# Risk adjusted resource allocation in Sweden

Webinar, December 13 2017


**Andreas Johansson**

andreas.johansson@ensolution.se

+46 709 - 90 00 30


Ensolution.

acg
JOHNS HOPKINS

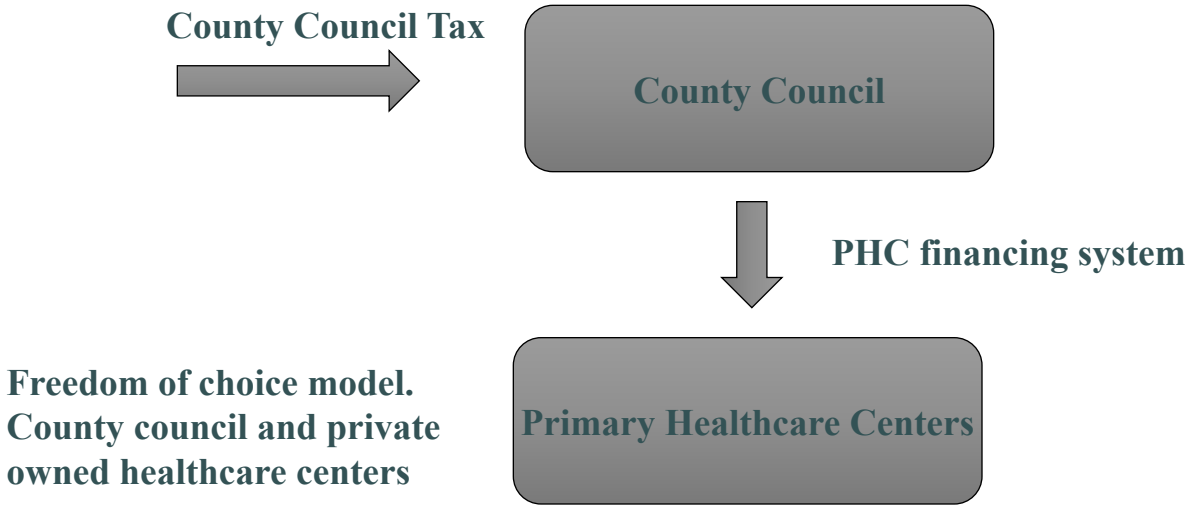
# Agenda

- Background
- Financing system
- Benefits
- Validation of the system
- Development of weight lists
- Reimbursement models in practice
- Experiences

# Background

- **Sweden was one of the early international adopters of the ACG-Case Mix System. Initial testing of the system already in the mid 1990's.**
- **In 2008 a new reform was introduced within Swedish primary health care. The tax paid health care system is controlled by twenty-one local County Councils and reimbursement system for Primary Care has traditionally been per capita model based on age and gender.**
- **With the introduction of the freedom of choice model there was a need for better risk adjusted allocation models. All county councils in Sweden have to establish a system where resources follow the individual patient.**
- **Today sixteen of the County Councils use the ACG system. On a monthly basis the ACG co-morbidity risk score is calculated for each provider. Approximately eighty percent of the inhabitants in Sweden (10 Mill 2017) is now covered by the system.**

# Financing system PHC in Sweden




**Most of the county councils uses a capitation model with a combination of factors**

- **ACG (40-80 %)**
- **Socioeconomic values**
- **Age & gender**
- **Admission rate or geography**
- **Quality measures**

