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Covert checks by standardized patients of general practitioners' delivery of new periodic health examinations: clustered cross-sectional study from a consumer organization

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Summary

Article Focus

* Can data from a consumer organisation be useful and valid for secondary analysis in health services research?

* Do General Practioners (GPs) follow the guideline for preventive service history taking

* Was the well-recognised time barrier for delivering preventive services also seen in this study in Vienna, Austria?

Key Messages

* Consumer organisation´s assessment of GP performance was valid, representative and precise.

* Around 1/4 of GPs failed to achieve the standard for history taking in the new periodic health examination

* Consultation time was longer than expected and sufficient: time-barrier problem has been overcome.

Strengths and Limitations

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* 40 visits at 21 GPs are a small sample, however this size is comparable to similar mystery patient studies.

* All incognito standardized patiens went undedected, in contrast to many similar studies.

* The random sample was found to be double stratified and well balanced.

* Multilevel analysis was possible and indicated the role of GP practice style.

* Additional to direct observation data, copies of GPs´ record notes may provide further objective assessment.

Abstract

Background

To improve the service quality of general practitioners (GPs) their actual performance level must be assessed. Direct observation of routine GP performance using actors is an established method in quality management. Consumer organisations frequently assess the quality of services in various industries through use of mystery shoppers. Analysing data on GPs' performance collected by consumer organisations may provide a new low-cost method in health service research.

Methods

We appraised the Austrian Consumer Organisation's sampling technique and clinical appropriateness of the cases presented by incognito standardized patients (ISPs, mystery shoppers) for the standardised Austrian periodic health examination (PHE) through the GPs. We analysed GP consultation/waiting times and quality of history taking.

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Results

The Austrian Consumer Organisation (VKI) used a double stratified random sampling method to observe in a cross-sectional study a representative sample of GPs. The location of GPs included in the VKI sample reflected the distribution we expected based on data provided by the city of Vienna. We determined that the clinical scenarios presented by the ISPs were valid and believable and that no GP realised the ISPs were not genuine patients. The average consultation time was 46 minutes (95% CI 37-54 mins). Waiting times differed more than consultation times between private and contracted GPs. No differences between private and contracted GPs in terms of adherence to the evidence-based guidelines regarding history taking (using the heath information sheet) and questions regarding alcohol use were found. According to our analysis, 20% of the GPs took a perfect history (95%CI 9% - 39%).

Conclusions

The analysis of secondary data collected by a consumer organisation was a valid method for drawing conclusions about GP PHE practice. Initial results, like consultation times longer than anticipated, and the moderate quality of history taking encourages continuing the analysis on available clinical data.

Background

For many eligible patients the provision of adequate preventive care is blocked by well-known barriers, despite the existence of elaborate guidelines based on best evidence. [1 2 3] Lack of time and inadequate reimbursement were the main barriers named by Canadian family physicians to performing the periodic health examination (PHE) as recommended by the Canadian Task force on the Periodic Health Examination. [4 5]

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Our publication reports and discusses a new method, the use of routine data from consumer associations for secondary analysis by health service researchers to study delivery of preventive care. We have not identified any other studies using consumer organisation data for secondary analysis in preventive health care performance assessment. As consumer associations with long traditions exist in all industrialized nations, such as Consumer Reports in the USA, similar data could well be available in many countries and could be analysed by health service researchers in the way we propose in this paper. [6]

Studies of preventive service provision which rely on electronic medical record audit, physician self-report, patient surveys and chart review are all prone to bias, as they usually lack validation against observed practice. Studies with standardized patients (SPs) have been used successfully to overcome these kinds of bias. [1;7] A standardized patient (SP) is a healthy subject who is trained to assess the performance of doctors based on pre-defined criteria. Unannounced or incognito SPs (ISPs) have been used unobtrusively to assess the routine practice performance of doctors. [8] *"Unknown to the prospective provider of care, such a 'patient' arrives at the clinic and requests care. What happens is gleaned from the records of care and also from the observations reported by the pseudo patients, who have been trained to make the needed observations".* [9]

These ISPs are the health care version of the mystery shoppers used in other industries. *"Mystery shopper or visitor are a well known and widely used standardized method in quality management for assessing service quality in the retailing and tourism industry".* [10] In autumn 2008 the official consumer information association of Austria, "Verein für Konsumenteninformation" (VKI), published a test report on physicians delivering the PHE. In the spring of 2008 two ISPs, members of

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the VKI tester team, had visited unannounced a sample of randomly selected general practitioners in Vienna, Austria. [11]

In Austria since 1974, GPs have been reimbursed for annual PHEs from public funds, currently at around 100 USD (75 Euro, current value) per patient. This service is provided free of charge to patients. A reform of the content and new documentation standards were introduced in 2005. Since this time, around 850,000 PHEs have been performed each year from the adult Austrian population of six million. [11 12 13 14"p.78"].

We wanted to determine whether the data gathered by a consumer organisation through their ISPs could be used to assess preventive service and quality. We also wanted to know if the assessments through the ISPs could be generalised to the GP workforce in Vienna. Initial findings related to the waiting time and quality of service are reported here.

Methods

Our methods consisted of two major steps. In the first step we critically appraised the sampling and data collection used by VKI. In the second, we performed our own analysis of the electronic dataset provided by VKI.

Our study design was presented to the legally relevant public health ethics commission of Vienna, which had no objections.

1. Appraisal of VKI sampling and data quality

Knowledge about the VKI methodology was gained through one personal and two phone interviews at the end of 2008 and in first quarter of 2009 with the researcher at VKI who managed the study. [11] We further analysed the note-taking forms used by

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the ISPs, the VKI's internal written interpretation guide, and a report on the VKI testing methodology published in 2008. [15]

We judged the quality of the sample by comparing it with the GP distribution in Vienna and by repeating the VKI sampling procedure in a simulation of our own. We assessed the quality of the data gathered by the ISPs against criteria for a good quality ISP study provided by a recent systematic literature review in the field. [8] These criteria cover the use of content checklists, note-taking by the ISP, soundness of clinical cases, and ISP detection rates. The results of our appraisal are presented in our first set of findings below.

2. Secondary analysis

Data preparation

VKI provided a de-identified electronic data set (42 records). In this data set GPs' names and office locations were deleted and GPs were sequentially numbered by VKI. We transformed the VKI ratings into corresponding numerical values (e.g. the five Likert scale satisfaction scores ranging from "+ +" (very good), through "o" (average) to "- -" (not satisfactory) were re-coded by us into the five integers from 4 to 0. Continuous variables such as waiting times, consultation times, were transferred unchanged into our final secondary data set.

Additionally we were provided with hard copy clinical results which had been given to the ISPs by the GPs, and which were not used by VKI in its own report (34 records – 8 were missing). These 34 forms were copies of the double page health summary sheets (HSS, "Befundblatt") which the GPs should provide in hard copy at the end of the PHE to their clients. [16 17] One of us (KT) blinded to the medical content of the ISP clinical cases, extracted and coded all clinical data from the 34 paper forms into a second electronic dataset in December 2008. More than 90 variables were coded from

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this data. Free text remarks by the physicians were not extracted (see additional file 1: Scanned HSS coding template with data of GP Nr. 1).

Statistical analysis

The primary sampling unit for our data analysis was the GP (see Figure 1). Each of 21 practitioners were offered two visits. Two of the practice visits were rejected by two GPs – one private and one contracted (because of an administrative error and because lab results were not ordered by the GP). Both GPs were visited by the other ISP. This resulted in a total of 40 observations. The 21 GPs belonged either to a private or a contracted insurance group, which we accounted for in our statistical analysis by the survey/panel data methods and by the multilevel data analysis. [18] There was double stratified probabilistic sampling as GPs were drawn within their strata and district blocks by a strictly random process. However, we were unable to verify the stratification across the 23 districts in Vienna as this identifying data was erased in the dataset provided to us to ensure GPs' anonymity. The two observations dealing with one GP were not independent and thus were "clustered at the level of the GP". We adjusted for this clustering effect, and estimated intra-class effects at the GP level by multilevel modelling also, as proposed in the literature [19 18].

We conducted our statistical analysis for this publication with Stata Versions 9.1 and 11.[20] Descriptive statistics (e.g. means, proportions, and confidence intervals (CI)) were produced by the Stata survey/panel data methods with the most conservative assumptions (e.g. finite-population assumption, linearized proportions and binomial Wald statistics for CI of proportions). For additional modelling we used mixed-effects restricted maximum likelihood (REML) estimation and generalized linear models for continuous variables, and random- or fixed-effects logistic regression for binary

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dependent variables (multilevel data modelling). All statistical tests performed and confidence intervals (CI) reported are at the 95% level.

For performance assessment we constructed appropriate indicator variables in accordance with the published guidelines for the PHE based on the observations of the ISPs. [21] For example, only if the full structured medical history proforma, the "Health Information Sheet" (HIS), was completed, including optimal alcohol screening according to guideline, was the constructed binary (yes/no) indicator coded positively.

Results

Step one: Appraisal of VKI sampling and data quality

Sampling GPs

Two types of insurance funding exist in Austria for GPs offering the PHE free of charge. A GP may hold a comprehensive insurance contract plus a PHE contract or a PHE contract only. In our study we referred to GPs with the comprehensive plus PHE contract as "contracted GPs" (in Austrian-German "§2 Kassenärzte"), and those with the PHE contract only as "private GPs" (in Austrian-German "Wahlärzte mit Vorsorgeuntersuchungsvertrag"). Payment of "private Austrian GPs" can involve out-of-pocket payments of patients to cover part or all of the patient expenses and refunding of a part by insurance. According to a previous study in Austria, the reasons for choosing such a private GP ("Wahlarzt") include short waiting and longer available consultation times. [22] A description of the Austrian health system with its mixed contracted and non-contracted private GP primary care system is beyond the scope of this paper, and can be found in an English/German WHO country report. [12]

In this study all GPs had a PHE contract, and thus no out-of-pocket payments for any PHE service were necessary, even for "private GPs".

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VKI reported to us that they used a double stratified random sampling method for GPs in Vienna. One strata was insurance contract status ("private/contracted") and the other was the geographic distribution of doctors among 23 districts in Vienna. Two independent numbered name lists, one for "private GPs" and another for "contracted GPs", were used. The lists were provided to VKI by the Central Association of Austrian health insurances ("Hauptverband der österreichischen Sozialversicherungsträger") which runs the central registry of all PHE contracts, but not to us. Each list was sorted for districts, showing the office locations and the total number of GPs in each district. The sample population in the lists was 1069 GPs, 211 (20%) of whom were "private". VKI fixed the GP sample size at 21, 7 of whom (33%) being "private GPs", thus creating a relative oversampling of "private GPs". To determine the sample size per district block, the number of GPs to be sampled for each district was calculated by VKI from the names lists sorted for districts. For example, the seven "private GPs" were sampled from a workforce distributed over 23 districts. Each of the seven district sampling blocks formed should comprise around 14% of the workforce. Thus districts were lumped together in the sorted list until a block held around 14% of the "private GPs" workforce, then the next block was created from the remaining districts, and so on. In this way the number of GPs per district was fixed for all 23 districts in Vienna, and for each of the two GP contract types separately.

Selection from a district block was done by drawing a random number within the numbered name lists. The random number for each district block was generated by an internet-based public domain software, AGITOS. The sampling base numbers used in AGITOS for each block was determined by the total number of GPs in each district block. [23]

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After the GPs' names were determined, the ISPs arranged the visits. If an appointment could not be arranged, the ISP called the VKI office and a replacement GP was drawn there by the random number mechanism within the district, as described above. To visit seven "private GPs", 14 replacements were needed. This contrasted with three replacements needed for the 14 "contracted GPs".

Table 1 - Outcome of VKI sampling of GPs in Vienna by City District and GP insurance contract

Vienna District Nr.	VKI sample (# GPs)	of these: "private"*	"contracted"**
1.	1	1	
2.	1		1
3.	2	1	1
4.	1	1	
5.			
6.			
7.			
8.			
9.	1	1	
10.	1		1
11.	1		1
12.	1		1
13.	1	1	
14.	1		1
15.	1		1
16.	1		1
17.			
18.	2	1	1
19.	2	1	1
20.	1		1
21.	1		1
22.	1		1
23.	1		1
Total GPs	21	7	14

VKI published the names of the GPs sampled and their office locations in its report 10/2008.

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* We assessed the contract status of each named GP through the public internet search template of the Vienna Medical Chamber (http: www.praxisplan.at).

** "Contracted GPs" have a full contract with the regional general health insurance including a PHE contract ("§2 Kassenärzte").

--- end of Table 1 ---

The VKI methodology resulted in one GP being selected in 15 of 23 districts; two GPs in three districts (Nos. 3, 18, 19), and no GPs in five districts (Nos. 5-8 and 17) (see Table 1). Six GPs in the sample were from inner districts, 15 from outer districts. 11 GPs had their office in the more affluent part of Vienna, 10 in the less affluent. The nine inner city districts (Nos. 1- 9) in combination with three outer districts (Nos. 13, 18, 19) comprised the more affluent part of Vienna compared with the rest, judged by purchasing power per head and housing prices (for details classifying affluent versus less affluent districts see additional file 3: GP sample distribution in rich and poor parts of Vienna).

The distribution of sampled GPs among the Viennese districts should resemble as much as possible the distribution of the real GP workforce performing PHE among the districts. The stratification aimed to improve the representativeness with regard to two strata, geographic distribution and insurance contract status. "Contracted GPs" per district should correlate with the district population size, as "contracted GPs" are placed by the Vienna general social insurance agency to serve the population. Thus highly populated districts should also be represented well in this sample. Inner city districts (Nos. 1-9) have a smaller population than most of the 13 outer ones (Nos. 10-

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23). The sample reflected this distribution, with a GP ratio of 6:15 for inner versus outer districts. “Private GPs”, meanwhile, are free to establish themselves wherever they like. We assumed that they would tend to open their offices in the more affluent districts, as their income relies on out-of-pocket payments for most of their services except the publicly financed PHE.

To examine the quality of the random sample block procedure of VKI we had to rely on other data, as we were not given access to the two original VKI sampling population GP lists. Only the totals of their two lists were reported to us, namely 211 “private GPs” and 858 “contracted GPs”. We repeated and thus simulated the VKI procedure with the most recent and applicable data we could find. These were published by the city administration of Vienna in 2002, reporting on the district distribution of 734 private GPs out of total of 1572 GPs. [24 25] Data on PHE contracts of these private GPs were not available. According to that data many of the private GPs (17%) practised in the 19th (9%) and 13th (8%) districts. When repeating the VKI’s district block procedure with this other data, the first of the 7 GPs was drawn by us out of the first block composed of those two districts. The next two (1st and 18th) did hold together 14%, so the next GP was drawn from this second bloc, and so on. In our simulation the seventh “private GP” was drawn from five districts at the end of the list, each with less than 3% of the workforce (see also additional Excel file 4: Sampling assessment including source data and further 2007 city administration workforce data).

When comparing our simulation result with the sampling result of VKI, published in its magazine with GP name and location, we found a nearly identical distribution. [11] In the VKI sample all seven “private GPs” were from the rich part of Vienna, whereas in our simulation six of the seven were from that part. However as only 211 “private

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GPs" held a PHE insurance contract in 2008, the district distribution of 211 "private GPs" in the VKI list might be different from that of the 734 private GPs of our data of 2002. This could explain the small deviation from our simulation result (see Figure 1).

Figure 1 – Results of VKI sampling compared with our simulation sampling of private GPs

Legend for Figure 1:

In 2008, 21 GPs were sampled by VKI, 7 of them "private GPs". All 7 were located in the richer part of Vienna. Among the "contracted GPs", 4 out of 14 were located in the richer Vienna districts.

GP workforce data of 2002, published in a health report of the City of Vienna administration, provided the most recent information on distribution of private GPs among the Vienna city districts.

As we were not provided with data, beyond totals, on the two sampling population lists of VKI, "n.a." means that we could not access the district distribution data.

-------(end of figure legend)-----

Validity of clinical cases

Two ISP clinical cases were constructed by VKI health experts on the basis of the Austrian PHE guideline handbook, available in print and Internet download since 2005. [21] The guideline handbook was intended to be used by health service administrators (such as screening programme managers at local and regional level) to organise the preventive service activities of GPs in their area, similar to guidelines by other professional bodies. [26 27] With the support of medical journalists, the guideline

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handbook was written to be understandable to a broader audience than GPs, although it includes evidence-based references. [28] The high amount of detail in the guideline handbook allowed VKI experts to develop the two clinical cases for the ISPs in such a manner as to elicit clearly observable actions by the GPs during the PHE.

Both the male and the female ISPs were over 65 and presented complex clinical screening cases. The predominant critical screening task of the male was the detection of his high cardiovascular risk and of the female her clearly problematic alcohol consumption. However, the task involved screening for nearly all 15 target conditions of the Austrian PHE.

Apart from the clinical case history the two ISPs presented the GP with fabricated laboratory data, tailored to their cases. For example, the woman reporting problematic alcohol consumption had elevated levels of serum liver enzymes (Gamma GT: 65 U/l, GOT 44 U/l, GPT 35 U/l). Before the fieldwork, the ISPs rehearsed with the help of the outpatient facility of the Vienna public social insurance medical service, where also their laboratory details were fine-tuned. A more detailed description of the clinical case construction is included as additional file (see additional file 2 – "ISP_Cases")

Assessment of data collection by ISPs

The two ISPs each arranged visits with 21 GPs. At the GP's office each ISP completed the standardized health information sheet (HIS), a questionnaire which all GPs offering reimbursed PHE are obliged to provide. [29] They also completed the AUDIT-GMAT, an Austrian version of the WHO questionnaire "AUDIT" for problematic alcohol consumption, when offered. [30] The ISP training had included completion of the HIS and AUDIT-GMAT as well as presentation of their history personally to the GP. At the end of the consultation they each collected the

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standardized health summary sheet (HSS), which the doctor is also obliged to complete and provide in copy to his/her client. More information about the standardized medical records set for the Austrian PHE is detailed below in the results and has been published elsewhere. [31]

Immediately after having left a GP's office the ISPs noted their experience using a standardized note form. At the VKI office an independent person extracted data for the calculation of scores. The data coding was explicitly defined for the GP test in advance by specifically written instructions called "Regeln für die Eingabe/Beurteilung in TestRev" (rules for data entry and assessment into TestRev). We were provided with these specific coding rules. TestRev is the routine software and database VKI applies for storing, analysing and reporting on the numerous tests they perform in all fields of industry and services. For data handling, an in-house quality management handbook exists, and this was also applied for the PHE test. VKI holds an official state quality certificate for its testing procedure. [15] After data entry a second person compared the extracted results in TestRev with the protocol notes of the ISP. In the case of disagreement a third independent senior person decided as to the correct interpretation and coding.

In this way VKI gathered in its electronic dataset detailed and summary statements such as the ISPs' subjective impressions (satisfaction), but mostly VKI gathered more objective observations on activities the GPs performed or omitted. These more objective ISP observations can be considered in the health care quality field as "patient experience", more amenable to effectively improving quality of care than the more subjective "patient satisfaction". [32 33-35] VKI condensed the ISP notes into 45 statements/judgements per visit. This 45 items VKI dataset was made available to us. We were not provided with the notes taken by the ISPs. However, as the strict rule-

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based coding system of VKI allows the condensed statements/judgements to be re-expand to the detailed observations we could interpret the performance of each GP to a greater degree than the 45 items would suggest. For example, problematic alcohol consumption should be screened for. VKI coded "+ +" (very satisfactory) when the AUDIT-GMAT questionnaire was handed over to the ISP, "o" (average) when the questionnaire was not used but the GP did discuss alcohol consumption with the ISP, and "- -" (not satisfactory) when the topic was not even raised verbally.

We found the VKI method to be reliable in reporting on the ISPs' experience of GP interventions which should have been performed during the PHE. For this first publication we restricted ourselves to analysing data on waiting and consultation time, and GP performance during the medical history taking phase, compared to guideline recommendations.

