health care professionals in PHC on their professional diabetes skills, knowledge, attitudes, practices, and types of services they were able to provide. Improved collaboration between county-level hospitals and PHC, with educational efforts both to health care staff and patients with T2DM, appears to be a feasible and effective way of improving care of patients with T2DM in rural areas in China.

Title: The burden of back pain: evaluation of costs and health outcomes
Candidate: Filip Gedin
University: Karolinska Institutet

Abstract
Background: Back pain is a leading cause of disability in the world. Beyond the negative impact on people’s health and quality of life, back pain is associated with substantial costs both within and outside the health care sector. The aim of the thesis was to explore the costs of back pain, and to explore the effectiveness and cost-effectiveness of various treatments for low back pain.

Methods: Studies I and II used a clinical trial design, where data from multiple study centres were combined and analysed in order to increase understanding of changes in patient-reported outcome and costs over time. Study III was a systematic mapping of systematic reviews on the effectiveness of various primary care treatments for chronic low back pain (CLBP). Study IV was a register study where data from multiple national registers were combined and productivity losses for patients with back pain were analysed.

Results: There were significant productivity losses due to long-term sickness absence and disability pension among individuals of working age who had undergone a first specialist health care visit for back pain. Productivity losses may be affected by
sociodemographic factors and it was indicated that individuals with back pain with an additional diagnosis might have higher productivity losses than individuals with only a back pain diagnosis. There was evidence that some primary care treatments had positive effects on pain and/or function in patients with CLBP. However, there are considerable knowledge gaps for most treatments. There were statistically significant improvements in health outcomes from a 4-week treatment with chiropractic care for patients with non-specific acute or chronic back pain. There were no statistically significant differences in back pain-related functional limitation, pain intensity, health-related quality of life, costs or quality-adjusted life years when physiotherapy, chiropractic care, and the combination of physiotherapy and chiropractic care were compared with advice among patients with non-specific CLBP over a 6-month period.

Conclusion: Back pain is associated with large productivity losses for individuals in the working age. Individuals with a first specialist health care visit for back pain have considerable greater productivity losses than those without back pain. Women tend to have higher productivity losses than men, and individuals with at least one other diagnosis tend to have higher productivity losses compared to those with only a back-pain diagnosis. Chiropractic care of patients with acute or chronic back pain may improve health outcomes. There were no statistically significant differences when physiotherapy, chiropractic care, and combination treatment were compared with advice, over a 6-month period, in the treatment of patients with CLBP in Sweden.

In conclusion, there is a great need for high-quality, large-scale studies to further study the effectiveness, costs and cost-effectiveness of primary care treatments for CLBP.

---

**Title:** Health Technology Assessment of Assistance Dogs and Dog-Assisted Interventions  
**Candidate:** Martina Lundqvist  
**University:** Department of Health, Medicine and Caring Sciences, Linköping University, Sweden

**Abstract:**
Dogs as an assistive aid for people with disabilities date as far back in time as the first century CE. Today, dogs are used in various settings to help and assist humans. ‘Assistance dogs’ is an umbrella term for guide dogs, hearing dogs and service dogs. They are custom trained to help and support their owners in their everyday life and thereby give them greater independence. Dogs who perform dog-assisted interventions are another type of working dog, where the dog and the owner work together as a team visiting people with various needs in different settings such as hospitals and nursing homes. There is a lack of evaluations of working dogs in the health technology assessment context, and in the health economic evaluation context. Hence, there is a need for structured analyses that include both the short and long-term effects and the costs of assistance dogs and dog-assisted interventions. The overall aim of this thesis is to explore and assess the use of assistance dogs and dog-assisted interventions. The research questions were investigated using a variety of methods. In paper I, inferential statistical analysis was used to analyse patient-reported outcomes measures. In paper II, a thematic content analysis was employed to explore the experiences of service and hearing dogs. To study the long-term cost-effectiveness of physical service dogs and diabetes alert dogs, a decision analytic model was used in paper III. Paper IV investigated the effects and cost-effectiveness of dog-assisted interventions, and takes the form of a systematic review. Paper I showed that a
service or hearing dog may have positive impact on its owner’s health-related quality of life, well-being and activity level. Paper II showed that owners of service or hearing dogs experienced both positive physical and psychosocial effects from their dog. Negative experiences were also identified, for example being denied access to public places and negative attitudes from other people. Paper III showed that physical service dogs and diabetes alert dogs are cost-effective in comparison with regular companion dogs, resulting in both lower costs and a gain in QALYs. The one-way sensitivity analysis did not change the results, but the probabilistic sensitivity analysis showed that the results were uncertain. Synthesizing the results from the review in paper IV showed that dog-assisted interventions for therapeutic purposes led to minor to moderate effects in psychiatric conditions. Dog-assisted interventions as an activity had minor to moderate effects on cognitive disorders, and dog-assisted interventions for support purposes were beneficial in different types of medical interventions. Studies of cost-effectiveness were lacking. To conclude, assistance dogs are valuable and may be cost-effective for use as assistive aids and dog-assisted interventions render minor to moderate effects in certain situations in healthcare settings.