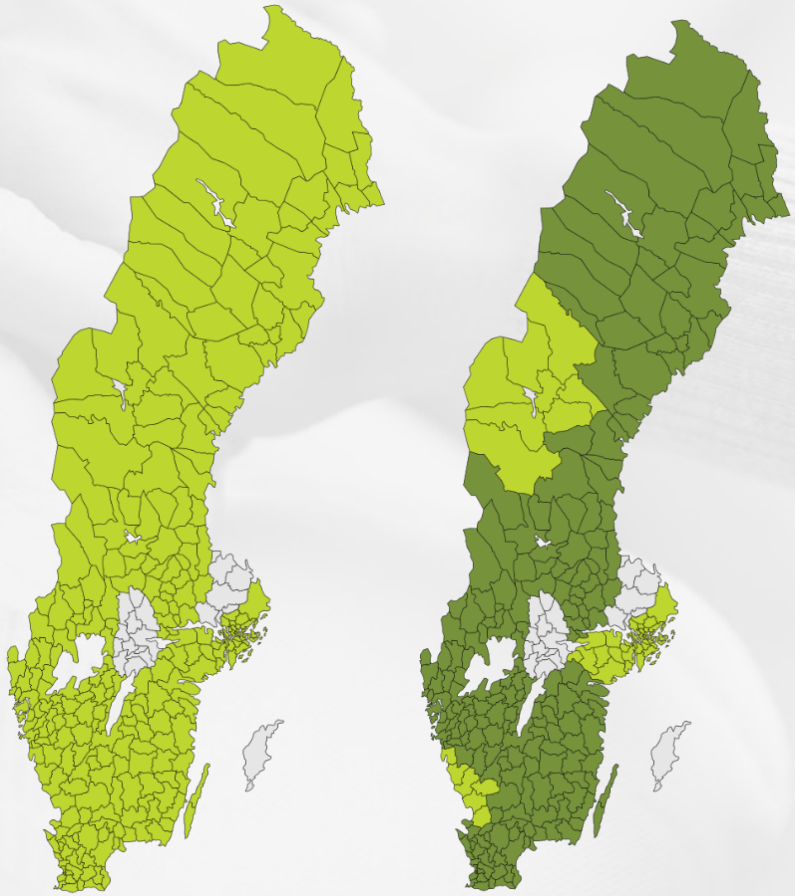
# Benefits using ACG in the Swedish PHC financing system

## Experiences after implementation

- To protect practices that take care of more resource consuming patients than average patients populations
- Guarantees that the County Councils allocates the tax money fair (not too high, not too low)
- Guide health care centers to not only pick the healthier patients
- Incentives for health care centers to match services with actual care need
- Possible for practices to specialize in needed services and to be fairly compensated
- Model that helps to identify patients with possible high resource need
- Comparability between different health care centers
- Easy to understand model. Accepted by professionals. Accepted by politicians
- Difficult to manipulate

# Usage in Sweden

**(green = license, dark green = also used in the reimbursement system)**



Ensolution.

# Validation of ACG Case-mix for equitable resource allocation in Swedish primary health care

Andrzej Zielinski, Maria Kronogård, Håkan Lenhoff and Anders Halling,
BMC Public Health,2009

**Background:**
Adequate resource allocation is an important factor to ensure equity in health care.
Previous reimbursement models have been based on age, gender and socioeconomic factors. An explanatory model based on individual need of primary health care (PHC) has not yet been used in Sweden to allocate resources. The aim of this study was to examine to what extent the ACG casemix system could explain concurrent costs in Swedish PHC.

**Methods:**
Diagnoses were obtained from electronic PHC records of inhabitants in Blekinge County (approx. 150,000) listed with public PHC (approx. 120,000) for three consecutive years, 2004-2006. The inhabitants were then classified into six different resource utilization bands (RUB) using the ACG case-mix system. The mean costs for primary health care were calculated for each RUB and year. Using linear regression models and log-cost as dependent variable the adjusted R2 was calculated in the unadjusted model (gender) and in consecutive models where age, listing with specific PHC and RUB were added. In an additional model the ACG groups were added.