Detection rate of ISP

Detection of ISP by the observed physician can be an important obstacle in ISP studies, [8] leading to bias and confounding. We are confident that all ISP visits went undetected and physician behaviour was not distorted by the idea that the client could be an expert observer with a constructed clinical case. The age of both ISPs was the same as in the presented clinical cases. Great care was taken to ensure that there was no observable difference on signs. The responsible researcher at VKI stressed in the first interview with us in October 2008 that none of the 40 ISP visits had been detected. We asked her again in February 2009 to interview the two ISPs to determine if they had any suspicion that any of the GPs could have detected them. The response was again negative. One ISP even replied on that occasion that the only GP who had seemed to be a little suspicious had just sent a personal invitation letter to return for the next annual PHE.

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Results of step two: Secondary analysis

In our secondary analysis we focused primarily on observational experience data. The satisfaction data has been published by VKI in its own magazine. [11] We received data on 40 of 42 arranged ISP visits, the same number as reported in the VKI test report publication in 2008. Two ISP visits were rejected by two GPs, one "private" the other "contracted". The reasons given by the two GPs for rejection were in one case an administrative GP error (a misunderstanding of the use of the electronic insurance patient access card), and in the other that the pre-prepared laboratory results were not ordered by the GP herself. However, both GPs were visited by the other ISP.

Service delivery time

For the completed visits the average consultation time was 46 minutes (95% CI 37 – 54 minutes). For the male ISP it was 38 minutes (CI 33 – 43) and for the female ISP 54 minutes (CI 40 – 67). The difference of 16 minutes between the two ISP cases was not significant, when applying a survey/panel data method adjusting for the clustering effect at GP level, but was significant in the full adjusted multilevel model (Coefficient 15,6; CI 4,9 – 26,3).

Female GPs offered longer consultations, with an average of 47 minutes (CI 38 – 57), than males, with an average of 38 minutes (CI 19 – 58). The observed difference of 11 minutes in our sample is not significant, when applying the survey/panel method adjustment for multilevel modelling.

Using multilevel analysis we estimated the proportion of variance explained by the intraclass effect versus the difference between the GPs. If a high proportion of variance is explained by one variable, then this variable has a strong effect on the outcome of interest. 62% of the variance for waiting time was determined by the GP

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intraclass effect compared to 30% for consultation time. These variance estimates result from a conservative monovariate random effect GLS regression model with the GPs as explanatory variable. Further adjusting for the two different ISP case types increased the variance proportion for consultation time explained by the GP by one third, to 45%. The same adjustment did not significantly change the variance proportion in waiting time (slightly increased from 62% to 67%). As could be expected, the intraclass and adjustment effects were even more pronounced in the fixed random effect model.

Table 2 - Proportion of all variance explained by intraclass (GP) variation in multilevel analysis on waiting and consultation time

Regressed on GP only

Time	Random effect (conservative)	Fixed effect (strong assumption)
Waiting	0.621*	0.686
Consultation	0.298	0.493

Regressed on GP and ISP (adjusted for ISP case type)

Time	Random effect	Fixed effect
Waiting	0.668	0.718
Consultation	0.445	0.562

After adjustment for ISP case type the intraclass effect of waiting time did increase a little, whereas for consultation time the effect increased from 0.30 to 0.45 in the random effect model. The conservative random effect model seems to us most appropriate for this kind of data.

* rho: proportion of all variance explained by intraclass (GP) variation

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-------- *End of Table 2* --------

The intraclass effect at the individual GP level could be interpreted as so-called "practice style", a term usual in the quality management literature for characterizing typical and constant patterns of office routines of individual service providers. [9]

In summary, the practice style of GPs had a strong influence on waiting time and a lesser influence on consultation time. Consultation time was dependent on the type of ISP case, but waiting time was not. GPs reacted to the specific cases in adjusting their consultation time.

We also found a difference of 22 minutes in average consultation time between private and contracted GPs. The difference was significant. "Private GPs" provided 60 minutes (CI 50 – 71), "contracted GPs" 38 minutes (CI 26 – 49) on average. The difference remained significant using a fully adjusted multivariate model which included the two ISP case types, GP gender, GP insurance type and the clustering on the GP level (generalized linear modelling statistics incorporated in Stata 11.0)

Quality of service

For this publication we compared observed GP history taking performance with the evidence-based recommendations. According to the officially published guideline, the PHE should include a structured general history taking supported by the HIS and questions regarding alcohol use, supported by the AUDIT-GMAT. We classified five performance levels in respect to general history taking adherence to the guideline before analysing the data. The five HIS-scores ranged from "0" (=below minimal) to

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"4" (=perfect history). The maximum general HIS score of four was achieved when the HIS was offered and all medical domains were addressed during the consultation. Omission of 1 of the 8 medical domains was tolerated in our data interpretation as possible measurement error on the part of VKI. A score of "3" was achieved when the HIS was offered but not all domains were touched on additionally verbally. No HIS, but raising at least 7 of the 8 required domains verbally scored "2". A score of "1" was given when there was no HIS and 2 or 3 domains were missing. No HIS and 4 – 8 domains not addressed scored "0". As the general PHE contract with the GPs requires that the HIS proforma be completed we considered HIS scores of "2" or less below standard. [36;37]

Screening for problematic alcohol consumption should start with completion of the AUDIT-GMAT questionnaire by the client. For this screening activity we scored the performance into two categories. Care according to guideline provided the AUDIT-GMAT (we scored "1"), otherwise we scored "0".

A HIS was offered in 53% (CI 34% - 71%) of all visits. Among the GPs offering a HIS a proportion outperformed the requirements of the guideline if they additionally addressed nearly all the medical content of the HIS during the consultation phase of the PHE (HIS score "4"). In 20% of all visits GPs scored "4", indicating perfect general medical history taking (CI 9% - 39%).

The AUDIT-GMAT was offered in 38% (CI 19% – 56%) of all visits. There was no difference between "private" and "contracted GPs" (p=0.89) and no difference between the female and male ISPs (p=0.73). All GPs who offered an AUDIT-GMAT had also offered a HIS (see also additional file 5: HIS- and AUDIT-scores crosstable n=40 cases).

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We considered the acceptable overall history taking service standard level to be a HIS offered (HIS score "3" or higher) plus the alcohol topic addressed at least verbally. 30% (CI 12–48) of all visits were performed below this standard. The difference in proportion of "private GPs" (21%) and "contracted GPs" (35%) was not significant in the full multilevel model ($p > 0.05$).

We found a significant intraclass effect at the GP level: For a given GP the Odds Ratio was 60% (CI 0.03 – 91) that their consecutive next ISP would also get the same level of medical history performance. This intraclass effect indicates that GP practice style was a determinant of history taking performance.

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Discussion

Our study is the first using direct observation via ISPs of routine preventive service GP performance compared to standards in an evidence-based structured national PHE programme. We have been unable to find any similar previous studies which used secondary data collected by mystery patients, ISPs engaged by a consumer organisation. The Austrian consumer organisation (VKI) evaluated GPs' performance in Vienna in delivering preventive care, specifically the highly standardized Austrian PHE. The random sampling process for GPs appears to have been sound and produced a representative sample. The clinical cases for the ISPs fitted well to the physical appearance of the two ISPs, one male and one female around 65 of age. In none of the 40 completed visits was there any evidence that the ISP had been detected by the GP. The 40 cases were clustered at the level of 21 GPs. The GP sample had two stratification levels. The first level stratification was "contracted GPs" and "private GPs". The "private GPs" were slightly over-sampled (by three GPs) as their proportion was 33% in the sample and 20% in the sampling population of 1069 GPs with PHE contract in 2008.

The second level, Vienna city districts, improved the sampling quality further, as the random sampling procedure within the city district blocks was found to be robust. Generalisation of the findings to the Viennese GP work-force delivering the PHE is reasonable within the statistical limits of the small sample.

Limitations and strength

One limitation of our study is the small sample size of 40 completed ISP cases for 21 GPs in the VKI dataset. In a recent systematic literature review of good quality SP studies by Rethans, [8] a median 39 GPs were visited across the 20 studies reporting on GPs since 1985. There has been a trend to smaller studies since 2000, with a median

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of 27 GPs. Our small sample size means that the estimates have wide confidence intervals, especially when considering subgroups, such as “private GPs”. Only when effect sizes are large, e.g. in our case when expected values differ dramatically from observed ones, can we rule out chance.

Measurement error on the part of the ISPs is an important potential threat to validity. Rethans proposes that this can be overcome by thorough ISP training, case preparation and robust documentation processes. In the VKI study the two ISPs were highly experienced, having worked more than two decades in consumer testing of many service industries. The VKI tests run now in the thousands – the test of the Viennese GPs on the PHE is just one of the assessments they have performed. More than 80 tests are conducted each year, the organisation has existed for more than three decades and is internationally recognised among European consumer organisations. It has an ISO quality certificate for its testing procedures and constant internal quality checks. The data has to be well documented and robust, as legal cases are common, with tested providers or producers often appealing to the courts. [15] In summary, our primary data collection was embedded in a high-volume routine with sound quality assurance, and collected by highly trained professionals, and thus the data is likely to be reliable.

The data collectors themselves (ISPs) were blinded to our (implicit) study hypotheses, such as expected duration of consultations being 5-10 minutes. It could be argued that consumer associations may be especially critical of doctors and that this might have affected the study design and data collection. In this case, however, the Austrian VKI test report signalled satisfaction with GPs’ PHE performance (translated title: “PHE in good hands”) – in contrast to its reports on pharmacies. [11]

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A further strength of our data, in contrast to many other ISP studies, is that all ISP visits were undetected. Furthermore, our study was not distorted by a self-selection bias of voluntarily participating GPs. In other studies, around 40% of physicians on average decline to participate, leading to a severe self-selection bias among physicians. [1 8] We were able to completely avoid this bias by using the anonymous data collected by VKI, as GPs were selected by a strict and sophisticated random sampling procedure. The Viennese Chamber of Physicians agreed collectively to participate, and single GPs could not exempt themselves from the random VKI visits. The visits to few of around 1500 GPs were announced to all by their Viennese medical chamber, without giving an exact date. However, the VKI never asks permission at the individual service provider level.

"Lack of time" barrier

One of the main obstacles or barriers named by GPs worldwide to delivering preventive care is the lack of time. [5] Among others factors, administrative arrangements including financial factors are important to consider when routine GP practice needs to be changed. [38 27] The average consultation time of 38 minutes among the "contracted GPs" (§ 2 Kassenarzt) is much longer than the 10-15 minutes we expected when the PHE reform was set in motion by one of us (FP) in 2003. Austria has a kind of capped fee-for-service system for "contracted GPs" which results in high volumes of services and high turnover of patients. [12] We estimate the average consultation time to be in the range of Germany with its 7.6 minutes, found in the most recent comparative, but not representative, study in Europe. [39] No study using representative data has been published in a peer-reviewed journal on this issue for Austria.

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The 60 minute consultation time with "private GPs" in this study is extraordinary, especially as these consultations are available free of charge to the eligible population. However, it was difficult for the ISPs to secure an appointment with "private GPs" – they had to contact 21 to make appointments with 7 (1:3 ratio). Thus the PHE is a scarce commodity in private practice and its widespread uptake would likely result in waiting lists.

The long average consultation time of 46 minutes may also be attributable to the complex ISP cases, as increased severity of cases leads to longer consultation all over the world. [40] Less complicated cases, especially among younger clients, would be more the norm and these may be handled in a shorter time. The consultation duration for less complicated cases is unknown and requires further research in Austria.

The Austrian model, developing guidelines accompanied by standardised report cards in combination with a generous reimbursement system based on special contracts for prevention (the PHE contracts) could obviously overcome the barrier of limited time available in Vienna general practice. [31]

The results that (a) waiting time was mainly influenced by the GP, and (b) consultation time was mainly influenced by the clinical case presented, are congruent with common knowledge from quality management on practice styles and results from health services research. [9 39]

The observed tendency of "private GPs" to counsel for longer duration than "contracted GPs" can be attributed to their general practice style, and not to direct financial incentive. The PHE reimbursement is the same 75 Euro for GP contract types, and the client does not have to make out-of-pocket payments, even to "private GPs".

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Service quality

Overall history taking standards were missed by 21% of "private" versus 34% of "contracted" GPs. This difference was not significant. Multilevel analysis revealed that performing below standard history taking was consistent at the GP level between the two ISP visits. This finding is an indication of the importance of GP personal practice styles influencing service quality, and it provides an opportunity for improvement through training and feedback.

The use of the standardised assessment of a history of problematic alcohol consumption, the AUDIT-GMAT questionnaire, is highly recommended in the guideline. [41] Yet in 2005 there was strong opposition voiced against the routine use of this questionnaire by unionized doctors (medical chamber). They considered the questionnaire to be too intrusive and were concerned that it would discourage potential clients. When in 2003 one of us (FP) led the development team for the new PHE it was expected that only a minority of GPs would apply the AUDIT-GMAT. However, in this study it was used in nearly 40% of visits, with no significant difference between "private" and "contracted GPs". Many GPs may consider screening for problematic alcohol consumption to be important in a country like Austria with high alcohol consumption.

Conclusion and outlook

Using ISPs is a well-established but complex method for health service research. Using data not designed for research is also complex. However, the increase in complexity is outweighed by the reduced bias from un-announced visits. Our study was the first to report physicians' preventive performance under direct observation of

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experienced ISPs applying standardized quality-assured documentation in Austria. This study mainly reports on the methods and variation in consultation times and the quality of history taking. Some better than expected results were found, such as the long consultation times and the relatively high completion rate of AUDIT-GMAT questionnaires. We hope that this paper will stimulate further health service research on the quality of service of the annual Austrian PHE provided to around 850,000 adults each year.

Data Sharing

The data of this study are owned by the Austrian Consumer Organisation (Verein für Konsumenteninformation, VKI).

On our written request in October 2008, VKI provided us with the electronic dataset (raw data: Excel file, 40 lines/records), and hardcopies of the completed medical result sheets (34 sheets) for the sole purpose of conducting health service research studies by us, the International Screening Committee for Austria.
We extracted data from the hardcopies and added it to our own secondary dataset.

We encourage any researcher to ask permission and perhaps request the dataset also from VKI in Vienna, Austria (http:\\www.vki.at).

Contributorship

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FP conceived the study, performed the statistical analysis and drafted the manuscript. KT extracted data, helped in the interpretation and finalisation of the manuscript. MH helped in the interpretation, internal review and finalisation. All authors read and approved the final manuscript.

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Competing Interests

All authors have completed the ICMJE uniform disclosure form at www.icmje.org/coi_disclosure.pdf (available on request from the corresponding author) and declare: no support from any organisation for the submitted work; no financial relationships with any organisations that might have an interest in the submitted work in the previous 3 years; no other relationships or activities that could appear to have influenced the submitted work.

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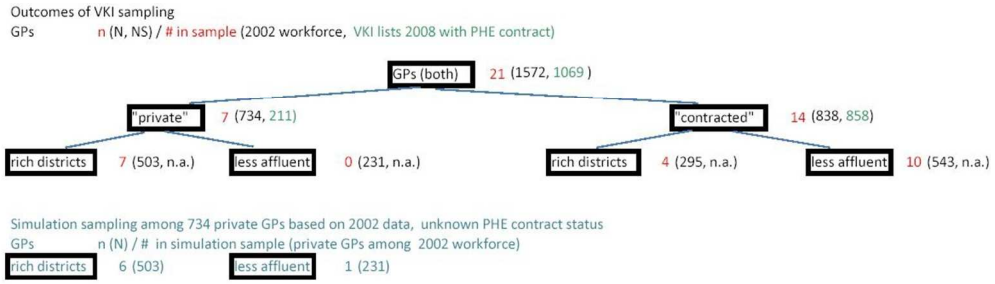

Results of VKI sampling compared with our simulation sampling of private GPs

In 2008, 21 GPs were sampled by VKI, 7 of them "private GPs". All 7 were located in the richer part of Vienna. Among the "contracted GPs", 4 out of 14 were located in the richer Vienna districts.
GP workforce data of 2002, published in a health report of the City of Vienna administration, provided the most recent information on distribution of private GPs among the Vienna city districts.
As we were not provided with data, beyond totals, on the two sampling population lists of VKI, "n.a." means that we could not access the district distribution data.

311x88mm (96 x 96 DPI)

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CODING COPY!!!

Vorsorgeuntersuchung der Österreichischen Sozialversicherung
Allgemeines Programm für Frauen und Männer

Seite 1/2

A TESTER 2 ♀ Nr. 1

☐ Kriegshinterbliebener ☐ nicht versichert

Klinische Untersuchung

Empfohlene Maßnahmen

Kopf/Hals: KSI; HWS beweglich, LK nicht tastbar SD → tastbar

ab 65 Jahre
Hörverminderung (Ergebnis Flüstertest): 1 ☐ ja 0 ☐ nein — nix
Sehschwierigkeiten (Anamnesebogen): 1 ☐ ja 0 ☐ nein

☐ Überweisung zum HNO-FA
☐ Überweisung zum Augen-FA

Herz/Lunge/Gefäße: Pulmo frei, Cor → rein rhythmisch, 1 ICR li.
Abdomen: weich, o.B.d. Hepar am Ri Bo
WS/Gelenke: frei beweglich
Haut: o.B.