Title: The value of reducing health risks based on willingness to pay in Sweden
Candidate: Sara Olofsson
University: Health Economic Unit, Faculty of Medicine, Lund University, Sweden

Abstract:
Public interventions with the aim to reduce health risks (e.g., building a new and safer road, implement a vaccination program for influenza) usually involve a trade-off between the incremental costs and benefits. If the aim of the interventions is to maximize societal welfare, the value of the benefits should optimally be based on the willingness to pay (WTP) for reducing health risks among the general population.

The first and second paper of the thesis deals with the value of a quality-adjusted life-year (QALY). Paper I apply a slightly adjusted version of a method designed to reduce scale sensitivity, a common bias in WTP studies that refers to an insensitivity to the size of the risk reduction or health gain. The method, “the chained approach”, is a combination of contingent valuation (CV) and standard gamble (SG). We found that the chained approach is capable of generating a close to constant value of a QALY when using a more severe injury in the first part of the chained approach and when calculated based on individual ratios.

Paper II investigates if the value of a QALY is higher when the expected remaining lifetime is shorter, i.e. the existence of an end-of-life (EoL) premium, using the CV approach and applying an individual ex ante perspective. We found that the WTP per QALY was slightly higher when expected remaining lifetime was 6 months compared to 24 months. However, no support for an EoL premium was found when comparing 24 and 36 months of expected remaining lifetime. The study also showed that respondents who were less worried about developing a fatal cancer disease had more preference for EoL.

The third and fourth paper of the thesis were designed to derive estimates for the value of a statistical injury (VSI) and value of a statistical life (VSL). The aim of Paper III was to compare the chained approach to CV as a method to derive the value of reducing risk of road traffic injuries. Despite two different ways of deriving VSI and VSL, the methods resulted in similar estimates for five injuries of different durations and severity.
However, both approaches were found to be associated with procedural invariance, i.e. estimates varied depending on the framing of the question.

Paper IV was designed to study the impact of context on the VSL. The CV approach was applied, asking respondents to pay for a reduction or elimination of a risk in five different contexts (amyotrophic lateral sclerosis, pancreatic cancer, multiple myeloma, sudden cardiac arrest and fatal road traffic accident). The study showed that the VSL varies depending on the context, being highest for the outcome that was considered to be the most dreadful (ALS) and lowest for the outcome that was considered to be the least dreadful (fatal road traffic accident). The VSL was also found to be higher when risk was eliminated.

Title: Impacts of Danish Healthcare System Changes Affecting Care of Patients with Type 2 Diabetes
Candidate: Ryan Pulleyblank
University: Danish Centre for Health Economics (DaCHE), Department of Public Health, University of Southern Denmark, Denmark

Abstract:
Diabetes is a complex, chronic, and progressive disease which significantly affects patients’ morbidity and mortality. As the prevalence has been increasing globally, diabetes has increasingly contributed to the global burden of disease, including imposing significant economic costs.

Healthcare systems are regularly subjected to organizational changes intended to sustain and improve care quality for patients. Over the past decade, there have been several organizational changes in the Danish healthcare system particularly targeting care for patients with type 2 diabetes. This thesis considers the impacts of changes within national GP contracts on costs and quality of care. In particular, this thesis comprises three research papers investigating such changes, including: 1) the introduction of an electronic health record (EHR) system in general practice which had a specific disease management program (DMP) module for improving diabetes care; 2) an agreement to move type 2 diabetes patients’ care away from hospital outpatient setting to the general practice setting; and 3) the introduction of a new capitation scheme targeting patients with type 2 diabetes in general practice.

The research is based on retrospective observational analyses of Danish administrative registries, which capture patients’ interactions with the healthcare system.

In paper 1, a panel of annual patient-level data was used in a fixed-effects (i.e. differences-in-differences) analysis. We find that use of an EHR/DMP in general practice was not associated with differences in total healthcare costs. The analysis identified a small increase in average treatment costs in primary care and a decrease in emergency hospital costs, indicating a care improvement.