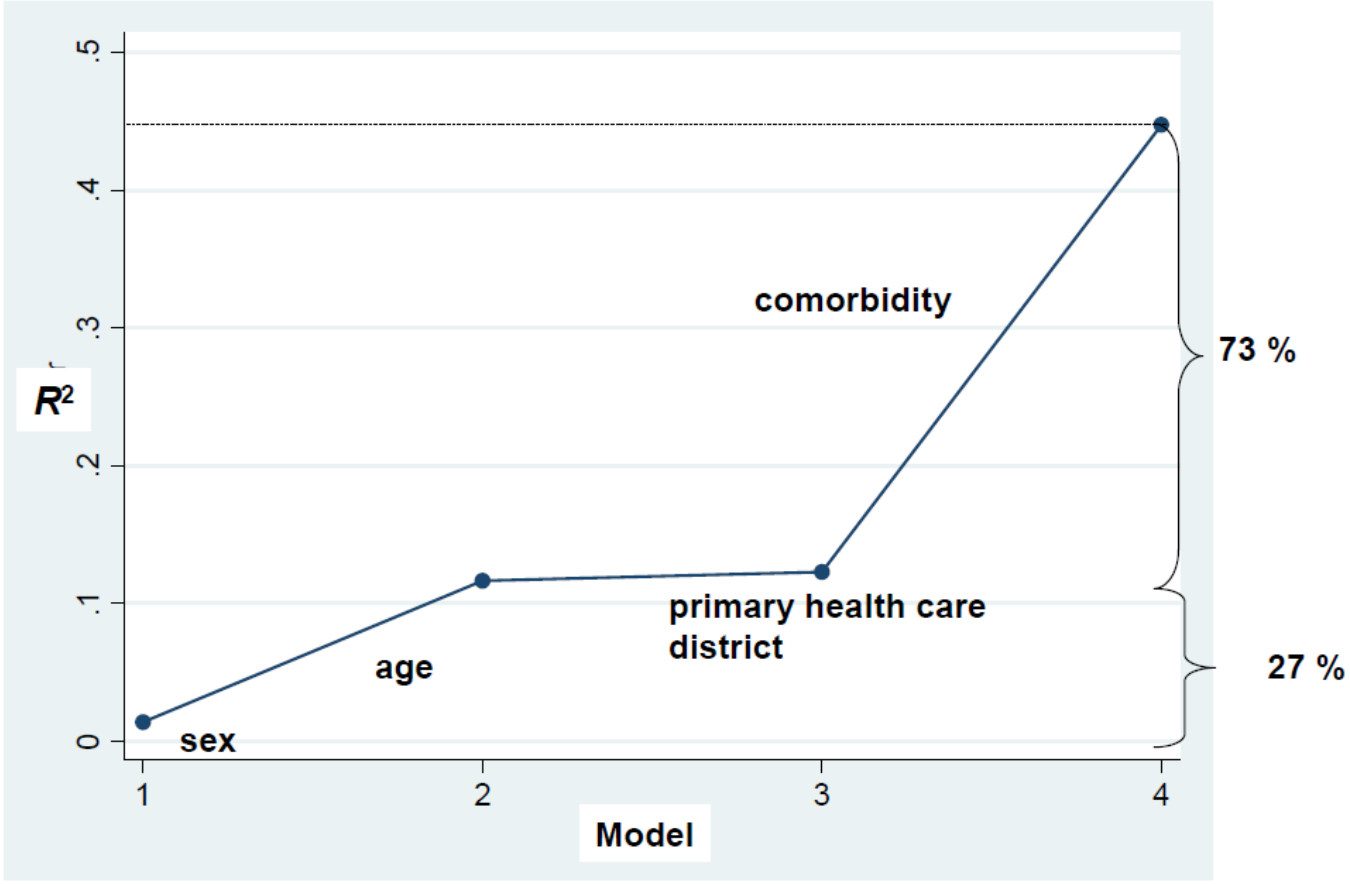
**Results:**
**Gender, age and listing** with specific PHC explained **14.48-14.88%** of the variance in individual costs for PHC. By also adding information on level of **co-morbidity**, as measured by the ACG case-mix system, to specific PHC the adjusted R2 increased to **60.89-63.41%.**

**Conclusion:**
The ACG case-mix system explains patient costs in primary care to a high degree.

# Co-morbidity matters

The coefficient of determination $R^2$

the proportion of variability in a data set that is accounted for by the statistical model




Assoc. Professor Anders Halling,
Department of Clinical Sciences Malmö
General Practice, Lund University

Ensolution.

# Customization in Sweden

- **The need of different Swedish weight lists emerged since there were different scopes of the reimbursement models on County Council level**
- **There are some different working practices in Sweden compered to the US for specific ACG groups i.e. pregnancy**
- **The ACG predictive model (Dx-PM) could also be improved since the absolute cost level between US (insurance based) and the Swedish (state funded) were different**
- **The main incentive for doing the customization was the need of developing Swedish weight lists for primary health care level**
- **Sweden does not have an insurance based healthcare system. Therefore there is no costing process in place. Most county councils in Sweden have developed micro-costing data (Cost per Patient) for the purpose of follow the patient´s costs and value chain**
- **The County Council of Östergötland, in the south-east of Sweden, has the most extensive cost per patient database in Sweden. It covers all levels of healthcare, including primary health care. The Östergötland diagnosis, pharmacy and cost data has in the first years been used to develop the Swedish ACG model. This has during 2017 been extended to other County Councils so the base for the weight lists are roughly 2,5 Mill patients**