Hautkrebs — von Proband/in angegebene Auffälligkeiten: ☐ ja ☐ nein ☐ bestätigt
bösart. Melanom bei Verwandtem 1. Grades: ☐ ja ☐ nein ☐ unklar
(1 / 0 / 2)

☐ keine
☐ Selbstbeobachtung
☐ Überweisung zum Haut-FA

sonstige auffällige Befunde

Parodontitis-Risikoklasse

gesundes Zahnfleisch: ☒ ja = 0 ☐ nein

Zahnstein/Plaque/Mundgeruch/Rauchen/Hormonveränderung (z.B. Pubertät, Wechseljahre)/Diabetes mellitus/motorisches Hygieneerschwernis: ☐ ja = 1 ☐ nein

Rötung/Schwellung/Lockerung: ☐ ja = 2 ☐ nein

☐ 0: sorgfältige Reinigung alle 24 h
☒ 1: Empfehlung zu fachger. Pflege
☐ 2: Überweisung zum Zahnarzt

Blutuntersuchung

Chol mg/dl: 278 — HDL-Chol mg/dl: 88 — T-Chol/HDL-Chol: 3,2

Rotes Blutbild (Frauen)

Ery T/l: 4,53 — Hb g/dl: 14,2 — Hkt %: 40,3

Blutzucker mg/dl: 114

Triglyceride (nüchtern) mg/dl: 88

Gamma-GT U/l: 65

Harnuntersuchung

	neg	pos
Leukozyten	☐	☐
Glucose	☐	☐
Nitrit	☐	☐
Eiweiß	☐	☐
Blut	☐	☐
Ubg	☐	☐

☐ Diagnosesicherung
☐ Befundbesprechung
☐ weitergehende Laboruntersuchung veranlasst
☐ Wiederholung der Laboruntersuchung

Blutdruck (mmHg)

(SY) 130 / (DI) 80

☐ blutdrucksenkendes Medikament eingenommen

- ☐ ideal 1 — <120/80
- ☐ normal 2 — 120—129/80—84
- ☐ noch normal 3 — 130—139/85—89
- ☐ Hypertonie Stadium 1 4 — 140—179/90—109
- ☐ Hypertonie Stadium 2 5 — ≥180/110
- ☐ isolierte systolische Hypertonie 6 — ≥140/<90

☐ Diagnosesicherung
☐ Hypertonieschulung (Angebot)
☐ Weiterführung der Therapie

BMI (kg/m²)

21,0

- ☐ ≤18,5 untergewichtig 1
- ☒ 18,5—24,9 2
- ☐ 25,0—29,9 Präadipositas 3
- ☐ 30,0—34,9 Grad I Adipositas 4
- ☐ 35,0—39,9 Grad II Adipositas 5
- ☐ ≥40,0 Grad III Adipositas 6

☒ Taille Männer <102 cm / Taille Frauen < 88 cm
☐ 2 größerer Taillenumfang

☐ Bewegungsberatung
☐ Ernährungsberatung

6865194548

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Vorsorgeuntersuchung der Österreichischen Sozialversicherung
Allgemeines Programm für Frauen und Männer

Seite 2:2

Körperliche Bewegung stexar 1 ☐ keine 2 ☐ gelegentlich 3 ☒ regelmäßig
☐ Bewegungsberatung rcexad
☐ Bewegungsprogramm rcexprg
☐ von Proband/in abgelehnt rcptref

Alkohol -1,0,1
Alkoholfragebogen [ ][ ] 50 stalc stalhis
Aufhörwille vorhanden ☐ ja ☐ nein
andere Vorbefunde (Alkohol) ☐ ja ☐ nein
☐ Gespräch rcadtlk
☐ Entwöhnungsprogramm rcalprg

Rauchverhalten 1 0 -1 stsmokp
sicher Nichtraucher ☒ ja ☐ nein stsmokr
Aufhörwille vorhanden ☐ ja ☐ nein
☐ Kurzintervention rcsmkdis
☐ Entwöhnungsprogramm rcsmprg

Blutzuckeruntersuchung -1,0
☐ bestehender Diabetes stdm
Ergebnis rodmfbg
☐ unauffällig 1
☐ nüchtern >126 [mg/dl] 2
☐ nicht nüchtern >200 [mg/dl] 3
☐ Diagnosesicherung rcdmdiag
☐ Schulung rcdmedu
☐ Weiterführung der Therapie rcdmmed

Kardiovaskuläres Risiko bis 40 Jahre cvdoharsk
anamnestisch stcvd ☒ 1
Ergebnis des AHA Risk Calculator
☐ gering 1
☐ moderat 2
☐ hoch 3
ab 40 Jahre cvdnzrsk
Ergebnis des New Zealand Risk Scale
☐ gering 1
☒ moderat 2
☐ hoch 3
☐ sehr hoch 4
☐ Übertrag in Gesundheitspass rccvdpac
☒ Gespräch rccvdtlk
☐ Lifestyleintervention rccvdint
☐ Therapieeinleitung rccvdmed

PAP-Abstrich-Befund (zeitgerecht) Frauen 70-
☐ Abstrich gemacht stpap
Befund vorhanden stpapp ☐ ja 1 ☐ nein 0 -1
☒ ärztliche Beratung und Aufklärung vor 2 PAP-Abstrich
☐ Überweisung Frauen-FA rcpapref
☐ von Probandin abgelehnt 0 -1 rcpapnjt

Mammographiebefund (zeitgerecht) Frauen ab 40 Jahre stmam
☐ ja 0
BIRADS-Befund vorhanden stmamn ☐ ja 1 ☐ nein 0 -1
☒ ärztliche Beratung und Aufklärung vor 2 Vorsorge-Mammographie
☒ Überweisung Röntgen-FA rcmamref
☐ von Probandin abgelehnt 0 -1 rcmamnj

Okkultes Blut im Stuhl Vorbefunde (12—24 Monate) stfobhist -1/0
☒ nicht vorhanden 1
☐ auffällig
☐ unauffällig 3
aktueller Befund lbfob
☐ auffällig 1
☐ unauffällig 0

Koloskopie stcolo
Wann war die letzte Koloskopie
☐ innerhalb der letzten 10 Jahre 1
☐ länger als 10 Jahre 2 0/-1
☐ bisher keine 3
☐ ärztliche Beratung/Aufklärung über Koloskopie durchgeführt 1
80 - rccolo -1
☐ Überweisung rccoloref
☐ von Proband/in abgelehnt 0 / rccolnjt

Prostata ab 50 Jahre rcpros -1/1
☐ Ärztliche Beratung/Aufklärung über den PSA-Test auf Wunsch des Probanden
rcproref -1/1
☐ Überweisung zum Urologie-FA auf Wunsch des Probanden

Bei Vorliegen von Diabetes mellitus oder Myopie (> -5dpt) oder familiärem Glaukom bis 65 Jahre 0 /-1
Risiko für Glaukom (Grüner Star) vorhanden stglrisk 1 ☐ ja ☐ nein
Untersuchung für Glaukom beim FA innerhalb der letzten 24 Monate stglex 1 ☐ ja ☐ nein -1
☐ Überweisung zum Augen-FA rcglref -1/1

Augen ab 65 Jahre stseeon
Sehvermögen innerhalb der letzten 24 Monate mind. 1x kontrolliert 1 ☐ ja 0 ☐ nein -1
Untersuchung für Glaukom beim FA innerhalb der letzten 24 Monate ☐ ja ☐ nein
☐ Überweisung zum Augen-FA

Bereits bekannte Erkrankungen stmedhis 1 - vorh. 0 - sonst -1 - unbek.
bei Diagnose Mitralklappenstenose und Vorhofflimmern

Verdacht auf behandlungswürdiges Gesundheitsproblem und neu entdeckte Erkrankungen
☐ ja ☒ nein 1 0 /-1
Wenn ja, welche
☐ Diagnosesicherung rcnewcon -1/1
☐ weitere Abklärung rcnaufkl -1/1

Untersuchungsdatum TT - MM - JJJJ
[0][7] - [0][7] - [2][0][0][8]
date

enddis -1/0
1 ☐ Abschlussgespräch durchgeführt
2 ☐ Proband/in ist nicht zum Abschlussgespräch erschienen

PiCo - Dr. Piribauer
Wimbergergasse 14-16/2-21
A-1070 Wien, Austria
Tel.&Fax: +43 (0)1 524 60 20
http://www.pico.at

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Appendix File 2

Incognito Standardised Patients (ISP) Case Descriptions

The Austrian Consumer Organisation, ("Verein für Konsumenteninformation", VKI) provided us with the clinical case construction of their two ISP.

The ISPs, being around the age listed below and with normal BMI, reported the following history on GP request and entered data in the history taking proforma (health information sheet, HIS), when offered, accordingly.

1.1 Female ISP

Age	66 years
Weight	BMI in normal range (21 kg/m2)
Diet	Reports healthy diet (Vegtables, little meat, however no fruits due to intolerance of fructose)
Alcohol	Reports on 2-3 glasses of wine every evening
Smoking	Not smoking
Physical Activity	Active, two times a week a special gym ("Kieser Training")
Vision control	2 times a year controlled by specialist
Hearing	Reports problems, specialist not visited yet
Oral Health	Swollen and sensitive gums, last visit to the dentist more than 3 years ago
Pap smear	Last visit 3 years ago
Mammogram	Around 5 years ago
Bowel Cancer	FOBT has been done, was ok, Colonoscopy never
Family history cancer	Mother had cervical cancer diagnosed
Abnormal	GGT: 65 U/l; GOT: 44 U/l GPT: 35 U/l;

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Laboratory results*	Total Cholesterol 278 mg/dl
Blood Pressure	Reported as normal and variable
Additional med. history	Three curettments

1.2 Male ISP

Age	65 years
Weight	BMI in normal range (22 kg/m2)
Diet	Reports Austrian "home-diet" (means: much meat, much animal fat, few vegetables)
Alcohol	Per month one glass of wine or beer
Smoking	Smoking reduced during the last 12 years to 8 cigarettes a day.
Physical Activity	None, no sports
Vision control	Is ok, has not seen a specialist for a very long time
Hearing	No problems reported, specialist not visited
Oral Health	No problems reported
Skin problems	Reports regular excisions of naevi at dermatologist
Bowel Cancer	A colonoscopy has been done long ago, at least 12 years
Family history CVD	Father has died of myocardial infarction before age of 55
Family history cancer	Sister has colon cancer
Abnormal Laboratory results*	Total Cholesterol 230 mg/dl, HDL 33 mg/dl; Ratio of Tot-Chol. / HDL is 6,9
Blood Pressure	He does home-measurements, reported it as sometimes elevated to 140/90

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Appendix 3 - GP sample distribution in rich and poor parts of Vienna

Our analysis of the sample proportions was impaired by the condition of anonymity of GPs. We could not get insight into the original name lists compromising the VKI sampling base.

However as name and office location of the visited 21 GPs were published in the VKI magazine report we could look up their contract status in the official website of the Medical Association of Vienna (Ärztekammer für Wien). We found seven “private GPs” and 14 “contracted GPs”.

With this data we were able to perform a further assessment of the quality and representativeness of the VKI sampling. We hypothesized, that the great majority of private GPs would practice in the richer part of Vienna and should be overrepresented in the sample there.

Vienna has 23 official political subunits, so called districts. We tried to find a measure to separate the 23 city districts into two equal parts regarding affluence. No official separation of rich versus poor districts exists. There is a historical dimension however, as the city grew out of the 2000 year old center, the 1. district now. The next ring around this core are the districts 2. – 9., built until 1900. Affluence is in principle more concentrated in the 9 inner traditional districts, than in the more modern city periphery.

To refine our simple historical inner/outer district model we looked for more objective data. We used two independent measures from two independents data sources to further triangulate and categorize districts in Vienna into rich and poor for the purpose of this study.

First we used purchasing power data, available on the internet, on the five richest versus the five poorest districts of whole Austria (99 districts). Among the five richest Austrian districts, four were in Vienna (districts number 1, 13, 18, 19). Among the poorest Austrian five was the 15th district of Vienna (RegioData Research 1-3).

As purchasing power data were not available to us for all Vienna districts, we used as proxy data the market price for purchasing a flat. End of 2008 the range was € 5370 (1. district) to € 1650 (11. district) per square meter. These data were published quarterly for all Vienna districts in the real estate commercial sector media and in the internet (ERESNET GmbH). We found that in beginning of 2009 a cut-off price of 3000 Euro per square meter to purchase a flat helped to divide Vienna, with it´s 23 districts, into two parts. 11 districts were below this threshold. The 9 inner city districts were not among these. The four rich districts according to their purchasing power were also not. The 15th district, found to be very poor in purchasing power was among the 11 below treshold.

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Thus we found 12 districts to belong to the rich part, and 11 to the less affluent half. The rich 12 were the inner ones (Nr. 1 – 9) plus the three outer districts (13, 18, 19) which we also derived from the purchasing power study. The less affluent – we try to avoid the word poor for a city like Vienna – are the rest of 11 districts from the periphery.

Examining the VKI sampling of seven “private” GPs revealed that all seven had their office in the richer part of Vienna. For the 14 “contracted GPs” only 4 of 10, a minority had their office in the richer part.

Contracted GPs can only open their office in a district where the health insurance has planned it. The health insurance plan places offices according the population size, the inner districts are much smaller in area and have less population than the periphery ones. “Private” GPs can open their office where they want. They will tend to open their office near those people who can afford to pay out of the pocket, which will tend to live in the richer districts of Vienna. Thus the stark difference in the distribution of the VKI sample is very plausible and the stratified sampling seems to represent the GP distribution in Vienna well.

We further tested statistically the sample proportions from two perspectives. First we compared the complete sample of 21 GPs with the distribution of all GPs (2002 data) in Vienna in regard to less populated inner nine districts versus populous outer districts. Second we did the same for all 21 GPs in regard to 12 rich versus poorer 11 districts. In the complete sample the GPs in the inner less populated districts (Inner/outer districts, RR 0.80; CI 0.31-2.04) have a small trend to be underrepresented. GPs are slightly, but not significantly, overrepresented for the richer parts (Richer/ less affluent, RR 1.16; CI 0.5-2.71) at the same time when compared to the GP workforce distribution. Most probably this is caused by the intentional oversampling, as reported by VKI during the first interview, of seven “private GPs” instead of four. Both tests give an additional indication that the double stratified sampling resulted in a balanced random sample in regard to two aspects of district characteristics, “private GP” and “contracted GP” density.

Reference List

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RegioData Research. Kaufkraft der Österreicher steigt - merklich aber unbemerkt - Press Release. 1-3. 29-7-2008. RegioData Research, 1060 Wien, Austria.

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VKI 9/2008 Doctor by district distribution

Source: p.23 23 districts in Vienna

Doc.Nr.	ZIP	Distr.Nr.
1	1110	11
2	1010	1
3	1120	12
4	1160	16
5	1210	21
6	1150	15
7	1020	2
8	1090	9
9	1200	20
10	1030	3
11	1100	10
12	1130	13
13	1190	19
14	1040	4
15	1030	3
16	1230	23
17	1190	19
18	1180	18
19	1220	22
20	1140	14
21	1180	18

SORTED by district

			if > 1: # of docs
2	1010	1	
7	1020	2	
10	1030	3	
15	1030	3	2
14	1040	4	
8	1090	9	
11	1100	10	
1	1110	11	
3	1120	12	
12	1130	13	
20	1140	14	
6	1150	15	
4	1160	16	
18	1180	18	
21	1180	18	2
13	1190	19	
17	1190	19	2
9	1200	20	
5	1210	21	
19	1220	22	
16	1230	23	

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Conclusion: 5 of 23 districts were not covered. (5,6,7,8, in 3 of the resulting 18, 2 doctors per distri
within districts random selection. … This if there is a bias in doctor selection,
7 out of 21 doctors "Wahlärzte" with VU-contract are private rimbursed with

Sampling muss von mir beschrieben und dann mit VKI Expertin durchbesprochen werden.

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ct were drawn. These districts do not belong to the populos but the the affluent one (preferred by do being more representative of doctors working in affluent areas.

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ıctors of choice) ..are not most popolous but the more afflent

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GP Sampling in Vienna by VKI / Vienna City administration data 2002 (private) and 2007 (overall)

Vienna District Nr.	2007 data # of GPs	2002 data # of GPs	2002 data # contracted	2002 data # private	2002 data % private	2007 data totals
1.	59	65	9	56	86%	
2.	76	70	47	23	33%	
3.	73	79	43	36	46%	
4.	39	48	17	31	65%	
5.	37	51	29	22	43%	
6.	39	43	15	28	65%	
7.	55	55	15	40	73%	
8.	45	57	12	45	79%	inner districts
9.	53	68	19	49	72%	476
10.	104	101	81	20	20%	
11.	44	51	38	13	25%	
12.	65	72	42	30	42%	
13.	71	83	23	60	72%	
14.	62	75	40	35	47%	
15.	50	54	38	16	30%	
16.	71	81	52	29	36%	
17.	43	42	28	14	33%	
18.	63	79	29	50	63%	
19.	83	100	37	63	63%	
20.	49	52	39	13	25%	
21.	83	90	73	17	19%	
22.	80	79	65	14	18%	outer districts
23.	80	77	47	30	39%	948
totals/ avg%	1424	1572	838	734	47%	1424

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2002 data	both in	
	# in sample	
		1
		1
		2
		1
		1
		1
		1
		1
		1
		1
		1
		2
		2
		1
		1
		1
		1
		21

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GP Sampling in Vienna by VKI												
Vienna	2007 data	**2002 data**	**2002 data**	**2002 data**	2002 data	2007 data	**2008 VKI sample popul.(NS)**					2007 data
District Nr.	# of GPs	# of GPs	# private	# contracted	% private	totals		NS % priva	# sample (n)	#private	#contract	inner
1.	59	65	56	9	86%				1	1		
2.	76	70	23	47	33%				1		1	
3.	73	79	36	43	46%				2	1	1	
4.	39	48	31	17	65%				1	1		
5.	37	51	22	29	43%							
6.	39	43	28	15	65%							
7.	55	55	40	15	73%							
8.	45	57	45	12	79%							
9.	53	68	49	19	72%	476			1	1		476
10.	104	101	20	81	20%				1		1	outer
11.	44	51	13	38	25%				1		1	
12.	65	72	30	42	42%				1		1	
13.	71	83	60	23	72%				1	1		
14.	62	75	35	40	47%				1		1	
15.	50	54	16	38	30%				1		1	
16.	71	81	29	52	36%				1		1	
17.	43	42	14	28	33%							
18.	63	79	50	29	63%				2	1	1	
19.	83	100	63	37	63%				2	1	1	
20.	49	52	13	39	25%				1		1	
21.	83	90	17	73	19%				1		1	
22.	80	79	14	65	18%				1		1	
23.	80	77	30	47	39%	948			1		1	948
	1424	**1572**	**734**	**838**		1424	1069	20%	21	7	14	1424
cheksumm		0										
2002 data all GPs		1572										

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2002 data	2007 sample					2007 data	2002 data		2007 sample		
# private (2002 data)				#reg.health ins.contrac		**RICH**	# private	# cntrct			
	#sample	**#priv**	#cntrct			inner +13+18+19			#sample	**#priv**	#cntrct
						versus					
330	6	**4**	2	206		**693**	**503**	**295**	11	7	4
						poor					
404	15	**3**	12	632		**731**	**231**	**543**	10	0	10
734	21	**7**	14	838		1424	734	838	21	7	14
							0				

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Contracted GP perspective

Vienna districts	2007 data # of GPs	2002 data % private	2007 sample **# in sample**
inner	476	63%	6
outer	948	39%	15
total/ avg %	1424	47%	21

Private GP perspective

districts	2007 data # of GPs	2002 data % private
RICH	693	503
less affluent	731	231
	1424	47%

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2007 sample	# in sample
	11
	10
	21

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GP Sampling in Vienna by VKI						Contracted GP perspective		"private"		
Vienna	2007 data	2002 data	2002 data	**2002 data**	**2002 data**	2007 data	2008 sample	**in sample**	private GP in simulation	
District Nr.	# of GPs	# of GPs	# contracted	# private	% private	# of GPs				
1.	59	65	9	56	86%		**# in sample**		1	1
2.	76	70	47	23	33%					
3.	73	79	43	36	46%				1	
4.	39	48	17	31	65%				1	1
5.	37	51	29	22	43%					
6.	39	43	15	28	65%					
7.	55	55	15	40	73%					1
8.	45	57	12	45	79%	**inner (1.-9.)**				
9.	53	68	19	49	72%	476		6	1	1
10.	104	101	81	20	20%					1
11.	44	51	38	13	25%					
12.	65	72	42	30	42%					RICH = inner 9 +13.+18.+19
13.	71	83	23	60	72%				1	1 6
14.	62	75	40	35	47%					
15.	50	54	38	16	30%					
16.	71	81	52	29	36%					
17.	43	42	28	14	33%					
18.	63	79	29	50	63%				1	0
19.	83	100	37	63	63%				1	1
20.	49	52	39	13	25%					
21.	83	90	73	17	19%					
22.	80	79	65	14	18%	**outer (10.-23.)**				less affluent
23.	80	77	47	30	39%	948		15		1
totals/avg %	1424	1572	838	734	47%	1424		21	7	7

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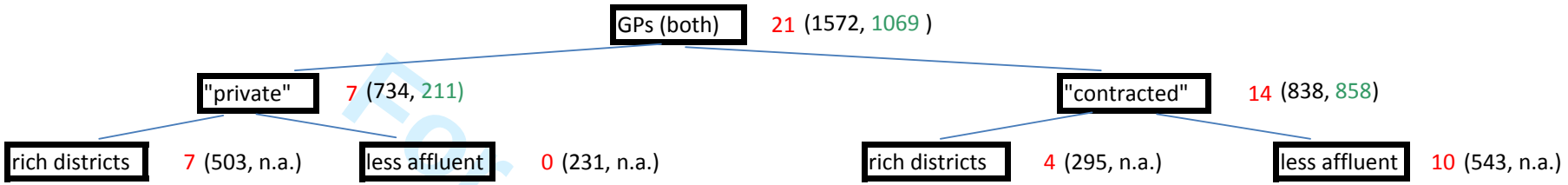
Outcomes of VKI sampling

GPs n (N, NS) / # in sample (2002 workforce, VKI lists 2008 with PHE contract)



Simulation sampling among 734 private GPs based on 2002 data, unknown PHE contract status

GPs n (N) / # in simulation sample (private GPs among 2002 workforce)

rich districts 6 (503) less affluent 1 (231)

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Appendix File 5

History taking and Health Information Sheet use as observed by the Incognito Standardised Patients (ISP)

Explanation how indicator variables were constructed during our secondary data analysis

Content

APPENDIX FILE 5 1

HISTORY TAKING AND HEALTH INFORMATION SHEET USE AS OBSERVED BY THE INCOGNITO STANDARDISED PATIENTS (ISP) 1

EXPLANATION HOW INDICATOR VARIABLES WERE CONSTRUCTED DURING THE ANALYSIS 1

1 GENERAL HISTORY TAKING 1

1.1 ALCOHOL DOMAIN 4

1.2 COMBINING GENERAL HISTORY TAKING AND ALCOHOL SCREENING 5

STATA Log files provide the trail

1. File “art_1_00.log” construction of “HIS use” indicator variable: “nHISuse” shows how the original VKI data was analysed and an overall indicator variable was constructed.