In paper 2, a cross-section of annual patient-level data was used in an instrumental variable analysis. We find evidence that moving care responsibility for type 2 diabetes patients with moderate disease severity from the specialist hospital setting back to the general practice setting can be expected to reduce costs without leading to increased emergency hospitalizations (i.e. without harming quality of care).

In paper 3, a panel of monthly patient-level data was used considering a period prior to and following the introduction of changes to the remunerations scheme for Danish GPs. We find evidence that enrolment into a capitation scheme for basic consultation
services is negatively associated with frequency of capitated services, and positively associated with frequency of remunerated services for patients who would be expected to be unprofitable to GPs under the new capitation scheme.

It is important for policy makers to understand the impacts of organizational changes, particularly which intended and unintended impacts are reasonably likely to and/or do emerge. This research indicates that changes to the Danish healthcare system affecting type 2 diabetes patients can and do have identifiable impacts on both costs (resource use) and quality of care.

Title: Essays on economics of mental health
Candidate: Henri Salokangas
University: Department of Economics, University of Turku, Finland

Abstract:
This dissertation consists of an introductory chapter and three empirical essays that examine the linkages between economic activity and mental disorders. I examine two separate themes: the effect of migration on long-term mental health and the association of mental disorders and labor market performance.

The first article of the thesis exploits a historical natural experiment in forced migration in the World War II to study the impact of migration on mental health. The Finnish-Soviet wars resulted in the displacement of 11% of the Finnish population. As the forced migration of Finnish Karelians unexpected and conducted with full compliance, the displacement provides a compelling “natural-experiment” framework to study the mental health effects of forced migration free on confounding. We do not find evidence that supports migration being a risk factor for mental disorders in the long-term. This result is at odds with the general finding from non-experimental studies that point to a positive association between migration and mental disorders. Our results highlight the importance of an appropriate research design when measuring the impacts of migration.

The second article examines the lifetime labor market consequences of mental disorders. The main contribution stems from the scope of the data, which allows the identification of the emergence of severe mental disorders as the first psychiatric admission. By documenting that, the labor market deficits are the greater the earlier the mental health problems manifest, the paper motivates the need for early intervention to tackle these problems.

The third article focuses more closely on the immediate changes in labor market performance surrounding the first psychiatric admission. I exploit a recently popularized dynamic differences-in-differences strategy where counterfactuals are constructed from amongst the individuals with psychiatric admissions, but who are just treated for the first time a few years later than the treatment group. I show that this way the observable differences between treatment and control group considerably reduced relative to case-control comparison. This strategy also produces results that do not violate the parallel trends assumption in anxiety disorders.

Title: Effectiveness and cost-effectiveness of indicated preventive interventions for depression in adolescents. An application of health economics methods.
Candidate: Richard Ssegonja
University: Department of Public Health and Caring Sciences, Uppsala University, Uppsala, Sweden.

Abstract:
Unipolar depressive disorders are commonly encountered conditions in clinical practice with about 25% reporting their first episode during adolescence. Longitudinal studies show adolescent depression to be associated with an increased risk of mental illness in adulthood, healthcare usage, poor educational outcomes, unemployment, and dependency on welfare recipiency. Therefore, adolescent depression contributes a high disease burden and impinges a considerable financial strain on society’s limited resources.

Several preventive interventions have been developed to prevent adolescent depression. Of these interventions, group-based cognitive behavioural therapy (GB-CBT) indicated preventive interventions for depression are well studied and accepted. However, evaluations of their effectiveness and cost effectiveness have yielded conflicting and incomplete results mainly due to methodological limitations.

Therefore, the overarching aim of this thesis was to investigate the effectiveness and cost-effectiveness of GB-CBT indicated preventive interventions for depression in children and adolescents, and estimate the additional healthcare costs and welfare burden in early to mid-adulthood associated with adolescent depression.

In study I, GB-CBT indicated preventive interventions for depression in children and adolescents were protective against developing a depressive disorder and also reduced depressive symptoms. The intervention relative effect was noted to decay over time. Study II revealed that adolescent depression was associated with considerable increased healthcare consumption in mid-adulthood compared to the non-depressed peers at a population level. This finding was more pronounced in females with persistent depressive disorder (PDD). Study III showed adolescent depression to be associated with all the forms of social transfer payments (welfare) especially in individuals with PDD and those with early comorbid psychopathologies.

Study IV demonstrated that GB-CBT indicated preventive interventions for adolescent depression are not only effective but also have the potential to be cost-effective compared to leaving adolescents with subsyndromal depression unattended.