# Swedish customized ACG weights examples

**Five Swedish ACG weight lists:**

**- All diagnosis with All cost**

**- All diagnosis with Primary healthcare cost (w/o Pharmaceutical cost)**

**- Primary healthcare diagnosis with primary healthcare cost (w/o Pharmaceutical cost)**

| ACG Code | ACG Name | ALLdia_ ALLcost | ALLdia_ PHcost | ALLdia_ Phcost_excl pharmacost | PHdia_ PHcost | PHdia_ Phcost_excl pharmacost |
|---|---|---|---|---|---|---|
| 100 | Acute Minor, Age 1 | 0,52 | 1,39 | 2,04 | 1,64 | 2,25 |
| 200 | Acute Minor, Age 2 to 5 | 0,26 | 0,62 | 0,88 | 0,77 | 1,00 |
| 300 | Acute Minor, Age > 5 | 0,23 | 0,50 | 0,63 | 0,73 | 0,80 |
| 400 | Acute Major | 0,37 | 0,58 | 0,56 | 0,90 | 0,97 |
| 500 | Likely to Recur, w/o Allergies | 0,27 | 0,53 | 0,62 | 0,76 | 0,81 |
| 600 | Likely to Recur, with Allergies | 0,30 | 0,58 | 0,67 | 0,76 | 0,86 |
| 700 | Asthma | 0,40 | 0,94 | 0,51 | 1,24 | 0,73 |
| 3800 | 2-3 Other ADG Combinations, Age < 18 | 1,02 | 0,79 | 0,85 | 1,39 | 1,67 |
| 3900 | 2-3 Other ADG Combinations, Males Age 18 to 34 | 1,30 | 0,90 | 0,88 | 1,42 | 1,62 |
| 4000 | 2-3 Other ADG Combinations, Females Age 18 to 34 | 1,16 | 1,05 | 1,14 | 1,56 | 1,81 |
| 4100 | 2-3 Other ADG Combinations, Age > 34 | 1,31 | 1,90 | 1,68 | 2,83 | 2,53 |
| 4210 | 4-5 Other ADG Combinations, Age < 18, no Major ADGs | 1,60 | 1,61 | 1,70 | 2,31 | 2,80 |
| 4220 | 4-5 Other ADG Combinations, Age < 18, 1+ Major ADGs | 3,21 | 1,12 | 1,15 | 2,27 | 2,86 |
| 4310 | 4-5 Other ADG Combinations, Age 18 to 44, no Major ADGs | 1,44 | 2,06 | 2,35 | 3,01 | 3,47 |
| 4320 | 4-5 Other ADG Combinations, Age 18 to 44, 1+ Major ADGs | 2,77 | 1,92 | 2,00 | 3,14 | 3,51 |
| 4710 | 6-9 Other ADG Combinations, Males, Age 18 to 34, no Major AD | 2,52 | 2,88 | 3,15 | 4,53 | 5,32 |
| 4720 | 6-9 Other ADG Combinations, Males, Age 18 to 34, 1+ Major AD | 5,17 | 2,53 | 2,57 | 4,97 | 5,55 |
| 4730 | 6-9 Other ADG Combinations, Males, Age 18 to 34, 2+ Major AD | 8,17 | 2,90 | 2,31 | 4,27 | 5,25 |
| 4810 | 6-9 Other ADG Combinations, Females, Age 18 to 34, no Major | 2,35 | 2,95 | 3,49 | 4,48 | 5,27 |
| 5030 | 10+ Other ADG Combinations, Age 1 to 17, 2 Major ADGs | 26,05 | 4,12 | 4,22 | | |
| 5040 | 10+ Other ADG Combinations, Age > 17, 0-1 Major ADGs | 6,17 | 6,67 | 7,04 | 8,99 | 9,75 |
| 5050 | 10+ Other ADG Combinations, Age > 17, 2 Major ADGs | 10,35 | 7,29 | 6,80 | 9,94 | 9,88 |
| 5060 | 10+ Other ADG Combinations, Age > 17, 3 Major ADGs | 15,16 | 6,91 | 6,47 | 11,03 | 10,44 |
| 5070 | 10+ Other ADG Combinations, Age > 17, 4+ Major ADGs | 24,89 | 7,11 | 6,45 | 10,67 | 10,73 |
| 5110 | No Diagnosis or Only Unclassified Diagnosis (2 input files) | 0,22 | 0,12 | 0,07 | 1,68 | 0,79 |
| 5200 | Non-Users (2 input files) | 0,02 | 0,05 | 0,03 | 0,11 | 0,05 |