1 General history taking

The original VKI “c21” variable reports how comprehensive the GP has talked about the history. “4” is excellent, “0” not at all and “-1” means that this data are missing. 1-3 are in between. We used this variable to construct of “nHISuse” indicator.

Additionally we checked the variable “raghnd”. The original VKI “raghnd” variable reports if a HIS has been offered (handed over) to the ISP. “4” means offered, “0” not offered, and “-1” missing again.

The missing data in both variables were attributable to one GP only (Nr. 19) who did not offer a HIS nor talk at all about the history to neither ISP as could be seen from another variable not missing (“c19” – reports that no history was used at all)

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See the relation of the two variables (STATA output)

. table raghnd c21

raghnd	c21				
	-1	0	1	2	3	4
-1	2					
0		1		2	4	10
4		3	2	1	3	12

"RagEYE" to "RAMEDhs" are original VKI variables were the ISP recorded how well during the visit the GP addressed the history regarding different domains starting with the history of eye problems over ears (hearing)… and so on to history of diseases (ramedhs). A score of "4" means domain touched, "0" not touched. There were 40 visits altogether.

During some visits lacking a perfect history taking ("c21" is coded with less than "4" by the ISP) some domains were still touched. See the stata output below:

. list docid rageye - ramedhs if (c21 < 4 & c21 > 0)

	docid	rageye	raear	rapar	radm	racvd	racanc	rasmk	ramedhs
4.	2	4	4	4	0	4	0	4	4
6.	3	4	4	4	4	0	0	4	4
9.	5	4	4	4	0	0	4	4	4
15.	8	0	4	0	4	0	0	0	4
18.	9	4	4	0	0	0	0	4	4
19.	10	4	0	4	4	4	0	4	4
22.	11	4	4	4	0	4	4	4	0
25.	13	4	4	4	4	0	0	4	4

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30.	16	0	0	4	4	4	4	4	4
31.	16	4	0	4	4	4	0	0	0
34.	18	4	0	0	0	0	4	4	4
38.	20	4	0	4	0	0	0	4	0

(Numbers show score per visit)

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As such we were now able to construct our “nHISuse” variable:

```
. replace nHISuse = 4 if (raghnd == 4 & c21 == 4)

(12 real changes made)

. replace nHISuse = 3 if (raghnd == 4 & c21 < 4)

(9 real changes made)

. replace nHISuse = 2 if (raghnd == 0 & c21 == 4)

(10 real changes made)

. * probe ob c21 korrekt von VKI errechnet:

. list docid rageye - ramedhs if (c21 > 3)
```

As exemplified in the paper the maximum general HIS-score of four was achieved when the HIS was offered and all medical domains were addressed during the consultation. An omission of 1 out of the 8 medical domains was tolerated in our data interpretation as possible measurement error on the VKI side. A score of “3” was achieved when the HIS was offered, and not all domains touched additionally verbally. No HIS, but raising at least 7 of 8 required domains verbally, scored “2”. Score “1” was with no HIS and 2 or 3 domains missing. No HIS and 4 – 8 domains not addressed scored “0”.

1.1 Alcohol Domain

In principle the GP should use a standardized questionaire the AUDIT-GMAT to screen for problematic alcohol consumption

In a similar way we construed the indicator variable “nbAUDIT”. If the AUDIT GMAT had been handed over we scored “2” if not “0”.

To keep this additional file short, we will not detail the process as we have done it for the general history taking part (see above).

As the ISP recorded in the original VKI variable “ranalk” how the alcohol domain was covered, we could determine when the alcohol domain was touched verbally, even when the AUDIT-GMAT was not offered.

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Providing the AUDIT-GMAT the visit was scored with “4”, no provision but addressing the alcohol topic during the consultation the score was “2”. Least performers did neither of both, neglecting the domain completely, thus the visit was scored “0”.

```
. tab ranalk nbAUDIT, nolabel


AUDIT-GMAT |  AUDIT-GMAT offered
      used |         0          1 |     Total
-----------+----------------------+----------
         0 |         7          0 |         7
         2 |        18          0 |        18
         4 |         0         15 |        15
-----------+----------------------+----------
     Total |        25         15 |        40
```

(Numbers show number of visits with that performance characteristic.)

1.2 Combining General History taking and Alcohol screening

When combining both newly constructed indicator variables “nHISuse” and “nbAUDIT” we could assess the distribution of the two performance parts of the GPs.

As described in our paper, there was strong correlation. See here the cross table.

```
   Alkohol |
 screening |
         & |                HIS and medical History taking
AUDIT-GMAT |         0          1          2          3          4 |     Total
-----------+-------------------------------------------------------+----------
         0 |         3          1          2          0          1 |         7
         2 |         0          5          8          2          3 |        18
         4 |         0          0          0          7          8 |        15
-----------+-------------------------------------------------------+----------
     Total |         3          6         10          9         12 |        40
```

(Numbers show number of visits with that performance characteristic.)

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The same table as above, horizontal categories now vertically, see below in labelled format:

Numbers show number of visits with that performance characteristic.

```
. tab  nHISuse ranalk

   HIS and Anamnesis |         AUDIT-GMAT used
                used | topic neg  not offer    offered |     Total
---------------------+---------------------------------+----------
      severe neglect |         3          0          0 |         3
incomplete Anamnesis |         1          5          0 |         6
 verbal Anamnesis ok |         2          8          0 |        10
           sufficient |         0          2          7 |         9
optimal (incl. talk) |         1          3          8 |        12
---------------------+---------------------------------+----------
               Total |         7         18         15 |        40
```

(Numbers show again number of visits with that performance characteristic.)

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Covert checks by standardized patients of general practitioners' delivery of new periodic health examinations: clustered cross-sectional study from a consumer organisation.

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Covert checks by standardized patients of general practitioners' delivery of new periodic health examinations: clustered cross-sectional study from a consumer organization

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Summary

Article Focus

* Can data from a consumer organisation be useful and valid for secondary analysis in health services research?

* Do General Practioners (GPs) follow the guideline for preventive service history taking

* Was the well-recognised time barrier for delivering preventive services also seen in this study in Vienna, Austria?

Key Messages

* Consumer organisation´s assessment of GP performance was valid, representative and precise.

* Around 1/4 of GPs failed to achieve the standard for history taking in the new periodic health examination

* Consultation time was longer than expected and sufficient: time-barrier problem has been overcome.

Strengths and Limitations

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* 40 visits at 21 GPs are a small sample, however this size is comparable to similar mystery patient studies.

* All incognito standardized patiens went undedected, in contrast to many similar studies.

* The random sample was found to be double stratified and well balanced.

* Multilevel analysis was possible and indicated the role of GP practice style.

* Additional to direct observation data, copies of GPs´ record notes may provide further objective assessment.

Abstract

Background

To improve the service quality of general practitioners (GPs) their actual performance level must be assessed. Direct observation of routine GP performance using actors is an established method in quality management. Consumer organisations frequently assess the quality of services in various industries through use of mystery shoppers. Analysing data on GPs' performance collected by consumer organisations may provide a new low-cost method in health service research.

Methods

We appraised the Austrian Consumer Organisation's sampling technique and clinical appropriateness of the cases presented by incognito standardized patients (ISPs, mystery shoppers) for the standardised Austrian periodic health examination (PHE) through the GPs. We analysed GP consultation/waiting times and quality of history taking.

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Results

The Austrian Consumer Organisation (VKI) used a double stratified random sampling method to observe in a cross-sectional study a representative sample of GPs. The location of GPs included in the VKI sample reflected the distribution we expected based on data provided by the city of Vienna. We determined that the clinical scenarios presented by the ISPs were valid and believable and that no GP realised the ISPs were not genuine patients. The average consultation time was 46 minutes (95% CI 37-54 mins). Waiting times differed more than consultation times between private and contracted GPs. No differences between private and contracted GPs in terms of adherence to the evidence-based guidelines regarding history taking (using the heath information sheet) and questions regarding alcohol use were found. According to our analysis, 20% of the GPs took a perfect history (95%CI 9% - 39%).

Conclusions

The analysis of secondary data collected by a consumer organisation was a valid method for drawing conclusions about GP PHE practice. Initial results, like consultation times longer than anticipated, and the moderate quality of history taking encourages continuing the analysis on available clinical data.

Background

For many eligible patients the provision of adequate preventive care is blocked by well-known barriers, despite the existence of elaborate guidelines based on best evidence. [1 2 3] Lack of time and inadequate reimbursement were the main barriers named by Canadian family physicians to performing the periodic health examination (PHE) as recommended by the Canadian Task force on the Periodic Health Examination. [4 5]

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Our publication reports and discusses a new method, the use of routine data from consumer associations for secondary analysis by health service researchers to study delivery of preventive care. We have not identified any other studies using consumer organisation data for secondary analysis in preventive health care performance assessment. As consumer associations with long traditions exist in all industrialized nations, such as Consumer Reports in the USA, similar data could well be available in many countries and could be analysed by health service researchers in the way we propose in this paper. [6]

Studies of preventive service provision which rely on electronic medical record audit, physician self-report, patient surveys and chart review are all prone to bias, as they usually lack validation against observed practice. Studies with standardized patients (SPs) have been used successfully to overcome these kinds of bias. [1;7] A standardized patient (SP) is a healthy subject who is trained to assess the performance of doctors based on pre-defined criteria. Unannounced or incognito SPs (ISPs) have been used unobtrusively to assess the routine practice performance of doctors. [8] *"Unknown to the prospective provider of care, such a 'patient' arrives at the clinic and requests care. What happens is gleaned from the records of care and also from the observations reported by the pseudo patients, who have been trained to make the needed observations"*. [9]

These ISPs are the health care version of the mystery shoppers used in other industries. *"Mystery shopper or visitor are a well known and widely used standardized method in quality management for assessing service quality in the retailing and tourism industry"*. [10] In autumn 2008 the official consumer information association of Austria, "Verein für Konsumenteninformation" (VKI), published a test report on physicians delivering the PHE. In the spring of 2008 two ISPs, members of

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the VKI tester team, had visited unannounced a sample of randomly selected general practitioners in Vienna, Austria. [11]

In Austria since 1974, GPs have been reimbursed for annual PHEs from public funds, currently at around 100 USD (75 Euro, current value) per patient. This service is provided free of charge to patients. A reform of the content and new documentation standards were introduced in 2005. Since this time, around 850,000 PHEs have been performed each year from the adult Austrian population of six million. [11 12 13 14"p.78"].

We wanted to determine whether the data gathered by a consumer organisation through their ISPs could be used to assess preventive service and quality. We also wanted to know if the assessments through the ISPs could be generalised to the GP workforce in Vienna. Initial findings related to the waiting time and quality of service are reported here.

Methods

Our methods consisted of two major steps. In the first step we critically appraised the sampling and data collection used by VKI. In the second, we performed our own analysis of the electronic dataset provided by VKI.

Our study design was presented to the legally relevant public health ethics commission of Vienna, which had no objections.

1. Appraisal of VKI sampling and data quality

Knowledge about the VKI methodology was gained through one personal and two phone interviews at the end of 2008 and in first quarter of 2009 with the researcher at VKI who managed the study. [11] We further analysed the note-taking forms used by

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the ISPs, the VKI's internal written interpretation guide, and a report on the VKI testing methodology published in 2008. [15]

We judged the quality of the sample by comparing it with the GP distribution in Vienna and by repeating the VKI sampling procedure in a simulation of our own. We assessed the quality of the data gathered by the ISPs against criteria for a good quality ISP study provided by a recent systematic literature review in the field. [8] These criteria cover the use of content checklists, note-taking by the ISP, soundness of clinical cases, and ISP detection rates. The results of our appraisal are presented in our first set of findings below.

2. Secondary analysis

Data preparation

VKI provided a de-identified electronic data set (42 records). In this data set GPs' names and office locations were deleted and GPs were sequentially numbered by VKI. We transformed the VKI ratings into corresponding numerical values (e.g. the five Likert scale satisfaction scores ranging from "+ +" (very good), through "o" (average) to "- -" (not satisfactory) were re-coded by us into the five integers from 4 to 0. Continuous variables such as waiting times, consultation times, were transferred unchanged into our final secondary data set.

Additionally we were provided with hard copy clinical results which had been given to the ISPs by the GPs, and which were not used by VKI in its own report (34 records – 8 were missing). These 34 forms were copies of the double page health summary sheets (HSS, "Befundblatt") which the GPs should provide in hard copy at the end of the PHE to their clients. [16 17] One of us (KT) blinded to the medical content of the ISP clinical cases, extracted and coded all clinical data from the 34 paper forms into a second electronic dataset in December 2008. More than 90 variables were coded from

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this data. Free text remarks by the physicians were not extracted (see additional file 1: Scanned HSS coding template with data of GP Nr. 1).

Statistical analysis

The primary sampling unit for our data analysis was the GP (see Figure 1). Each of 21 practitioners were offered two visits. Two of the practice visits were rejected by two GPs – one private and one contracted (because of an administrative error and because lab results were not ordered by the GP). Both GPs were visited by the other ISP. This resulted in a total of 40 observations. The 21 GPs belonged either to a private or a contracted insurance group, which we accounted for in our statistical analysis by the survey/panel data methods and by the multilevel data analysis. [18] There was double stratified probabilistic sampling as GPs were drawn within their strata and district blocks by a strictly random process. However, we were unable to verify the stratification across the 23 districts in Vienna as this identifying data was erased in the dataset provided to us to ensure GPs' anonymity. The two observations dealing with one GP were not independent and thus were "clustered at the level of the GP". We adjusted for this clustering effect, and estimated intra-class effects at the GP level by multilevel modelling also, as proposed in the literature [19 18].

We conducted our statistical analysis for this publication with Stata Versions 9.1 and 11.[20] Descriptive statistics (e.g. means, proportions, and confidence intervals (CI)) were produced by the Stata survey/panel data methods with the most conservative assumptions (e.g. finite-population assumption, linearized proportions and binomial Wald statistics for CI of proportions). For additional modelling we used mixed-effects restricted maximum likelihood (REML) estimation and generalized linear models for continuous variables, and random- or fixed-effects logistic regression for binary

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dependent variables (multilevel data modelling). All statistical tests performed and confidence intervals (CI) reported are at the 95% level.

For performance assessment we constructed appropriate indicator variables in accordance with the published guidelines for the PHE based on the observations of the ISPs. [21] For example, only if the full structured medical history proforma, the "Health Information Sheet" (HIS), was completed, including optimal alcohol screening according to guideline, was the constructed binary (yes/no) indicator coded positively.

Results

Step one: Appraisal of VKI sampling and data quality

Sampling GPs

Two types of insurance funding exist in Austria for GPs offering the PHE free of charge. A GP may hold a comprehensive insurance contract plus a PHE contract or a PHE contract only. In our study we referred to GPs with the comprehensive plus PHE contract as "contracted GPs" (in Austrian-German "§2 Kassenärzte"), and those with the PHE contract only as "private GPs" (in Austrian-German "Wahlärzte mit Vorsorgeuntersuchungsvertrag"). Payment of "private Austrian GPs" can involve out-of-pocket payments of patients to cover part or all of the patient expenses and refunding of a part by insurance. According to a previous study in Austria, the reasons for choosing such a private GP ("Wahlarzt") include short waiting and longer available consultation times. [22] A description of the Austrian health system with its mixed contracted and non-contracted private GP primary care system is beyond the scope of this paper, and can be found in an English/German WHO country report. [12] In this study all GPs had a PHE contract, and thus no out-of-pocket payments for any PHE service were necessary, even for "private GPs".

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VKI reported to us that they used a double stratified random sampling method for GPs in Vienna. One strata was insurance contract status ("private/contracted") and the other was the geographic distribution of doctors among 23 districts in Vienna. Two independent numbered name lists, one for "private GPs" and another for "contracted GPs", were used. The lists were provided to VKI by the Central Association of Austrian health insurances ("Hauptverband der österreichischen Sozialversicherungsträger") which runs the central registry of all PHE contracts, but not to us. Each list was sorted for districts, showing the office locations and the total number of GPs in each district. The sample population in the lists was 1069 GPs, 211 (20%) of whom were "private". VKI fixed the GP sample size at 21, 7 of whom (33%) being "private GPs", thus creating a relative oversampling of "private GPs". To determine the sample size per district block, the number of GPs to be sampled for each district was calculated by VKI from the names lists sorted for districts. For example, the seven "private GPs" were sampled from a workforce distributed over 23 districts. Each of the seven district sampling blocks formed should comprise around 14% of the workforce. Thus districts were lumped together in the sorted list until a block held around 14% of the "private GPs" workforce, then the next block was created from the remaining districts, and so on. In this way the number of GPs per district was fixed for all 23 districts in Vienna, and for each of the two GP contract types separately.

Selection from a district block was done by drawing a random number within the numbered name lists. The random number for each district block was generated by an internet-based public domain software, AGITOS. The sampling base numbers used in AGITOS for each block was determined by the total number of GPs in each district block. [23]

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After the GPs' names were determined, the ISPs arranged the visits. If an appointment could not be arranged, the ISP called the VKI office and a replacement GP was drawn there by the random number mechanism within the district, as described above. To visit seven "private GPs", 14 replacements were needed. This contrasted with three replacements needed for the 14 "contracted GPs".

Table 1 - Outcome of VKI sampling of GPs in Vienna by City District and GP insurance contract

Vienna District Nr.	VKI sample (# GPs)	of these: "private"*	"contracted"**
1.	1	1	
2.	1		1
3.	2	1	1
4.	1	1	
5.			
6.			
7.			
8.			
9.	1	1	
10.	1		1
11.	1		1
12.	1		1
13.	1	1	
14.	1		1
15.	1		1
16.	1		1
17.			
18.	2	1	1
19.	2	1	1
20.	1		1
21.	1		1
22.	1		1
23.	1		1
Total GPs	21	7	14

VKI published the names of the GPs sampled and their office locations in its report 10/2008.

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* We assessed the contract status of each named GP through the public internet search template of the Vienna Medical Chamber (http: www.praxisplan.at).

** "Contracted GPs" have a full contract with the regional general health insurance including a PHE contract ("§2 Kassenärzte").

--- end of Table 1 ---

The VKI methodology resulted in one GP being selected in 15 of 23 districts; two GPs in three districts (Nos. 3, 18, 19), and no GPs in five districts (Nos. 5-8 and 17) (see Table 1). Six GPs in the sample were from inner districts, 15 from outer districts. 11 GPs had their office in the more affluent part of Vienna, 10 in the less affluent. The nine inner city districts (Nos. 1- 9) in combination with three outer districts (Nos. 13, 18, 19) comprised the more affluent part of Vienna compared with the rest, judged by purchasing power per head and housing prices (for details classifying affluent versus less affluent districts see additional file 3: GP sample distribution in rich and poor parts of Vienna).