Findings from studies II and III, emphasized the large financial burden to society in terms of additional healthcare costs and welfare expenditure associated with adolescent depression. Whereas, study I and IV bring forward the message that it is possible to change the course of subsyndromal depression by offering GB-CBT indicated preventive interventions to adolescents with subsyndromal depression. Such an initiative was not only cost-effective compared to not intervening, but also largely cost-saving. Therefore, GB-CBT indicated preventive interventions could be used as part of a stepped care program linking into more specialized care services. The results of this thesis will be useful in decision-making concerning the resource allocation related to adoption and implementation of such preventive measures.

Title: Health economic perspectives on early treatment of mental health problems in children
Candidate: Rasmus Trap Wolf
University: Danish Centre for Health Economics – DaCHE, University of Southern Denmark, Denmark
Abstract:
A large proportion of children suffers from mental health problems world-wide. Despite the promising clinical evidence of effective psychological interventions there is very limited access to such treatments. Through four papers the thesis investigates different health economic perspectives of early treatment for children with mental health problems. In Paper I the potential of a new screening algorithm to identify children with sub-threshold and undiagnosed mental disorders was evaluated. A combination of historical birth cohort data and data from national registers was used to mimic the performance of screening by analyzing the later school performance and health care utilization of the screened children. The screening was based on parent-reported answers to the Strength and Difficulties Questionnaire. The results demonstrate that children with mental health problems and a poor prognosis can be identified using the screening. Paper II investigated whether a novel visitation model for school-aged youth with mental health problems based on a stage-based stepped-care approach facilitated a systematic identification and stratification process without problems with equity in access. 573 children took part in the visitation process. To assess problems with inequity in access, individual-level socioeconomic data were obtained from national registers. The visitation model succeeded in defining three groups of youth with increasing severity of mental health problems. Potential problems in reaching youth of less resourceful parents, and older youth were identified. The objective of Paper III was to examine the construct validity and responsiveness of the preference-based health-related quality-of-life measure Child Health Utility 9D (CHU9D) in a mental health setting, using utility weights derived from an adult and adolescent population, respectively. Data of 396 children from a randomized controlled trial is used in the validation. The discriminant validity and convergent validity were examined using the mental health specific The Strengths and Difficulties Questionnaire and the generic KIDSCREEN-27. Responsiveness was assessed by examining the floor-ceiling effects, the magnitude of change over time, and the ability to differentiate between improvement and no improvement. The findings demonstrate that CHU9D is an appropriate preference-based health-related quality-of-life measure for use in mental health trials. In Paper IV the cost-effectiveness of the transdiagnostic psychotherapy program Mind My Mind for children with common mental health problems was evaluated using a cost-utility analysis framework and data from a randomized controlled trial. Furthermore, the impact of respondent and preference weights used in the estimation of Quality Adjusted Life Years on the results was analyzed. The results show that the intervention has the potential to be cost-effective, but it is dependent on the duration of the treatment effects. The results varied significant based on the choice of respondent and preference weights indicating that both factors need to be considered when assessing cost-utility analysis involving children.

Title: Cost-Effectiveness of Vaccination and the Value of Prevention
Candidate: Ellen Wolff
University: School of Public Health and Community Medicine, University of Gothenburg, Sweden

Abstract:
The overall aim of this thesis was to analyse the cost-effectiveness of vaccination of infectious diseases and to investigate the value of prevention, in a Swedish setting.
This thesis consists of five studies. In Study I through IV, decision analytical modelling was applied to economic evaluations of the cost-effectiveness of vaccination or vaccination strategies against infectious diseases. Study I investigated the cost-effectiveness of sex-neutral HPV vaccination compared to girls-only vaccination, and Study II examined the cost-effectiveness of different vaccination strategies for pertussis. Study III investigated the cost-effectiveness of pneumococcal vaccination of the elderly, and Study IV the cost-effectiveness of varicella and/or herpes zoster vaccination among children and the elderly. There are no official cost-effectiveness thresholds in Sweden or guidelines on the relative cost-effectiveness of prevention in relation to treatment. Study V used contingent valuation and a two-part model to investigate whether, and how, the willingness to pay for prevention differed from the willingness to pay for treatment.

Overall, the results from the four economic evaluations suggest that vaccinations lead to a reduced burden of disease and that the cost-effectiveness often was heavily influenced by the values of the included parameters, as the price of the vaccine, the applied time horizon, and model choice. Finally, the results from Study V suggest that prevention was, on an average, valued higher than treatment.