# Active Swedish user forum

**In association with Swedish Federation of Local Authorities and County Councils. Updated continuously in the ACG users meeting this summary matrix shows usage of ACG. Including status, ACG share in payment model, education, Swedish RAV**

| Council | Pilot | Test | Decision | ACG usage | | | Rx | DW | Education | | Period | RAV | Diagnosis | | Cost | | Plans for ACG | CPP PHC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Analysis | Payment | % ACG | | | Input | Output | | | PHC | All | PHC | All | | |
| *Blekinge* | Yes | No | No | | | | Age | Yes | Earlier | | | | | | | | | 2006 |
| *Dalarna* | Yes | Yes | Yes | Yes | Yes | 53% | | Excisting | Yes | Yes | 18 month | LiÖ | Yes | | Yes | | More quality | No |
| *Gotland* | Ongoing | | | | | | | | | | | | | | | | | |
| *Gävleborg* | Yes | Yes | Yes in May | | Yes 2013 | 20-25% | No | Excisting | Yes | | 15 month | LiÖ 2011 | | Yes | Yes | | Analysis and increase ACG in | Yes |
| *Halland* | | | No | | | | | | | | | | | | | | | |
| *Jämtland* | | | Discussi | | | | | | | | | | | | | | | |
| *Kronoberg* | Yes | Yes | Yes | Utveckl as | Yes | 76% | Yes | Excisting | Yes | No | 24 month | LiÖ 2007 | | Yes | Yes | | | No not yet |
| *Norrbotten* | Yes | Yes | Yes June | Yes | Yes 2013 | 25% | Age | Excisting | Yes | | 18 month | LiÖ 2011 | | Yes | Yes | | | PåbörYest |
| *Region Skåne* | Yes | Yes | Yes | Yes, inkl. | Yes | ca 80% | Yes | Excisting | Yes | | 18 month | LiÖ | | Yes | Yes | | | Yes, but slow |
| *Stockholm* | Yes, 2000 och 2009 | Yes | Yes | Yes | No | | | VAL-database | Yes | | 12 month | | | | | | ACG as PHC description | Pilot planned |
| *Sörmland* | Yes | Yes | Yes | | | | | | | | | | | | | | | |
| *Uppsala* | | | | | | | | | | | | | | | | | | |
| *Värmland* | Yes | Yes | Yes, 2009 | Över-siktligt | Yes | 45% | Yes | No | Yes | No | 15 month | LiÖ | Yes | | Yes | | Analysis and increase ACG in payment | Vision |
| *Västerbotten* | Yes | No | Spring | Yes | Yes | ? | Age | Yes | Yes 2012 | No | | | | | | | Start 2014 | |
| *Västernorrland* | Yes | Yes | Spring 2011 | Yes | Yes 2013 | ? | Age | Finns | Yes 2013 | No | 18 month | LiÖ 2011 | | Yes | Yes | | | Yes |
| *Västmanland* | Yes | Yes | Yes | No | Yes | | | No | Yes | | 15 month | | Yes | | Yes | | | Maybe later |
| *VGR* | Yes | Yes | Yes | Utveckl as | Yes | 43% | Age | Excisting, VEGA | Yes | Yes | 15 month | Blekinge/ LiÖ 2006 | Yes | | Yes | | Analysis and increase ACG in payment | Yes, but slow |
| *Kalmar* | Yes | Yes | Yes | Utveckl as | Yes | 15% | Age/CNI | EPJ: Cosmic, | Yes | No | 18 month | LiÖ 2011 | | Yes | Yes | | | No |
| *Jönköping* | Yes | Yes | Yes | Utveckl as | Yes | 21% | Yes | EPJ: Cosmic | Yes | | 18 month | LiÖ | | Yes | Yes | | | No |
| *Örebro* | | | | | | | | | | | | | | | | | | |
| *Östergötland* | Report/ Analysis | Yes | Yes | Yes | Yes 2014 | | | Yes | Yes | | | | | | Yes | | | Yes |