The distribution of sampled GPs among the Viennese districts should resemble as much as possible the distribution of the real GP workforce performing PHE among the districts. The stratification aimed to improve the representativeness with regard to two strata, geographic distribution and insurance contract status. "Contracted GPs" per district should correlate with the district population size, as "contracted GPs" are placed by the Vienna general social insurance agency to serve the population. Thus highly populated districts should also be represented well in this sample. Inner city districts (Nos. 1-9) have a smaller population than most of the 13 outer ones (Nos. 10-

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23). The sample reflected this distribution, with a GP ratio of 6:15 for inner versus outer districts. “Private GPs”, meanwhile, are free to establish themselves wherever they like. We assumed that they would tend to open their offices in the more affluent districts, as their income relies on out-of-pocket payments for most of their services except the publicly financed PHE.

To examine the quality of the random sample block procedure of VKI we had to rely on other data, as we were not given access to the two original VKI sampling population GP lists. Only the totals of their two lists were reported to us, namely 211 “private GPs” and 858 “contracted GPs”. We repeated and thus simulated the VKI procedure with the most recent and applicable data we could find. These were published by the city administration of Vienna in 2002, reporting on the district distribution of 734 private GPs out of total of 1572 GPs. [24 25] Data on PHE contracts of these private GPs were not available. According to that data many of the private GPs (17%) practised in the 19th (9%) and 13th (8%) districts. When repeating the VKI’s district block procedure with this other data, the first of the 7 GPs was drawn by us out of the first block composed of those two districts. The next two (1st and 18th) did hold together 14%, so the next GP was drawn from this second bloc, and so on. In our simulation the seventh “private GP” was drawn from five districts at the end of the list, each with less than 3% of the workforce (see also additional Excel file 4: Sampling assessment including source data and further 2007 city administration workforce data).

When comparing our simulation result with the sampling result of VKI, published in its magazine with GP name and location, we found a nearly identical distribution. [11] In the VKI sample all seven “private GPs” were from the rich part of Vienna, whereas in our simulation six of the seven were from that part. However as only 211 “private

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GPs" held a PHE insurance contract in 2008, the district distribution of 211 "private GPs" in the VKI list might be different from that of the 734 private GPs of our data of 2002. This could explain the small deviation from our simulation result (see Figure 1).

Figure 1 – Results of VKI sampling compared with our simulation sampling of private GPs

Legend for Figure 1:

In 2008, 21 GPs were sampled by VKI, 7 of them "private GPs". All 7 were located in the richer part of Vienna. Among the "contracted GPs", 4 out of 14 were located in the richer Vienna districts.

GP workforce data of 2002, published in a health report of the City of Vienna administration, provided the most recent information on distribution of private GPs among the Vienna city districts.

As we were not provided with data, beyond totals, on the two sampling population lists of VKI, "n.a." means that we could not access the district distribution data.

-------(end of figure legend)-----

Validity of clinical cases

Two ISP clinical cases were constructed by VKI health experts on the basis of the Austrian PHE guideline handbook, available in print and Internet download since 2005. [21] The guideline handbook was intended to be used by health service administrators (such as screening programme managers at local and regional level) to organise the preventive service activities of GPs in their area, similar to guidelines by other professional bodies. [26 27] With the support of medical journalists, the guideline

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handbook was written to be understandable to a broader audience than GPs, although it includes evidence-based references. [28] The high amount of detail in the guideline handbook allowed VKI experts to develop the two clinical cases for the ISPs in such a manner as to elicit clearly observable actions by the GPs during the PHE.

Both the male and the female ISPs were over 65 and presented complex clinical screening cases. The predominant critical screening task of the male was the detection of his high cardiovascular risk and of the female her clearly problematic alcohol consumption. However, the task involved screening for nearly all 15 target conditions of the Austrian PHE.

Apart from the clinical case history the two ISPs presented the GP with fabricated laboratory data, tailored to their cases. For example, the woman reporting problematic alcohol consumption had elevated levels of serum liver enzymes (Gamma GT: 65 U/l, GOT 44 U/l, GPT 35 U/l). Before the fieldwork, the ISPs rehearsed with the help of the outpatient facility of the Vienna public social insurance medical service, where also their laboratory details were fine-tuned. A more detailed description of the clinical case construction is included as additional file (see additional file 2 – "ISP_Cases")

Assessment of data collection by ISPs

The two ISPs each arranged visits with 21 GPs. At the GP's office each ISP completed the standardized health information sheet (HIS), a questionnaire which all GPs offering reimbursed PHE are obliged to provide. [29] They also completed the AUDIT-GMAT, an Austrian version of the WHO questionnaire "AUDIT" for problematic alcohol consumption, when offered. [30] The ISP training had included completion of the HIS and AUDIT-GMAT as well as presentation of their history personally to the GP. At the end of the consultation they each collected the

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standardized health summary sheet (HSS), which the doctor is also obliged to complete and provide in copy to his/her client. More information about the standardized medical records set for the Austrian PHE is detailed below in the results and has been published elsewhere. [31]

Immediately after having left a GP's office the ISPs noted their experience using a standardized note form. At the VKI office an independent person extracted data for the calculation of scores. The data coding was explicitly defined for the GP test in advance by specifically written instructions called "Regeln für die Eingabe/Beurteilung in TestRev" (rules for data entry and assessment into TestRev). We were provided with these specific coding rules. TestRev is the routine software and database VKI applies for storing, analysing and reporting on the numerous tests they perform in all fields of industry and services. For data handling, an in-house quality management handbook exists, and this was also applied for the PHE test. VKI holds an official state quality certificate for its testing procedure. [15] After data entry a second person compared the extracted results in TestRev with the protocol notes of the ISP. In the case of disagreement a third independent senior person decided as to the correct interpretation and coding.

In this way VKI gathered in its electronic dataset detailed and summary statements such as the ISPs' subjective impressions (satisfaction), but mostly VKI gathered more objective observations on activities the GPs performed or omitted. These more objective ISP observations can be considered in the health care quality field as "patient experience", more amenable to effectively improving quality of care than the more subjective "patient satisfaction". [32 33-35] VKI condensed the ISP notes into 45 statements/judgements per visit. This 45 items VKI dataset was made available to us. We were not provided with the notes taken by the ISPs. However, as the strict rule-

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based coding system of VKI allows the condensed statements/judgements to be re-expand to the detailed observations we could interpret the performance of each GP to a greater degree than the 45 items would suggest. For example, problematic alcohol consumption should be screened for. VKI coded "+ +" (very satisfactory) when the AUDIT-GMAT questionnaire was handed over to the ISP, "o" (average) when the questionnaire was not used but the GP did discuss alcohol consumption with the ISP, and "- -" (not satisfactory) when the topic was not even raised verbally.

We found the VKI method to be reliable in reporting on the ISPs' experience of GP interventions which should have been performed during the PHE. For this first publication we restricted ourselves to analysing data on waiting and consultation time, and GP performance during the medical history taking phase, compared to guideline recommendations.

Detection rate of ISP

Detection of ISP by the observed physician can be an important obstacle in ISP studies, [8] leading to bias and confounding. We are confident that all ISP visits went undetected and physician behaviour was not distorted by the idea that the client could be an expert observer with a constructed clinical case. The age of both ISPs was the same as in the presented clinical cases. Great care was taken to ensure that there was no observable difference on signs. The responsible researcher at VKI stressed in the first interview with us in October 2008 that none of the 40 ISP visits had been detected. We asked her again in February 2009 to interview the two ISPs to determine if they had any suspicion that any of the GPs could have detected them. The response was again negative. One ISP even replied on that occasion that the only GP who had seemed to be a little suspicious had just sent a personal invitation letter to return for the next annual PHE.

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Results of step two: Secondary analysis

In our secondary analysis we focused primarily on observational experience data. The satisfaction data has been published by VKI in its own magazine. [11] We received data on 40 of 42 arranged ISP visits, the same number as reported in the VKI test report publication in 2008. Two ISP visits were rejected by two GPs, one "private" the other "contracted". The reasons given by the two GPs for rejection were in one case an administrative GP error (a misunderstanding of the use of the electronic insurance patient access card), and in the other that the pre-prepared laboratory results were not ordered by the GP herself. However, both GPs were visited by the other ISP.

Service delivery time

For the completed visits the average consultation time was 46 minutes (95% CI 37 – 54 minutes). For the male ISP it was 38 minutes (CI 33 – 43) and for the female ISP 54 minutes (CI 40 – 67). The difference of 16 minutes between the two ISP cases was not significant, when applying a survey/panel data method adjusting for the clustering effect at GP level, but was significant in the full adjusted multilevel model (Coefficient 15,6; CI 4,9 – 26,3).

Female GPs offered longer consultations, with an average of 47 minutes (CI 38 – 57), than males, with an average of 38 minutes (CI 19 – 58). The observed difference of 11 minutes in our sample is not significant, when applying the survey/panel method adjustment for multilevel modelling.

Using multilevel analysis we estimated the proportion of variance explained by the intraclass effect versus the difference between the GPs. If a high proportion of variance is explained by one variable, then this variable has a strong effect on the outcome of interest. 62% of the variance for waiting time was determined by the GP

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intraclass effect compared to 30% for consultation time. These variance estimates result from a conservative monovariate random effect GLS regression model with the GPs as explanatory variable. Further adjusting for the two different ISP case types increased the variance proportion for consultation time explained by the GP by one third, to 45%. The same adjustment did not significantly change the variance proportion in waiting time (slightly increased from 62% to 67%). As could be expected, the intraclass and adjustment effects were even more pronounced in the fixed random effect model.

Table 2 - Proportion of all variance explained by intraclass (GP) variation in multilevel analysis on waiting and consultation time

Regressed on GP only

Time	Random effect (conservative)	Fixed effect (strong assumption)
Waiting	0.621*	0.686
Consultation	0.298	0.493

Regressed on GP and ISP (adjusted for ISP case type)

Time	Random effect	Fixed effect
Waiting	0.668	0.718
Consultation	0.445	0.562

After adjustment for ISP case type the intraclass effect of waiting time did increase a little, whereas for consultation time the effect increased from 0.30 to 0.45 in the random effect model. The conservative random effect model seems to us most appropriate for this kind of data.

* rho: proportion of all variance explained by intraclass (GP) variation

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-------- *End of Table 2* --------

The intraclass effect at the individual GP level could be interpreted as so-called "practice style", a term usual in the quality management literature for characterizing typical and constant patterns of office routines of individual service providers. [9]

In summary, the practice style of GPs had a strong influence on waiting time and a lesser influence on consultation time. Consultation time was dependent on the type of ISP case, but waiting time was not. GPs reacted to the specific cases in adjusting their consultation time.

We also found a difference of 22 minutes in average consultation time between private and contracted GPs. The difference was significant. "Private GPs" provided 60 minutes (CI 50 – 71), "contracted GPs" 38 minutes (CI 26 – 49) on average. The difference remained significant using a fully adjusted multivariate model which included the two ISP case types, GP gender, GP insurance type and the clustering on the GP level (generalized linear modelling statistics incorporated in Stata 11.0)

Quality of service

For this publication we compared observed GP history taking performance with the evidence-based recommendations. According to the officially published guideline, the PHE should include a structured general history taking supported by the HIS and questions regarding alcohol use, supported by the AUDIT-GMAT. We classified five performance levels in respect to general history taking adherence to the guideline before analysing the data. The five HIS-scores ranged from "0" (=below minimal) to

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"4" (=perfect history). The maximum general HIS score of four was achieved when the HIS was offered and all medical domains were addressed during the consultation. Omission of 1 of the 8 medical domains was tolerated in our data interpretation as possible measurement error on the part of VKI. A score of "3" was achieved when the HIS was offered but not all domains were touched on additionally verbally. No HIS, but raising at least 7 of the 8 required domains verbally scored "2". A score of "1" was given when there was no HIS and 2 or 3 domains were missing. No HIS and 4 – 8 domains not addressed scored "0". As the general PHE contract with the GPs requires that the HIS proforma be completed we considered HIS scores of "2" or less below standard. [36;37]

Screening for problematic alcohol consumption should start with completion of the AUDIT-GMAT questionnaire by the client. For this screening activity we scored the performance into two categories. Care according to guideline provided the AUDIT-GMAT (we scored "1"), otherwise we scored "0".

A HIS was offered in 53% (CI 34% - 71%) of all visits. Among the GPs offering a HIS a proportion outperformed the requirements of the guideline if they additionally addressed nearly all the medical content of the HIS during the consultation phase of the PHE (HIS score "4"). In 20% of all visits GPs scored "4", indicating perfect general medical history taking (CI 9% - 39%).

The AUDIT-GMAT was offered in 38% (CI 19% – 56%) of all visits. There was no difference between "private" and "contracted GPs" (p=0.89) and no difference between the female and male ISPs (p=0.73). All GPs who offered an AUDIT-GMAT had also offered a HIS (see also additional file 5: HIS- and AUDIT-scores crosstable n=40 cases).

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We considered the acceptable overall history taking service standard level to be a HIS offered (HIS score "3" or higher) plus the alcohol topic addressed at least verbally. 30% (CI 12–48) of all visits were performed below this standard. The difference in proportion of "private GPs" (21%) and "contracted GPs" (35%) was not significant in the full multilevel model (p> 0.05).

We found a significant intraclass effect at the GP level: For a given GP the Odds Ratio was 60% (CI 0.03 – 91) that their consecutive next ISP would also get the same level of medical history performance. This intraclass effect indicates that GP practice style was a determinant of history taking performance.

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Discussion

Our study is the first using direct observation via ISPs of routine preventive service GP performance compared to standards in an evidence-based structured national PHE programme. We have been unable to find any similar previous studies which used secondary data collected by mystery patients, ISPs engaged by a consumer organisation. The Austrian consumer organisation (VKI) evaluated GPs' performance in Vienna in delivering preventive care, specifically the highly standardized Austrian PHE. The random sampling process for GPs appears to have been sound and produced a representative sample. The clinical cases for the ISPs fitted well to the physical appearance of the two ISPs, one male and one female around 65 of age. In none of the 40 completed visits was there any evidence that the ISP had been detected by the GP. The 40 cases were clustered at the level of 21 GPs. The GP sample had two stratification levels. The first level stratification was "contracted GPs" and "private GPs". The "private GPs" were slightly over-sampled (by three GPs) as their proportion was 33% in the sample and 20% in the sampling population of 1069 GPs with PHE contract in 2008.

The second level, Vienna city districts, improved the sampling quality further, as the random sampling procedure within the city district blocks was found to be robust. Generalisation of the findings to the Viennese GP work-force delivering the PHE is reasonable within the statistical limits of the small sample.

Limitations and strength

One limitation of our study is the small sample size of 40 completed ISP cases for 21 GPs in the VKI dataset. In a recent systematic literature review of good quality SP studies by Rethans, [8] a median 39 GPs were visited across the 20 studies reporting on GPs since 1985. There has been a trend to smaller studies since 2000, with a median

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of 27 GPs. Our small sample size means that the estimates have wide confidence intervals, especially when considering subgroups, such as “private GPs”. Only when effect sizes are large, e.g. in our case when expected values differ dramatically from observed ones, can we rule out chance.

Measurement error on the part of the ISPs is an important potential threat to validity. Rethans proposes that this can be overcome by thorough ISP training, case preparation and robust documentation processes. In the VKI study the two ISPs were highly experienced, having worked more than two decades in consumer testing of many service industries. The VKI tests run now in the thousands – the test of the Viennese GPs on the PHE is just one of the assessments they have performed. More than 80 tests are conducted each year, the organisation has existed for more than three decades and is internationally recognised among European consumer organisations. It has an ISO quality certificate for its testing procedures and constant internal quality checks. The data has to be well documented and robust, as legal cases are common, with tested providers or producers often appealing to the courts. [15] In summary, our primary data collection was embedded in a high-volume routine with sound quality assurance, and collected by highly trained professionals, and thus the data is likely to be reliable.

The data collectors themselves (ISPs) were blinded to our (implicit) study hypotheses, such as expected duration of consultations being 5-10 minutes. It could be argued that consumer associations may be especially critical of doctors and that this might have affected the study design and data collection. In this case, however, the Austrian VKI test report signalled satisfaction with GPs’ PHE performance (translated title: “PHE in good hands”) – in contrast to its reports on pharmacies. [11]

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A further strength of our data, in contrast to many other ISP studies, is that all ISP visits were undetected. Furthermore, our study was not distorted by a self-selection bias of voluntarily participating GPs. In other studies, around 40% of physicians on average decline to participate, leading to a severe self-selection bias among physicians. [1 8] We were able to completely avoid this bias by using the anonymous data collected by VKI, as GPs were selected by a strict and sophisticated random sampling procedure. The Viennese Chamber of Physicians agreed collectively to participate, and single GPs could not exempt themselves from the random VKI visits. The visits to few of around 1500 GPs were announced to all by their Viennese medical chamber, without giving an exact date. However, the VKI never asks permission at the individual service provider level.

"Lack of time" barrier

One of the main obstacles or barriers named by GPs worldwide to delivering preventive care is the lack of time. [5] Among others factors, administrative arrangements including financial factors are important to consider when routine GP practice needs to be changed. [38 27] The average consultation time of 38 minutes among the "contracted GPs" (§ 2 Kassenarzt) is much longer than the 10-15 minutes we expected when the PHE reform was set in motion by one of us (FP) in 2003. Austria has a kind of capped fee-for-service system for "contracted GPs" which results in high volumes of services and high turnover of patients. [12] We estimate the average consultation time to be in the range of Germany with its 7.6 minutes, found in the most recent comparative, but not representative, study in Europe. [39] No study using representative data has been published in a peer-reviewed journal on this issue for Austria.

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The 60 minute consultation time with "private GPs" in this study is extraordinary, especially as these consultations are available free of charge to the eligible population. However, it was difficult for the ISPs to secure an appointment with "private GPs" – they had to contact 21 to make appointments with 7 (1:3 ratio). Thus the PHE is a scarce commodity in private practice and its widespread uptake would likely result in waiting lists.

The long average consultation time of 46 minutes may also be attributable to the complex ISP cases, as increased severity of cases leads to longer consultation all over the world. [40] Less complicated cases, especially among younger clients, would be more the norm and these may be handled in a shorter time. The consultation duration for less complicated cases is unknown and requires further research in Austria.

The Austrian model, developing guidelines accompanied by standardised report cards in combination with a generous reimbursement system based on special contracts for prevention (the PHE contracts) could obviously overcome the barrier of limited time available in Vienna general practice. [31]

The results that (a) waiting time was mainly influenced by the GP, and (b) consultation time was mainly influenced by the clinical case presented, are congruent with common knowledge from quality management on practice styles and results from health services research. [9 39]

The observed tendency of "private GPs" to counsel for longer duration than "contracted GPs" can be attributed to their general practice style, and not to direct financial incentive. The PHE reimbursement is the same 75 Euro for GP contract types, and the client does not have to make out-of-pocket payments, even to "private GPs".

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Service quality

Overall history taking standards were missed by 21% of "private" versus 34% of "contracted" GPs. This difference was not significant. Multilevel analysis revealed that performing below standard history taking was consistent at the GP level between the two ISP visits. This finding is an indication of the importance of GP personal practice styles influencing service quality, and it provides an opportunity for improvement through training and feedback.

The use of the standardised assessment of a history of problematic alcohol consumption, the AUDIT-GMAT questionnaire, is highly recommended in the guideline. [41] Yet in 2005 there was strong opposition voiced against the routine use of this questionnaire by unionized doctors (medical chamber). They considered the questionnaire to be too intrusive and were concerned that it would discourage potential clients. When in 2003 one of us (FP) led the development team for the new PHE it was expected that only a minority of GPs would apply the AUDIT-GMAT. However, in this study it was used in nearly 40% of visits, with no significant difference between "private" and "contracted GPs". Many GPs may consider screening for problematic alcohol consumption to be important in a country like Austria with high alcohol consumption.

Conclusion and outlook

Using ISPs is a well-established but complex method for health service research. Using data not designed for research is also complex. However, the increase in complexity is outweighed by the reduced bias from un-announced visits. Our study was the first to report physicians' preventive performance under direct observation of

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experienced ISPs applying standardized quality-assured documentation in Austria. This study mainly reports on the methods and variation in consultation times and the quality of history taking. Some better than expected results were found, such as the long consultation times and the relatively high completion rate of AUDIT-GMAT questionnaires. We hope that this paper will stimulate further health service research on the quality of service of the annual Austrian PHE provided to around 850,000 adults each year.

Data Sharing

The data of this study are owned by the Austrian Consumer Organisation (Verein für Konsumenteninformation, VKI).

On our written request in October 2008, VKI provided us with the electronic dataset (raw data: Excel file, 40 lines/records), and hardcopies of the completed medical result sheets (34 sheets) for the sole purpose of conducting health service research studies by us, the International Screening Committee for Austria.
We extracted data from the hardcopies and added it to our own secondary dataset.

We encourage any researcher to ask permission and perhaps request the dataset also from VKI in Vienna, Austria (http:\\www.vki.at).

Contributorship

Franz Piribauer1§, Kylie Thaler2,, Mark Harris3

1 International Screening Committee for Austria, Austrian Public Health Association;

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2 Centre for Clinical Epidemiology, Danube University Krems, Austria

3 Centre for Primary Health Care and Equity, UNSW Sydney Australia

FP conceived the study, performed the statistical analysis and drafted the manuscript. KT extracted data, helped in the interpretation and finalisation of the manuscript. MH helped in the interpretation, internal review and finalisation. All authors read and approved the final manuscript.

§Corresponding author

Competing Interests

All authors have completed the ICMJE uniform disclosure form at www.icmje.org/coi_disclosure.pdf (available on request from the corresponding author) and declare: no support from any organisation for the submitted work; no financial relationships with any organisations that might have an interest in the submitted work in the previous 3 years; no other relationships or activities that could appear to have influenced the submitted work.

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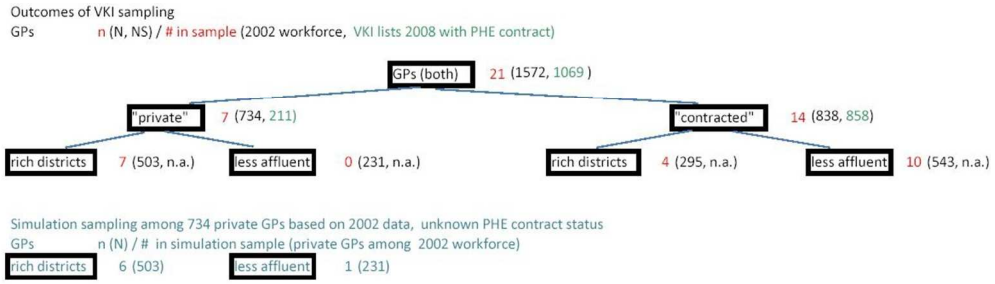

Results of VKI sampling compared with our simulation sampling of private GPs

In 2008, 21 GPs were sampled by VKI, 7 of them "private GPs". All 7 were located in the richer part of Vienna. Among the "contracted GPs", 4 out of 14 were located in the richer Vienna districts.
GP workforce data of 2002, published in a health report of the City of Vienna administration, provided the most recent information on distribution of private GPs among the Vienna city districts.
As we were not provided with data, beyond totals, on the two sampling population lists of VKI, "n.a." means that we could not access the district distribution data.

311x88mm (96 x 96 DPI)

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STROBE Statement—Checklist of items that should be included in reports of ***cross-sectional studies***

	Item No	Recommendation
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found
Introduction		
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported
Objectives	3	State specific objectives, including any prespecified hypotheses
Methods		
Study design	4	Present key elements of study design early in the paper
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection
Participants	6	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group
Bias	9	Describe any efforts to address potential sources of bias
Study size	10	Explain how the study size was arrived at
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding
		(*b*) Describe any methods used to examine subgroups and interactions
		(*c*) Explain how missing data were addressed
		(*d*) If applicable, describe analytical methods taking account of sampling strategy
		(*e*) Describe any sensitivity analyses
Results		
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed
		(b) Give reasons for non-participation at each stage
		(c) Consider use of a flow diagram
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders
		(b) Indicate number of participants with missing data for each variable of interest
Outcome data	15*	Report numbers of outcome events or summary measures
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included
		(*b*) Report category boundaries when continuous variables were categorized
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses

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Discussion		
Key results	18	Summarise key results with reference to study objectives
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence
Generalisability	21	Discuss the generalisability (external validity) of the study results
Other information		
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based

*Give information separately for exposed and unexposed groups.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.

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Vorsorgeuntersuchung der Österreichischen Sozialversicherung
Allgemeines Programm für Frauen und Männer

Seite 1/2

Feld

A TESTER 2

Nr. 1

☐ Kriegshinterbliebener ☐ nicht versichert

Klinische Untersuchung | **Empfohlene Maßnahmen**

Kopf/Hals: KS 1; HWS beweglich, LK nicht tastbar SD → tastbar

ab 65 Jahre: Hörverminderung (Ergebnis Flüstertest) 1 ☐ ja 0 ☐ nein nix
Sehschwierigkeiten (Anamnesebogen) 1 ☐ ja 0 ☐ nein

☐ Überweisung zum HNO-FA
☐ Überweisung zum Augen-FA

Herz/Lunge/Gefäße: Pulmo frei, Cor → leiser Systolen ICR 2
Abdomen: weich, DDS, Hepar am Ribo
WS/Gelenke: frei beweglich
Haut

Hautkrebs
von Proband/in angegebene Auffälligkeiten ☐ ja ☒ nein ☐ bestätigt
bösart. Melanom bei Verwandtem 1. Grades ☐ ja ☐ nein ☐ unklar

☐ keine
☐ Selbstbeobachtung
☐ Überweisung zum Haut-FA

sonstige auffällige Befunde

Parodontitis-Risikoklasse

gesundes Zahnfleisch ☒ ja = 0 ☐ nein
Zahnstein/Plaque/Mundgeruch/Rauchen/Hormonveränderung (z. B. Pubertät, Wechseljahre)/Diabetes mellitus/motorisches Hygieneerschwernis ☐ ja = 1 ☐ nein
Rötung/Schwellung/Lockerung ☐ ja = 2 ☐ nein

☐ 0: sorgfältige Reinigung alle 24 h
☒ 1: Empfehlung zu fachger. Pflege
☐ 2: Überweisung zum Zahnarzt

Blutuntersuchung

Chol mg/dl 278 | HDL-Chol mg/dl 88 | T-Chol/HDL-Chol 3,2

Rotes Blutbild (Frauen)

Ery T/l 4,53 | Blutzucker mg/dl 114
Hb g/dl 14,2 | Triglyceride (nüchtern) mg/dl 88
Hkt % 40,3 | Gamma-GT U/l 65

Harnuntersuchung

	neg	pos
Leukozyten	☐	☐
Glucose	☐	☐
Nitrit	☐	☐
Eiweiß	☐	☐
Blut	☐	☐
Ubg	☐	☐

☐ Diagnosesicherung
☐ Befundbesprechung
☐ weitergehende Laboruntersuchung veranlasst
☐ Wiederholung der Laboruntersuchung

Blutdruck (mmHg)

130 / 80

☐ blutdrucksenkendes Medikament eingenommen

☐ ideal <120/80
☐ normal 120—129/80—84
☐ noch normal 130—139/85—89
☐ Hypertonie Stadium 1 140—179/90—109
☐ Hypertonie Stadium 2 ≥180/110
☐ isolierte systolische Hypertonie ≥140/<90

☐ Diagnosesicherung
☐ Hypertonieschulung (Angebot)
☐ Weiterführung der Therapie

BMI (kg/m²)

21,0

☒ Taille Männer <102 cm
Taille Frauen < 88 cm
☐ größerer Taillenumfang

☐ <18,5
☒ 18,5—24,9
☐ 25,0—29,9 Präadipositas
☐ 30,0—34,9 Grad I Adipositas
☐ 35,0—39,9 Grad II Adipositas
☐ ≥40,0 Grad III Adipositas

☐ Bewegungsberatung
☐ Ernährungsberatung

Design by JOANNEUM RESEARCH (2005)

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Vorsorgeuntersuchung der Österreichischen Sozialversicherung
Allgemeines Programm für Frauen und Männer

Seite 2:2

Körperliche Bewegung stexar
☐ keine ☐ gelegentlich ☒ regelmäßig
☐ Bewegungsberatung recexad
☐ Bewegungsprogramm recexprg
☐ von Proband/in abgelehnt reptref

Alkohol stalc
Alkoholfragebogen
Aufhörwille vorhanden ☐ ja ☐ nein
andere Vorbefunde (Alkohol) ☐ ja ☐ nein
☐ Gespräch recaltlk
☐ Entwöhnungsprogramm recalprg

Rauchverhalten stsmok
sicher Nichtraucher ☒ ja ☐ nein
Aufhörwille vorhanden ☐ ja ☐ nein
☐ Kurzintervention recsmkdis
☐ Entwöhnungsprogramm recsmprg

Blutzuckeruntersuchung stdm
☐ bestehender Diabetes
Ergebnis nodmfbg
☐ unauffällig
☐ nüchtern >126 [mg/dl]
☐ nicht nüchtern >200 [mg/dl]
☐ Diagnosesicherung recdmdiag
☐ Schulung recdmedu
☐ Weiterführung der Therapie recdmmed

Kardiovaskuläres Risiko bis 40 Jahre cvdhsrsk
anamnestisch ☒ stcvd
Ergebnis des AHA Risk Calculator
☐ gering ☐ moderat ☐ hoch
ab 40 Jahre cvdnzrsk
Ergebnis des New Zealand Risk Scale
☐ gering ☐ moderat ☐ hoch ☐ sehr hoch
☐ Übertrag in Gesundheitspass recvdpec
☒ Gespräch recvdtlk
☐ Lifestyleintervention recvdint
☐ Therapieeinleitung recvdmed

PAP-Abstrich-Befund (zeitgerecht) stpap
☐ Abstrich gemacht
Befund vorhanden ☐ ja ☐ nein
☒ ärztliche Beratung und Aufklärung vor PAP-Abstrich
Frauen ab 40 Jahre stmam
Mammographiebefund (zeitgerecht)
☐ ja
BIRADS-Befund vorhanden ☐ ja ☐ nein
☒ ärztliche Beratung und Aufklärung vor Vorsorge-Mammographie
☒ Überweisung Frauen-FA repapref
☐ von Probandin abgelehnt repapnjt
☒ Überweisung Röntgen-FA remamref
☐ von Probandin abgelehnt remamnjt

Okkultes Blut im Stuhl stfobbut
Vorbefunde (12—24 Monate)
☒ nicht vorhanden
☐ auffällig
☐ unauffällig
aktueller Befund lbfob
☐ auffällig
☐ unauffällig

Koloskopie stcolo
Wann war die letzte Koloskopie
☐ innerhalb der letzten 10 Jahre
☐ länger als 10 Jahre
☐ bisher keine
☐ ärztliche Beratung/Aufklärung über Koloskopie durchgeführt
☐ Überweisung recolref
☐ von Proband/in abgelehnt recolrjt

Prostata stpros
☐ Ärztliche Beratung/Aufklärung über den PSA-Test auf Wunsch des Probanden
☐ Überweisung zum Urologie-FA auf Wunsch des Probanden reprosref

Bei Vorliegen von Diabetes mellitus oder Myopie (> -5dpt) oder familiärem Glaukom stglarsk
Risiko für Glaukom (Grüner Star) vorhanden ☐ ja ☐ nein
Untersuchung für Glaukom beim FA innerhalb der letzten 24 Monate ☐ ja ☐ nein
☐ Überweisung zum Augen-FA rcglref

Augen stsee
Sehvermögen innerhalb der letzten 24 Monate mind. 1x kontrolliert ☐ ja ☐ nein
Untersuchung für Glaukom beim FA innerhalb der letzten 24 Monate ☐ ja ☐ nein
☐ Überweisung zum Augen-FA

Bereits bekannte Erkrankungen stmedhs
Bei Diagnose Mitralklappenstenose

Verdacht auf behandlungswürdiges Gesundheitsproblem und neu entdeckte Erkrankungen newdis
☐ ja ☒ nein
Wenn ja, welche
☐ Diagnosesicherung renewcon
☐ weitere Abklärung renaufkl

Untersuchungsdatum TT - MM - JJJJ
01 - 07 - 2008
date

enddis
1 ☐ Abschlussgespräch durchgeführt
2 ☐ Proband/in ist nicht zum Abschlussgespräch erschienen

PiCo - Dr. Piribauer
Wimbergergasse 14-16/2-21
A-1070 Wien, Austria
Tel.&Fax: +43 (0)1 524 60 20
http://www.pico.at

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Appendix File 2

Incognito Standardised Patients (ISP) Case Descriptions

The Austrian Consumer Organisation, ("Verein für Konsumenteninformation", VKI) provided us with the clinical case construction of their two ISP.

The ISPs, being around the age listed below and with normal BMI, reported the following history on GP request and entered data in the history taking proforma (health information sheet, HIS), when offered, accordingly.

1.1 Female ISP

Age	66 years
Weight	BMI in normal range (21 kg/m2)
Diet	Reports healthy diet (Vegtables, little meat, however no fruits due to intolerance of fructose)
Alcohol	Reports on 2-3 glasses of wine every evening
Smoking	Not smoking
Physical Activity	Active, two times a week a special gym ("Kieser Training")
Vision control	2 times a year controlled by specialist
Hearing	Reports problems, specialist not visited yet
Oral Health	Swollen and sensitive gums, last visit to the dentist more than 3 years ago
Pap smear	Last visit 3 years ago
Mammogram	Around 5 years ago
Bowel Cancer	FOBT has been done, was ok, Colonoscopy never
Family history cancer	Mother had cervical cancer diagnosed
Abnormal	GGT: 65 U/l; GOT: 44 U/l GPT: 35 U/l;

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Laboratory results*	Total Cholesterol 278 mg/dl
Blood Pressure	Reported as normal and variable
Additional med. history	Three curettments

1.2 Male ISP

Age	65 years
Weight	BMI in normal range (22 kg/m2)
Diet	Reports Austrian "home-diet" (means: much meat, much animal fat, few vegetables)
Alcohol	Per month one glass of wine or beer
Smoking	Smoking reduced during the last 12 years to 8 cigarettes a day.
Physical Activity	None, no sports
Vision control	Is ok, has not seen a specialist for a very long time
Hearing	No problems reported, specialist not visited
Oral Health	No problems reported
Skin problems	Reports regular excisions of naevi at dermatologist
Bowel Cancer	A colonoscopy has been done long ago, at least 12 years
Family history CVD	Father has died of myocardial infarction before age of 55
Family history cancer	Sister has colon cancer
Abnormal Laboratory results*	Total Cholesterol 230 mg/dl, HDL 33 mg/dl; Ratio of Tot-Chol. / HDL is 6,9
Blood Pressure	He does home-measurements, reported it as sometimes elevated to 140/90

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Appendix 3 - GP sample distribution in rich and poor parts of Vienna

Our analysis of the sample proportions was impaired by the condition of anonymity of GPs. We could not get insight into the original name lists compromising the VKI sampling base.

However as name and office location of the visited 21 GPs were published in the VKI magazine report we could look up their contract status in the official website of the Medical Association of Vienna (Ärztekammer für Wien). We found seven “private GPs” and 14 “contracted GPs”.

With this data we were able to perform a further assessment of the quality and representativeness of the VKI sampling. We hypothesized, that the great majority of private GPs would practice in the richer part of Vienna and should be overrepresented in the sample there.

Vienna has 23 official political subunits, so called districts. We tried to find a measure to separate the 23 city districts into two equal parts regarding affluence. No official separation of rich versus poor districts exists. There is a historical dimension however, as the city grew out of the 2000 year old center, the 1. district now. The next ring around this core are the districts 2. – 9., built until 1900. Affluence is in principle more concentrated in the 9 inner traditional districts, than in the more modern city periphery.

To refine our simple historical inner/outer district model we looked for more objective data. We used two independent measures from two independents data sources to further triangulate and categorize districts in Vienna into rich and poor for the purpose of this study.

First we used purchasing power data, available on the internet, on the five richest versus the five poorest districts of whole Austria (99 districts). Among the five richest Austrian districts, four were in Vienna (districts number 1, 13, 18, 19). Among the poorest Austrian five was the 15th district of Vienna (RegioData Research 1-3).

As purchasing power data were not available to us for all Vienna districts, we used as proxy data the market price for purchasing a flat. End of 2008 the range was € 5370 (1. district) to € 1650 (11. district) per square meter. These data were published quarterly for all Vienna districts in the real estate commercial sector media and in the internet (ERESNET GmbH). We found that in beginning of 2009 a cut-off price of 3000 Euro per square meter to purchase a flat helped to divide Vienna, with it´s 23 districts, into two parts. 11 districts were below this threshold. The 9 inner city districts were not among these. The four rich districts according to their purchasing power were also not. The 15th district, found to be very poor in purchasing power was among the 11 below treshold.

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Thus we found 12 districts to belong to the rich part, and 11 to the less affluent half. The rich 12 were the inner ones (Nr. 1 – 9) plus the three outer districts (13, 18, 19) which we also derived from the purchasing power study. The less affluent – we try to avoid the word poor for a city like Vienna – are the rest of 11 districts from the periphery.

Examining the VKI sampling of seven “private” GPs revealed that all seven had their office in the richer part of Vienna. For the 14 “contracted GPs” only 4 of 10, a minority had their office in the richer part.

Contracted GPs can only open their office in a district where the health insurance has planned it. The health insurance plan places offices according the population size, the inner districts are much smaller in area and have less population than the periphery ones. “Private” GPs can open their office where they want. They will tend to open their office near those people who can afford to pay out of the pocket, which will tend to live in the richer districts of Vienna. Thus the stark difference in the distribution of the VKI sample is very plausible and the stratified sampling seems to represent the GP distribution in Vienna well.

We further tested statistically the sample proportions from two perspectives. First we compared the complete sample of 21 GPs with the distribution of all GPs (2002 data) in Vienna in regard to less populated inner nine districts versus populous outer districts. Second we did the same for all 21 GPs in regard to 12 rich versus poorer 11 districts. In the complete sample the GPs in the inner less populated districts (Inner/outer districts, RR 0.80; CI 0.31-2.04) have a small trend to be underrepresented. GPs are slightly, but not significantly, overrepresented for the richer parts (Richer/ less affluent, RR 1.16; CI 0.5-2.71) at the same time when compared to the GP workforce distribution. Most probably this is caused by the intentional oversampling, as reported by VKI during the first interview, of seven “private GPs” instead of four. Both tests give an additional indication that the double stratified sampling resulted in a balanced random sample in regard to two aspects of district characteristics, “private GP” and “contracted GP” density.

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Ref Type: Report

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VKI 9/2008 Doctor by district distribution

Source: p.23 23 districts in Vienna

Doc.Nr.	ZIP	Distr.Nr.
1	1110	11
2	1010	1
3	1120	12
4	1160	16
5	1210	21
6	1150	15
7	1020	2
8	1090	9
9	1200	20
10	1030	3
11	1100	10
12	1130	13
13	1190	19
14	1040	4
15	1030	3
16	1230	23
17	1190	19
18	1180	18
19	1220	22
20	1140	14
21	1180	18

SORTED by district

			if > 1: # of docs
2	1010	1	
7	1020	2	
10	1030	3	
15	1030	3	2
14	1040	4	
8	1090	9	
11	1100	10	
1	1110	11	
3	1120	12	
12	1130	13	
20	1140	14	
6	1150	15	
4	1160	16	
18	1180	18	
21	1180	18	2
13	1190	19	
17	1190	19	2
9	1200	20	
5	1210	21	
19	1220	22	
16	1230	23	

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Conclusion: 5 of 23 districts were not covered. (5,6,7,8, in 3 of the resulting 18, 2 doctors per distri
within districts random selection. … This if there is a bias in doctor selection,
7 out of 21 doctors "Wahlärzte" with VU-contract are private rimbursed with

Sampling muss von mir beschrieben und dann mit VKI Expertin durchbesprochen werden.