# ACG in the different reimbursement models in Sweden

## Factors to consider

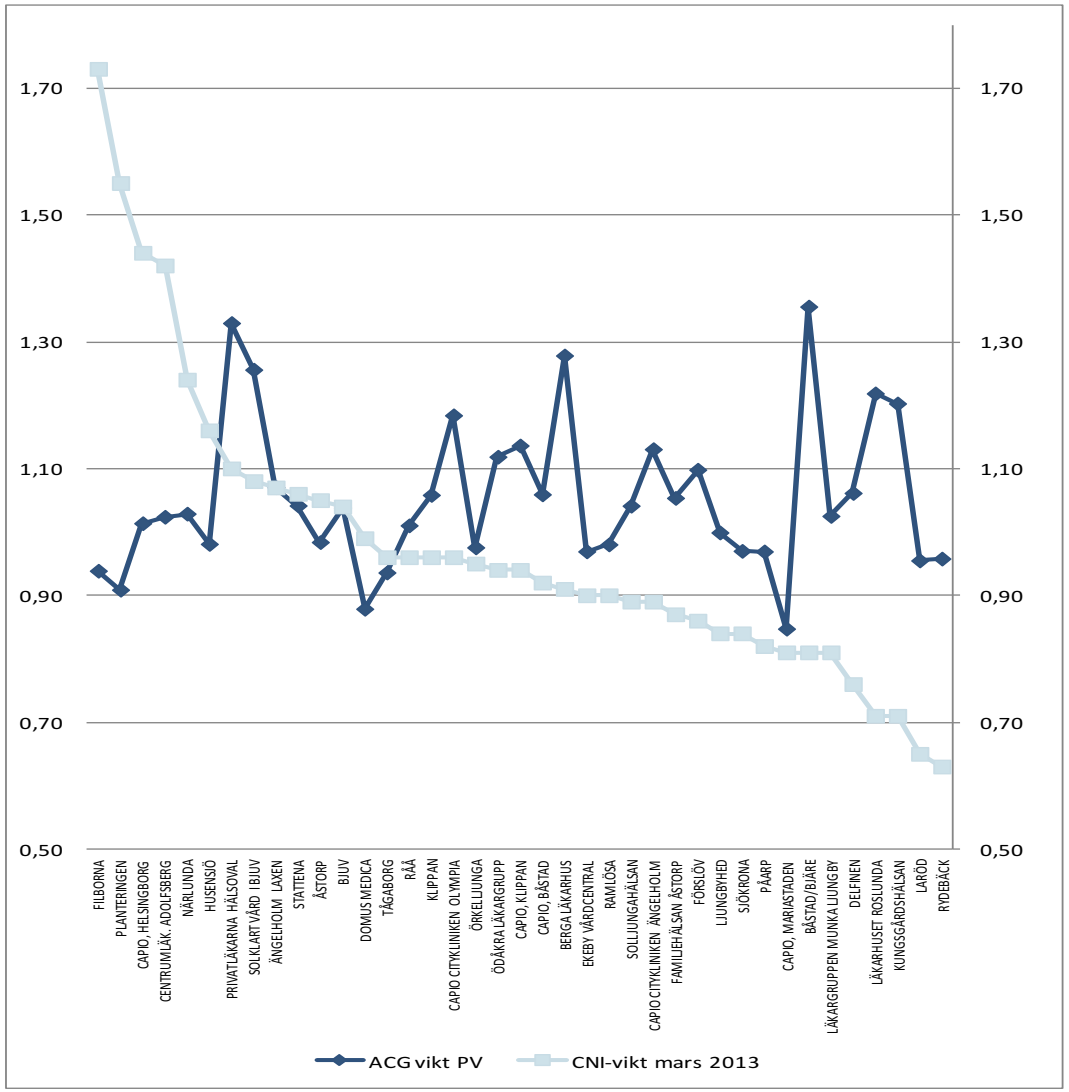
- **Primary healthcare's scope of assignment and responsibilities**
  - **Pharmaceuticals, Elderly care and so on**
- **Components in the reimbursement model**
  - **ACG, CNI (socioeconomic factors), Age, Visits, Quality measures,**
- **ACG based on all diagnosis or diagnosis only registrated in primary healthcare**
- **Time frame for historical diagnosis data**
  - **12 , 15, 18  or 24 months**

# Reimbursement model example Region Skåne

- **98 percent fixed capitation based reimbursement**
  - **80 percent of the capitation based on ACG. Diagnosis from all healthcare in Skåne 18 month period. ”Multi-sick patients need more resurces”. Index between 0.75 to 1.35**
  - **20 percent of the capitation based on socioeconomy Care Need Index CNI (unempoyment, income, education level). ”Risk groups need more resources for preventive care”. Index between 0.55 to 2.35**
- **2 percent target directed budget**
- **Healthcare units are responsible for all base pharmacueticals (aprox 75 per cent of all pharma cost), medical services and medical tools.**
- **ACG calculations based on all healthcare/ all diagnosis.18 month rolling diagnosis data.**

# ACG and socioeconomic index

- Example from Region Skane
- Low/ no correlation between ACG and socioeconomic score.
- In a reimbursement model they are used to support different porposes.
  - ACG = actual resource need
  - CNI = preventive work targeted risk groups of population



# Reimbursement model example Värmland

## Example from County Council Värmland Including payments for ACG, Socioeconomic, Geography, Age/gender, mothers visits, translated visits, other special services.

**LiV HV payment model (example)**

Landstinget i Värmland

| | |
|---|---|
| pecial services payment | 27 803 000 |
| get related Kr per Year t | 13 000 000 |
| Kr per translated visit | 300 |
| Å/K+ACG - Kr per point | 697,92 kr |
| MVC - Kr per woman per month | 48,08 kr |
| GEO Kr per year total | 5 000 000 |
| CNI Kr per year total | 12 000 000 |