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ct were drawn. These districts do not belong to the populos but the the affluent one (preferred by do being more representative of doctors working in affluent areas.

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ıctors of choice) ..are not most popolous but the more afflent

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GP Sampling in Vienna by VKI / Vienna City administration data 2002 (private) and 2007 (overall)

Vienna District Nr.	2007 data # of GPs	2002 data # of GPs	2002 data # contracted	2002 data # private	2002 data % private	2007 data totals
1.	59	65	9	56	86%	
2.	76	70	47	23	33%	
3.	73	79	43	36	46%	
4.	39	48	17	31	65%	
5.	37	51	29	22	43%	
6.	39	43	15	28	65%	
7.	55	55	15	40	73%	
8.	45	57	12	45	79%	inner districts
9.	53	68	19	49	72%	476
10.	104	101	81	20	20%	
11.	44	51	38	13	25%	
12.	65	72	42	30	42%	
13.	71	83	23	60	72%	
14.	62	75	40	35	47%	
15.	50	54	38	16	30%	
16.	71	81	52	29	36%	
17.	43	42	28	14	33%	
18.	63	79	29	50	63%	
19.	83	100	37	63	63%	
20.	49	52	39	13	25%	
21.	83	90	73	17	19%	
22.	80	79	65	14	18%	outer districts
23.	80	77	47	30	39%	948
totals/ avg%	1424	1572	838	734	47%	1424

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2002 data	both in	
	# in sample	
		1
		1
		2
		1
		1
		1
		1
		1
		1
		1
		1
		1
		2
		2
		1
		1
		1
		1
		21

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GP Sampling in Vienna by VKI												
Vienna	2007 data	**2002 data**	**2002 data**	**2002 data**	2002 data	2007 data	**2008 VKI sample popul.(NS)**					2007 data
District Nr.	# of GPs	# of GPs	# private	# contracted	% private	totals		NS % priva	# sample (n)	#private	#contract	inner
1.	59	65	56	9	86%				1	1		
2.	76	70	23	47	33%				1		1	
3.	73	79	36	43	46%				2	1	1	
4.	39	48	31	17	65%				1	1		
5.	37	51	22	29	43%							
6.	39	43	28	15	65%							
7.	55	55	40	15	73%							
8.	45	57	45	12	79%							
9.	53	68	49	19	72%	476			1	1		476
10.	104	101	20	81	20%				1		1	outer
11.	44	51	13	38	25%				1		1	
12.	65	72	30	42	42%				1		1	
13.	71	83	60	23	72%				1	1		
14.	62	75	35	40	47%				1		1	
15.	50	54	16	38	30%				1		1	
16.	71	81	29	52	36%				1		1	
17.	43	42	14	28	33%							
18.	63	79	50	29	63%				2	1	1	
19.	83	100	63	37	63%				2	1	1	
20.	49	52	13	39	25%				1		1	
21.	83	90	17	73	19%				1		1	
22.	80	79	14	65	18%				1		1	
23.	80	77	30	47	39%	948			1		1	948
	1424	**1572**	**734**	**838**		1424	1069	20%	21	7	14	1424
cheksumm		0										
2002 data all GPs		1572										

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2002 data	2007 sample					2007 data	2002 data		2007 sample		
# private (2002 data)				#reg.health ins.contrac		**RICH**	# private	# cntrct			
	#sample	**#priv**	#cntrct			inner +13+18+19			#sample	**#priv**	#cntrct
						versus					
330	6	**4**	2	206		**693**	**503**	**295**	11	7	4
						poor					
404	15	**3**	12	632		**731**	**231**	**543**	10	0	10
734	21	**7**	14	838		1424	734	838	21	7	14
							0				

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Contracted GP perspective

Vienna districts	2007 data # of GPs	2002 data % private	2007 sample **# in sample**
inner	476	63%	6
outer	948	39%	15
total/ avg %	1424	47%	21

Private GP perspective

districts	2007 data # of GPs	2002 data % private
RICH	693	503
less affluent	731	231
	1424	47%

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2007 sample	# in sample
	11
	10
	21

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GP Sampling in Vienna by VKI						Contracted GP perspective		"private"		
Vienna	2007 data	2002 data	2002 data	**2002 data**	**2002 data**	2007 data	2008 sample	**in sample**	private GP in simulation	
District Nr.	# of GPs	# of GPs	# contracted	# private	% private	# of GPs				
1.	59	65	9	56	86%		**# in sample**		1	1
2.	76	70	47	23	33%					
3.	73	79	43	36	46%				1	
4.	39	48	17	31	65%				1	1
5.	37	51	29	22	43%					
6.	39	43	15	28	65%					
7.	55	55	15	40	73%					1
8.	45	57	12	45	79%	**inner (1.-9.)**				
9.	53	68	19	49	72%	476		6	1	1
10.	104	101	81	20	20%					1
11.	44	51	38	13	25%					
12.	65	72	42	30	42%					RICH = inner 9 +13.+18.+19
13.	71	83	23	60	72%				1	1 6
14.	62	75	40	35	47%					
15.	50	54	38	16	30%					
16.	71	81	52	29	36%					
17.	43	42	28	14	33%					
18.	63	79	29	50	63%				1	0
19.	83	100	37	63	63%				1	1
20.	49	52	39	13	25%					
21.	83	90	73	17	19%					
22.	80	79	65	14	18%	**outer (10.-23.)**				less affluent
23.	80	77	47	30	39%	948		15		1
totals/avg %	1424	1572	838	734	47%	1424		21	7	7

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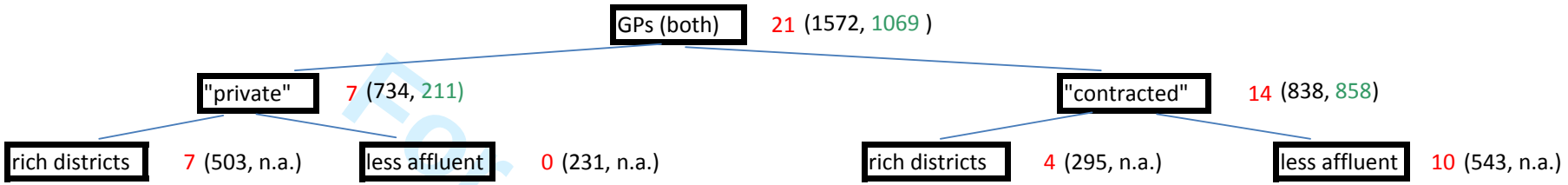
Outcomes of VKI sampling

GPs n (N, NS) / # in sample (2002 workforce, VKI lists 2008 with PHE contract)



Simulation sampling among 734 private GPs based on 2002 data, unknown PHE contract status

GPs n (N) / # in simulation sample (private GPs among 2002 workforce)

rich districts 6 (503) less affluent 1 (231)

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Appendix File 5

History taking and Health Information Sheet use as observed by the Incognito Standardised Patients (ISP)

Explanation how indicator variables were constructed during our secondary data analysis

Content

APPENDIX FILE 5 1

HISTORY TAKING AND HEALTH INFORMATION SHEET USE AS OBSERVED BY THE INCOGNITO STANDARDISED PATIENTS (ISP) 1

EXPLANATION HOW INDICATOR VARIABLES WERE CONSTRUCTED DURING THE ANALYSIS 1

1 GENERAL HISTORY TAKING 1

1.1 ALCOHOL DOMAIN 4

1.2 COMBINING GENERAL HISTORY TAKING AND ALCOHOL SCREENING 5

STATA Log files provide the trail

1. File “art_1_00.log” construction of “HIS use” indicator variable: “nHISuse” shows how the original VKI data was analysed and an overall indicator variable was constructed.

1 General history taking

The original VKI “c21” variable reports how comprehensive the GP has talked about the history. “4” is excellent, “0” not at all and “-1” means that this data are missing. 1-3 are in between. We used this variable to construct of “nHISuse” indicator.

Additionally we checked the variable “raghnd”. The original VKI “raghnd” variable reports if a HIS has been offered (handed over) to the ISP. “4” means offered, “0” not offered, and “-1” missing again.

The missing data in both variables were attributable to one GP only (Nr. 19) who did not offer a HIS nor talk at all about the history to neither ISP as could be seen from another variable not missing (“c19” – reports that no history was used at all)

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See the relation of the two variables (STATA output)

. table raghnd c21

raghnd	c21					
	-1	0	1	2	3	4
-1	2					
0		1		2	4	10
4		3	2	1	3	12

"RagEYE" to "RAMEDhs" are original VKI variables were the ISP recorded how well during the visit the GP addressed the history regarding different domains starting with the history of eye problems over ears (hearing)… and so on to history of diseases (ramedhs). A score of "4" means domain touched, "0" not touched. There were 40 visits altogether.

During some visits lacking a perfect history taking ("c21" is coded with less than "4" by the ISP) some domains were still touched. See the stata output below:

```
. list docid rageye - ramedhs if (c21 < 4 & c21 > 0)
```

	docid	rageye	raear	rapar	radm	racvd	racanc	rasmk	ramedhs
4.	2	4	4	4	0	4	0	4	4
6.	3	4	4	4	4	0	0	4	4
9.	5	4	4	4	0	0	4	4	4
15.	8	0	4	0	4	0	0	0	4
18.	9	4	4	0	0	0	0	4	4
19.	10	4	0	4	4	4	0	4	4
22.	11	4	4	4	0	4	4	4	0
25.	13	4	4	4	4	0	0	4	4

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30.	16	0	0	4	4	4	4	4	4
31.	16	4	0	4	4	4	0	0	0
34.	18	4	0	0	0	0	4	4	4
38.	20	4	0	4	0	0	0	4	0

(Numbers show score per visit)

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As such we were now able to construct our “nHISuse” variable:

```
. replace nHISuse = 4 if (raghnd == 4 & c21 == 4)

(12 real changes made)

. replace nHISuse = 3 if (raghnd == 4 & c21 < 4)

(9 real changes made)

. replace nHISuse = 2 if (raghnd == 0 & c21 == 4)

(10 real changes made)

. * probe ob c21 korrekt von VKI errechnet:

. list docid rageye - ramedhs if (c21 > 3)
```

As exemplified in the paper the maximum general HIS-score of four was achieved when the HIS was offered and all medical domains were addressed during the consultation. An omission of 1 out of the 8 medical domains was tolerated in our data interpretation as possible measurement error on the VKI side. A score of “3” was achieved when the HIS was offered, and not all domains touched additionally verbally. No HIS, but raising at least 7 of 8 required domains verbally, scored “2”. Score “1” was with no HIS and 2 or 3 domains missing. No HIS and 4 – 8 domains not addressed scored “0”.

1.1 Alcohol Domain

In principle the GP should use a standardized questionaire the AUDIT-GMAT to screen for problematic alcohol consumption

In a similar way we construed the indicator variable “nbAUDIT”. If the AUDIT GMAT had been handed over we scored “2” if not “0”.

To keep this additional file short, we will not detail the process as we have done it for the general history taking part (see above).

As the ISP recorded in the original VKI variable “ranalk” how the alcohol domain was covered, we could determine when the alcohol domain was touched verbally, even when the AUDIT-GMAT was not offered.

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Providing the AUDIT-GMAT the visit was scored with “4”, no provision but addressing the alcohol topic during the consultation the score was “2”. Least performers did neither of both, neglecting the domain completely, thus the visit was scored “0”.

```
. tab ranalk nbAUDIT, nolabel


AUDIT-GMAT |  AUDIT-GMAT offered
      used |         0          1 |     Total
-----------+----------------------+----------
         0 |         7          0 |         7
         2 |        18          0 |        18
         4 |         0         15 |        15
-----------+----------------------+----------
     Total |        25         15 |        40
```

(Numbers show number of visits with that performance characteristic.)

1.2 Combining General History taking and Alcohol screening

When combining both newly constructed indicator variables “nHISuse” and “nbAUDIT” we could assess the distribution of the two performance parts of the GPs.

As described in our paper, there was strong correlation. See here the cross table.

```
   Alkohol |
 screening |
         & |                HIS and medical History taking
AUDIT-GMAT |         0          1          2          3          4 |     Total
-----------+-------------------------------------------------------+----------
         0 |         3          1          2          0          1 |         7
         2 |         0          5          8          2          3 |        18
         4 |         0          0          0          7          8 |        15
-----------+-------------------------------------------------------+----------
     Total |         3          6         10          9         12 |        40
```

(Numbers show number of visits with that performance characteristic.)

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The same table as above, horizontal categories now vertically, see below in labelled format:

Numbers show number of visits with that performance characteristic.

```
. tab  nHISuse ranalk

   HIS and Anamnesis |         AUDIT-GMAT used
                used | topic neg  not offer    offered |     Total
---------------------+---------------------------------+----------
      severe neglect |         3           0           0 |         3
incomplete Anamnesis |         1           5           0 |         6
 verbal Anamnesis ok |         2           8           0 |        10
           sufficient |         0           2           7 |         9
optimal (incl. talk) |         1           3           8 |        12
---------------------+---------------------------------+----------
               Total |         7          18          15 |        40
```

(Numbers show again number of visits with that performance characteristic.)

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The full adjusted multilevel model (GLM, REML)

$$Var(\text{Dep. Variable (e.g. waiting time)}) = \beta_0 + \beta_{1\,(GP)} + \beta_{2(GP\ gender)} + \beta_{3\,(GP\ contract\ type)} + \beta_{4\,(ISP\ case)}$$

The full adjusted multilevel model (GLM, REML) - simplified equation formula
297x209mm (200 x 200 DPI)

view only

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Rational for Analysis in STATA - Selected Examples of original stata commands and their output
(in response to request by reviewer 1)

Data were found clustered or levelled (stratified) at the GP level (Repeated Observations (40 visits) of 21 GPs).

Adjustment for clustering was done by the family of SVY commands in STATA. Clustering at the GP level of observations was indicated by "SVYSET" command, the GP (variable "docid") the primary sampling unit (PSU).

Thus the results of the following estimates for means of continous variables.

****
ESTIMATION OF WAITING and COUNSELLING TIME

```
. svy: mean rtimwt rtimcn
(running mean on estimation sample)

Survey: Mean estimation

Number of strata =       2          Number of obs    =      40
Number of PSUs   =      21          Population size  =      40
                                    Design df        =      19

--------------------------------------------------------------
             |             Linearized
             |       Mean   Std. Err.     [95% Conf. Interval]
-------------+------------------------------------------------
      rtimwt |         22    3.87269      13.89437    30.10563
      rtimcn |      45.55     3.8922      37.40353    53.69647
--------------------------------------------------------------



. svy: mean rtimwt, over(tstper)
(running mean on estimation sample)

Survey: Mean estimation

Number of strata =       2          Number of obs    =      40
Number of PSUs   =      21          Population size  =      40
                                    Design df        =      19

   maleTester: tstper = maleTester
 FemaleTester: tstper = FemaleTester

--------------------------------------------------------------
             |             Linearized
        Over |       Mean   Std. Err.     [95% Conf. Interval]
-------------+------------------------------------------------
rtimwt       |
  maleTester |      18.75   3.741751      10.91842    26.58158
FemaleTester |      25.25   5.005685      14.77298    35.72702
--------------------------------------------------------------

. svy: mean rtimcn, over(docpriv)
(running mean on estimation sample)
```

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```
Survey: Mean estimation

Number of strata =       2          Number of obs    =      40
Number of PSUs   =      21          Population size  =      40
                                    Design df        =      19

          no: docpriv = no
         yes: docpriv = yes

--------------------------------------------------------------
             |             Linearized
        Over |       Mean   Std. Err.     [95% Conf. Interval]
-------------+------------------------------------------------
rtimcn       |
          no |   37.57692     5.3288      26.42362    48.73023
         yes |   60.35714    5.10102      49.68058     71.0337
--------------------------------------------------------------

. svy: mean rtimwt, over(docpriv)
(running mean on estimation sample)

Survey: Mean estimation

Number of strata =       2          Number of obs    =      40
Number of PSUs   =      21          Population size  =      40
                                    Design df        =      19

          no: docpriv = no
         yes: docpriv = yes

--------------------------------------------------------------
             |             Linearized
        Over |       Mean   Std. Err.     [95% Conf. Interval]
-------------+------------------------------------------------
rtimwt       |
          no |   29.80769   5.569197      18.15123    41.46416
         yes |        7.5   3.971626     -.8127078    15.81271
--------------------------------------------------------------

. * Waiting time at private GPs significant shorter than  at contracted GPs


------------------------------------------------------------------------------
-----------------------------------------
For regression analysis the family of "XT commands" is suited for data
clustered or levelled (stratified) at the GP level (Repeated Observations (40
visits) of 21 GPs). XT-commands allow a multilevel analysis.