| | |
|---|---|
| ACG | 10,0% |
| Listningsp | 90,0% |
| Summa | 0,0% |

| | |
|---|---|
| GEO-border | 8,0 |
| CNI-border | 1,5 |

or senaste version

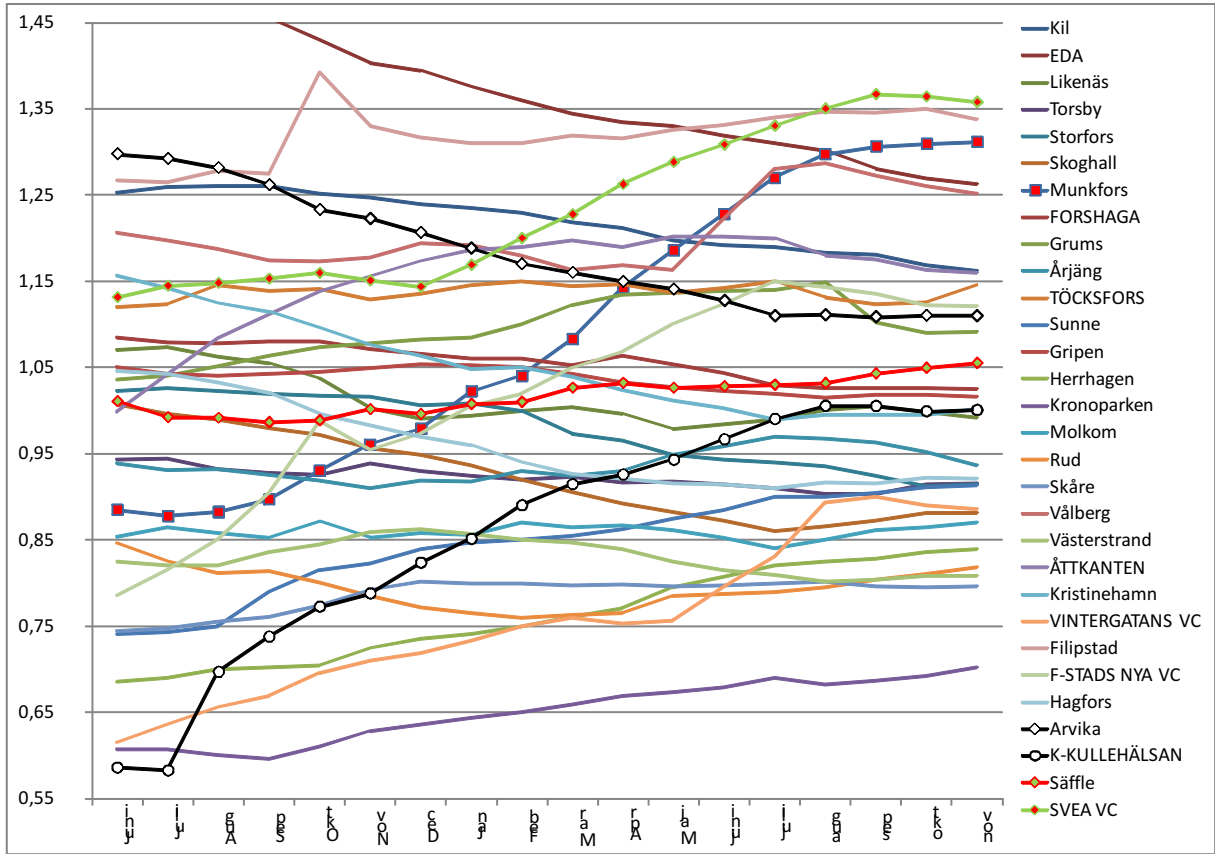
0,029265

| Enhet | Privat / Offentlig | Calculated total payment per month (Total 72447712) | # listed patients (Totalt 273112) | Payment Age & gender per month (Total 58705469) | ACG casemix alla listade 090622 (Average 1) | Payment ACG per month (Totalt 6522830) | Listed women between 15 and 44 | Payment for MVC per month (Total 2318434) | Geography points | Payment geography (Total 1377732) | Payment geography per month (Total 416667) | Target related payment (Total 1083333) | # translation visits (Total 3363) | Payment translation visits (Total 84063) | Care Need Index points (Average 2,2) | Payment points for socioec (Total 974020) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Arvika | O | 7 062 770 | 26 596 | 5 770 329 | 1,00 | 641 148 | 4589 | 220 654 | 6 | 0 | 0 | 106 484 | 235 | 5 875 | 2,14 | 88 191 |
| Eda | O | 2 324 579 | 8 546 | 1 884 167 | 1,00 | 209 352 | 1340 | 64 432 | 12 | 95 989 | 29 030 | 34 770 | 30 | 750 | 2,10 | 26 997 |
| Ekshärad | O | 1 058 848 | 3 837 | 868 033 | 1,00 | 96 448 | 518 | 24 907 | 11 | 33 167 | 10 031 | 16 018 | 0 | 0 | 1,93 | 8 914 |
| Filipstad | O | 2 154 440 | 7 607 | 1 728 892 | 1,00 | 192 099 | 1163 | 55 921 | 12 | 88 079 | 26 638 | 31 904 | 165 | 4 125 | 2,60 | 45 416 |
| Forshaga/Deje | O | 3 017 962 | 11 657 | 2 457 178 | 1,00 | 273 020 | 2116 | 101 744 | 7 | 0 | 0 | 45 344 | 158 | 3 938 | 2,16 | 38 728 |
| Gripen | O | 4 913 993 | 17 475 | 3 976 554 | 1,00 | 441 839 | 3467 | 166 705 | 3 | 0 | 0 | 73 382 | 160 | 4 000 | 2,47 | 92 114 |
| Grums | O | 2 381 960 | 8 964 | 1 947 187 | 1,00 | 216 354 | 1501 | 72 173 | 8 | 0 | 0 | 35 933 | 40 | 1 000 | 2,18 | 31 620 |
| Hagakliniken | O | 808 100 | 3 039 | 655 475 | 1,00 | 72 831 | 446 | 21 445 | 12 | 33 393 | 10 099 | 12 096 | 0 | 0 | 2,14 | 10 018 |
| Hagfors | O | 2 331 226 | 8 432 | 1 889 196 | 1,00 | 209 911 | 1199 | 57 652 | 12 | 96 246 | 29 108 | 34 863 | 85 | 2 125 | 2,23 | 32 934 |
| Herrhagen | O | 2 159 360 | 8 341 | 1 718 005 | 1,00 | 190 889 | 2123 | 102 081 | 3 | 0 | 0 | 31 704 | 18 | 438 | 2,65 | 47 181 |
| Kil | O | 3 114 762 | 12 051 | 2 541 366 | 1,00 | 282 374 | 2163 | 104 004 | 7 | 0 | 0 | 46 898 | 73 | 1 813 | 2,11 | 37 020 |
| Kristinehamn | O | 5 489 477 | 20 541 | 4 463 083 | 1,00 | 495 898 | 3532 | 169 830 | 9 | 56 843 | 17 191 | 82 360 | 423 | 10 563 | 2,18 | 72 475 |

# Development of ACG weight per health care unit

**At start of implementation some units were missing diagnosis descriptions**

**Swedish experience is it takes approximately 18-24 months for model to be fair and stable**



# Questions?