************************************************************
STUDYING Differences among contract types of GPs (Full model, see paper Figure
2)
-----------------

. xtmixed rtimwt  docpriv docfem tstper || docid:

Performing EM optimization:

Performing gradient-based optimization:
```

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```
Iteration 0:   log restricted-likelihood = -158.61422
Iteration 1:   log restricted-likelihood =  -158.6142
Iteration 2:   log restricted-likelihood =  -158.6142

Computing standard errors:

Mixed-effects REML regression                   Number of obs      =         40
Group variable: docid                           Number of groups   =         21

                                                Obs per group: min =          1
                                                               avg =        1.9
                                                               max =          2


                                                Wald chi2(3)       =      13.49
Log restricted-likelihood =  -158.6142          Prob > chi2        =     0.0037

------------------------------------------------------------------------------
      rtimwt |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
     docpriv |  -26.97722   8.464749    -3.19   0.001    -43.56782   -10.38661
      docfem |   15.10222   10.13316     1.49   0.136    -4.758416    34.96285
      tstper |   7.269289   4.074915     1.78   0.074    -.7173978    15.25597
       _cons |   8.471067   10.47674     0.81   0.419    -12.06297     29.0051
------------------------------------------------------------------------------

------------------------------------------------------------------------------
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
docid: Identity              |
                  sd(_cons) |   14.45412   3.507873      8.982836    23.25787
-----------------------------+------------------------------------------------
               sd(Residual) |   12.70295   2.095368      9.193858    17.55138
------------------------------------------------------------------------------
LR test vs. linear regression: chibar2(01) =     6.94 Prob >= chibar2 = 0.0042



*******************************
STUDYING INTRACLASS EFFECTS









*******************************
STUDYING INTRACLASS EFFECTS


. xtreg rtimwt tstper, i(docid)

Random-effects GLS regression                   Number of obs      =         40
Group variable (i): docid                       Number of groups   =         21

R-sq:  within  = 0.1680                         Obs per group: min =          1
       between = 0.0246                                        avg =        1.9
```

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```
       overall = 0.0220                                        max =         2

Random effects u_i ~ Gaussian                     Wald chi2(1)       =      3.26
corr(u_i, X)       = 0 (assumed)                  Prob > chi2        =    0.0709

------------------------------------------------------------------------------
      rtimwt |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      tstper |   7.415388   4.106422     1.81   0.071     -.633051    15.46383
       _cons |   11.29696   7.598517     1.49   0.137    -3.595862    26.18978
-------------+----------------------------------------------------------------
     sigma_u |  18.097855
     sigma_e |   12.76474
         rho |  .66779156   (fraction of variance due to u_i)
------------------------------------------------------------------------------


. xtreg rtimcn tstper, i(docid)

Random-effects GLS regression                     Number of obs      =        40
Group variable (i): docid                         Number of groups   =        21

R-sq:  within  = 0.2909                           Obs per group: min =         1
       between = 0.0138                                          avg =       1.9
       overall = 0.1019                                          max =         2

Random effects u_i ~ Gaussian                     Wald chi2(1)       =      7.69
corr(u_i, X)       = 0 (assumed)                  Prob > chi2        =    0.0056

------------------------------------------------------------------------------
      rtimcn |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      tstper |   15.61365   5.631156     2.77   0.006     4.576788    26.65051
       _cons |   21.84556   9.543747     2.29   0.022     3.140158    40.55096
-------------+----------------------------------------------------------------
     sigma_u |  15.871951
     sigma_e |  17.729778
         rho |  .44487887   (fraction of variance due to u_i)
------------------------------------------------------------------------------



Interpretation (see also paper, Table 2)

TABLE Multilevel analysis
Time
regressed on GP
proportion of all variance explained by intraclass (GP) variation

     conservative (random effect)      strong assumption (fixed effect)
Waiting   rho = 0.621                             rho = 0.686
counselling        rho = 0.298                             rho = 0.493


Time
regressed on GP and ISP
(adjusted for ISP case type)

Waiting   rho = 0.668                             rho = 0.718
counselling        rho = 0.445                             rho = 0.562
```

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Covert checks by standardized patients of general practitioners' delivery of new periodic health examinations: clustered cross-sectional study from a consumer organisation.

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Abstract

Objective

To assess if data collected by a consumer organisation are valid for a health service research study on physicians´ performance in preventive care. To report first results of the analysis of physicians performance like consultation time and guideline adherence in history taking.

Design

Secondary data analysis of a clustered cross-sectional direct observation survey.

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Setting

General practitioners' (GPs) in Vienna, Austria, visited unannounced by mystery shoppers (incognito standardized patients, ISPs).

Participants

21 randomly selected GPs were visited by two different ISPs each. 40 observation protocols were realized.

Main outcome measures

Robustness of sampling and data collection by the consumer organisation. GPs consultation and waiting times, guideline adherence in history taking., ~~plus consultation and waiting times~~.

Results

The double stratified random sampling method was robust and representative for the private and contracted GPs mix of Vienna. The clinical scenarios presented by the ISPs were valid and believable and no GP realised the ISPs were not genuine patients. The average consultation time was 46 minutes (95% CI 37-54 min.). Waiting times differed more than consultation times between private and contracted GPs. No differences between private and contracted GPs in terms of adherence to the evidence-based guidelines regarding history taking including questions regarding alcohol use were found. According to our analysis, 20% of the GPs took a perfect history (95%CI 9% - 39%).

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Conclusions

The analysis of secondary data collected by a consumer organisation was a valid method for drawing conclusions about GPs preventive practice. Initial results, like consultation times longer than anticipated, and the moderate quality of history taking encourages continuing the analysis on available clinical data.

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Background

For many eligible patients the provision of adequate preventive care is blocked by well-known barriers, despite the existence of elaborate guidelines based on best evidence. [1] [2] [3] Lack of time and inadequate reimbursement were the main barriers named by Canadian family physicians to performing the periodic health examination (PHE) as recommended by the Canadian Task force on the Periodic Health Examination. [4] [5]

Our main research question was whether publication reports and discusses a new method, the secondary analysis use of routine data from consumer associations for secondary analysis was feasible to observe quality aspects of by health service researchers to study the delivery of preventive care. We have not identified any other studies using consumer organisation data for secondary analysis in preventive health care performance assessment. As consumer associations with long traditions exist in all industrialized nations, such as Consumer Reports in the USA, similar data could well be available in many countries and could be analysed by health service researchers in the way we propose in this paper. [6]

Studies of preventive service provision which rely on electronic medical record audit, physician self-report, patient surveys and chart review are all prone to bias, as they usually lack validation against observed practice. Studies with standardized patients (SPs) have been used successfully to overcome these kinds of bias. [1;7] A standardized patient (SP) is a healthy subject who is trained to assess the performance of doctors based on pre-defined criteria. Unannounced or incognito SPs (ISPs) have been used unobtrusively to assess the routine practice performance of doctors. [8]

"Unknown to the prospective provider of care, such a 'patient' arrives at the clinic and requests care. What happens is gleaned from the records of care and also from

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the observations reported by the pseudo patients, who have been trained to make the needed observations". [99]

These ISPs are the health care version of the mystery shoppers used in other industries. *"Mystery shopper or visitor are a well known and widely used standardized method in quality management for assessing service quality in the retailing and tourism industry".* [1040] Observing health service providers routine or students practical performance by ISPs is a method established since decades in health services and health education research.[11-18] Collecting data by observing performance enables researchers to judge if guidelines are followed, like it has been demonstrated for community pharmacies recently.[19-21]. For instance in the case of PHE delivered by GPs it could by observed if they ask their patients on their smoking status, as recommended by the preventive service guideline.

-In autumn 2008 the official consumer information association of Austria, "Verein für Konsumenteninformation" (VKI), published a test report on physicians delivering the PHE. In the spring of 2008 two ISPs, members of the VKI tester team, had visited unannounced a sample of randomly selected general practitioners in Vienna, Austria. [2211]

In Austria since 1974, GPs have been reimbursed for annual PHEs from public funds, currently at around 100 USD (75 Euro, current value) per patient. This service is provided free of charge to patients. A reform of the content and new documentation standards were introduced in 2005. Since then the PHE is based on a published evidence based guideline. The evidence base is derived mostly from the US, Canadian and Australian preventive service guidelines with local adaptations. These guidelines demonstrated by the use of best evidence the causal link of interventions and beneficial medical outcomes for a long list of conditions [23 24 25;26]. The interventions

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recommended in the local Austrian guideline should yield beneficial medical outcomes when performed according to guideline by GPs. These beneficial screening interventions include, to name a few, assessing smoking status, blood-pressure, BMI, Cardiovascular Risk calculation, and recommended follow ups like brief smoking cessation advice, etc.. Not performing those during the PHE may harm the still healthy patient (client) [27;28] ~~Since this time,~~ Each year around 850,000 PHEs ~~have~~ are ~~been~~ performed ~~each year from~~among the adult Austrian population of six million. [22~~11~~ 29~~12~~ 30~~13~~ 31"p.78"~~14"p.78"~~].

Two types of insurance funding exist in Austria for GPs offering the PHE free of charge. A GP may hold a comprehensive insurance contract plus a PHE contract or a PHE contract only. In our study we referred to GPs with the comprehensive plus PHE contract as "contracted GPs" (in Austrian-German "§2 Kassenärzte"), and those with the PHE contract only as "private GPs" (in Austrian-German "Wahlärzte mit Vorsorgeuntersuchungsvertrag"). Payment of "private Austrian GPs" can involve out-of-pocket payments of patients to cover part or all of the patient expenses and refunding of a part by insurance. According to a previous study in Austria, the reasons for choosing such a private GP ("Wahlarzt") include short waiting and longer available consultation times. [32] A description of the Austrian health system with its mixed contracted and non-contracted private GP primary care system is beyond the scope of this paper, and can be found in an English/German WHO country report. [29] In this study all GPs had a PHE contract, and thus no out-of-pocket payments for any PHE service were necessary, even for "private GPs".

The first research question for our secondary analysis was: Did Austrian GPs spend sufficient time to conduct the preventive activities required? Further, we wanted to

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examine if there was a difference between “private” and “contracted” GPs in three quality aspects of care delivered: Consultation and waiting time and guideline adherence.

~~We wanted to determine whether the data gathered by a consumer organisation through their ISPs could be used to assess preventive service and quality. We also wanted to know if the assessments through the ISPs could be generalised to the GP workforce in Vienna. Initial findings related to the waiting time and quality of service are reported here.~~

Methods

Our ~~-~~methods were structured in two step-like parts~~consisted of two major steps~~. In the first step we critically appraised the methods used by VKI: Their sampling and data collection ~~used by VKI~~. In the second, we performed our own analysis on ~~of~~ the electronic dataset provided by VKI.

Our study design was presented to the legally relevant public health ethics commission of Vienna, which had no objections: The secondary use of these anonymous data on physician performance did not infringe on rights of patients nor physicians.

The GPs´ legal representative, the Vienna medical chamber, had agreed end of 2007 that some randomly selected GPs may be tested for their PHE performance by ISP from VKI in the upcoming weeks. All GPs of Vienna were informed by their legal representative, about the possible random sample visits. There was no possibility for GPs to opt out.

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1. Appraisal of VKI sampling and data quality

Knowledge about the VKI methodology was gained through one personal and two phone interviews at the end of 2008 and in first quarter of 2009 with the researcher at VKI who managed the study.[2211] We further analysed the note-taking forms used by the ISPs, the VKI's internal written interpretation guide, and a report on the VKI testing methodology published in 2008.[3315]

We judged the quality of the sample by comparing it with the GP distribution in Vienna and by repeating the VKI sampling procedure in a simulation of our own. We assessed the quality of the data gathered by the ISPs against criteria for a good quality ISP study provided by a recent systematic literature review in the field.[88] These criteria cover the use of content checklists, note-taking by the ISP, soundness of clinical cases, and ISP detection rates. The results of our appraisal are presented in our first set of findings below.

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2. Secondary analysis

Data preparation

VKI provided a de-identified electronic data set (42 records). In this data set GPs' names and office locations were deleted and GPs were sequentially numbered by VKI. We transformed the VKI ratings into corresponding numerical values (e.g. the five Likert scale satisfaction scores ranging from "+ +" (very good), through "o" (average) to "- -" (not satisfactory) were re-coded by us into the five integers from 4 to 0. Continuous variables such as waiting times, consultation times, were transferred unchanged into our final secondary data set.

Additionally we were provided with hard copy clinical results which had been given to the ISPs by the GPs, and which were not used by VKI in its own report (34 records – 8 were missing). These 34 forms were copies of the double page health summary

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sheets (HSS, "Befundblatt") which the GPs should provide in hard copy at the end of the PHE to their clients.[34~~16~~ 35~~17~~] One of us (KT) blinded to the medical content of the ISP clinical cases, extracted and coded all clinical data from the 34 paper forms into a second electronic dataset in December 2008. More than 90 variables were coded from this data. Free text remarks by the physicians were not extracted (see additional file 1: Scanned HSS coding template with data of GP Nr. 1).

Statistical analysis

We found a double stratified probabilistic sampling. GPs were drawn by VKI within their two strata, private/contracted (stratum 1) and district blocks (stratum 2) by a strictly random process.

The primary sampling unit for our data analysis was the GP (see Figure 1). Each of 21 practitioners were offered a ~~two visits~~ visit by the two different ISPs. Two of the practice visits were rejected by two GPs – one private and one contracted (because of an administrative error and because lab results were not ordered by the GP). Both GPs were visited by the other ISP. The visits ~~is~~ resulted in a total of 40 observations on ~~.~~ ~~The~~ 21 GPs, belonging~~ed~~ either to ~~a~~the "private" or the~~a~~ "contracted" ~~insurance~~ GP group. ~~,~~ The clustering at the GP ~~which we~~ was accounted for in our statistical analysis by ~~the~~ survey/panel data methods and additionally by ~~the~~ multilevel data analysis.[36~~18~~] The reasons for the multilevel analysis are explained below in the appraisal of sampling by VKI.

~~There was double stratified probabilistic sampling as GPs were drawn within their strata and district blocks by a strictly random process. However, we were unable to verify the stratification across the 23 districts in Vienna as this identifying data was erased in the dataset provided to us to ensure GPs' anonymity. The two observations dealing with one GP were not independent and thus were "clustered at the level of the~~

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~~GP". We adjusted for this clustering effect, and estimated intra-class effects at the GP level by multilevel modelling also, as proposed in the literature [19] [18].~~

We conducted our statistical analysis for this publication with Stata Versions 9.1 and 11.[37][20] Descriptive statistics (e.g. means, proportions, and confidence intervals (CI)) were produced by the Stata survey/panel data methods with the most conservative assumptions (e.g. finite-population assumption, linearized proportions and binomial Wald statistics for CI of proportions). For additional modelling we used mixed-effects restricted maximum likelihood (REML) estimation and generalized linear models for continuous variables, and random- or fixed-effects logistic regression for binary dependent variables (multilevel data modelling). All statistical tests performed and confidence intervals (CI) reported are at the 95% level.

For performance assessment we constructed appropriate indicator variables in accordance with the published guidelines for the PHE based on the observations of the ISPs.[23][21] For example, only if the full structured medical history proforma, the "Health Information Sheet" (HIS), was completed, including optimal alcohol screening according to guideline, was the constructed binary (yes/no) indicator coded positively.

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Results

Step one: Appraisal of VKI sampling and data quality

Sampling GPs

~~Two types of insurance funding exist in Austria for GPs offering the PHE free of charge. A GP may hold a comprehensive insurance contract plus a PHE contract or a PHE contract only. In our study we referred to GPs with the comprehensive plus PHE contract as "contracted GPs" (in Austrian-German "§2 Kassenärzte"), and those with the PHE contract only as "private GPs" (in Austrian-German "Wahlärzte mit~~

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~~Vorsorgeuntersuchungsvertrag"). Payment of "private Austrian GPs" can involve out-of-pocket payments of patients to cover part or all of the patient expenses and refunding of a part by insurance. According to a previous study in Austria, the reasons for choosing such a private GP ("Wahlarzt") include short waiting and longer available consultation times.[22] A description of the Austrian health system with its mixed contracted and non-contracted private GP primary care system is beyond the scope of this paper, and can be found in an English/German WHO country report.[12] In this study all GPs had a PHE contract, and thus no out-of-pocket payments for any PHE service were necessary, even for "private GPs".~~

VKI reported to us that they used a double stratified random sampling method for GPs in Vienna. One strata was insurance contract status ("private/contracted") and the other was the geographic distribution of doctors among 23 districts in Vienna. Two independent numbered name lists, one for "private GPs" and another for "contracted GPs", were used. The lists were provided to VKI by the Central Association of Austrian health insurances ("Hauptverband der österreichischen Sozialversicherungsträger") which runs the central registry of all PHE contracts, but not to us. Each list was sorted for districts, showing the office locations and the total number of GPs in each district. The sample population in the lists was 1069 GPs, 211 (20%) of whom were "private". VKI fixed the GP sample size at 21, 7 of whom (33%) being "private GPs", thus creating deliberately an ~~relative~~ oversampling of "private GPs" as they explained in the initial interview.

To determine the sample size per district block, the number of GPs to be sampled for each district was calculated by VKI from the names lists sorted for districts. For example, the seven "private GPs" were sampled from a workforce distributed over 23 districts. Each of the seven district sampling blocks formed should comprise around

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14% of the workforce. Thus districts were lumped together in the sorted list until a block held around 14% of the "private GPs" workforce, then the next block was created from the remaining districts, and so on. In this way the number of GPs per district was fixed for all 23 districts in Vienna, and for each of the two GP contract types separately.

Selection from a district block was done by drawing a random number within the numbered name lists. The random number for each district block was generated by an internet-based public domain software, AGITOS. The sampling base numbers used in AGITOS for each block was determined by the total number of GPs in each district block. [38~~23~~]

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After the GPs' names were determined, the ISPs arranged the visits. If an appointment could not be arranged, the ISP called the VKI office and a replacement GP was drawn there by the random number mechanism within the district, as described above. To visit seven "private GPs", 14 replacements were needed. This contrasted with three replacements needed for the 14 "contracted GPs".

Table 1 - Outcome of VKI sampling of GPs in Vienna by City District and GP insurance contract

Vienna District Nr.	VKI sample (# GPs)	of these: "private"*	"contracted"**
1.	1	1	
2.	1		1
3.	2	1	1
4.	1	1	
5.			
6.			
7.			
8.			
9.	1	1	
10.	1		1
11.	1		1
12.	1		1
13.	1	1	

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14.	1		1
15.	1		1
16.	1		1
17.			
18.	2	1	1
19.	2	1	1
20.	1		1
21.	1		1
22.	1		1
23.	1		1
Total GPs	21	7	14

VKI published the names of the GPs sampled and their office locations in its report 10/2008.

* We assessed the contract status of each named GP through the public internet search template of the Vienna Medical Chamber (http: www.praxisplan.at).

** "Contracted GPs" have a full contract with the regional general health insurance including a PHE contract ("§2 Kassenärzte").

--- end of Table 1 ---

The VKI methodology resulted in one GP being selected in 15 of 23 districts; two GPs in three districts (Nos. 3, 18, 19), and no GPs in five districts (Nos. 5-8 and 17) (see Table 1). Six GPs in the sample were from inner districts, 15 from outer districts. 11 GPs had their office in the more affluent part of Vienna, 10 in the less affluent. The nine inner city districts (Nos. 1- 9) in combination with three outer districts (Nos. 13, 18, 19) comprised the more affluent part of Vienna compared with the rest, judged by purchasing power per head and housing prices (for details classifying affluent versus less affluent districts see additional file 3: GP sample distribution in rich and poor parts of Vienna).

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The distribution of sampled GPs among the Viennese districts should resemble as much as possible the distribution of the real GP workforce performing PHE among the districts. The stratification aimed to improve the representativeness with regard to two strata, geographic distribution and insurance contract status. “Contracted GPs” per district should correlate with the district population size, as “contracted GPs” are placed by the Vienna general social insurance agency to serve the population. Thus highly populated districts should also be represented well in this sample. Inner city districts (Nos. 1-9) have a smaller population than most of the 13 outer ones (Nos. 10-23). The sample reflected this distribution, with a GP ratio of 6:15 for inner versus outer districts. “Private GPs”, meanwhile, are free to establish themselves wherever they like. We assumed that they would tend to open their offices in the more affluent districts, as their income relies on out-of-pocket payments for most of their services except the publicly financed PHE.

To examine the quality of the random sample block procedure of VKI we had to rely on other data, as we were not given access to the two original VKI sampling population GP lists. Only the totals of their two lists were reported to us, namely 211 “private GPs” and 858 “contracted GPs”. We repeated and thus simulated the VKI procedure with the most recent and applicable data we could find. These were published by the city administration of Vienna in 2002, reporting on the district distribution of 734 private GPs out of total of 1572 GPs.[39][24] [40][25] Data on PHE contracts of these private GPs were not available. According to that data many of the private GPs (17%) practised in the 19th (9%) and 13th (8%) districts. When repeating the VKI’s district block procedure with this other data, the first of the 7 GPs was drawn by us out of the first block composed of those two districts. The next two (1st and 18th) did hold together 14%, so the next GP was drawn from this second bloc, and

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so on. In our simulation the seventh "private GP" was drawn from five districts at the end of the list, each with less than 3% of the workforce (see also additional Excel file 4: Sampling assessment including source data and further 2007 city administration workforce data).

When comparing our simulation result with the sampling result of VKI, published in its magazine with GP name and location, we found a nearly identical distribution.[22~~11~~] In the VKI sample all seven "private GPs" were from the rich part of Vienna, whereas in our simulation six of the seven were from that part. However as only 211 "private GPs" held a PHE insurance contract in 2008, the district distribution of 211 "private GPs" in the VKI list might be different from that of the 734 private GPs of our data of 2002. This could explain the small deviation from our simulation result (see Figure 1).

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Figure 1 – Results of VKI sampling compared with our simulation sampling of private GPs

Legend for Figure 1:

In 2008, 21 GPs were sampled by VKI, 7 of them "private GPs". All 7 were located in the richer part of Vienna. Among the "contracted GPs", 4 out of 14 were located in the richer Vienna districts.

GP workforce data of 2002, published in a health report of the City of Vienna administration, provided the most recent information on distribution of private GPs among the Vienna city districts.

As we were not provided with data, beyond totals, on the two sampling population lists of VKI, "n.a." means that we could not access the district distribution data.

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VKI sampling supports level analysis

VKI used a double stratified probabilistic sampling. One strata was "private" or "contracted" GPs. The other strata were the 23 district blocks as described above. By such an intensive stratification and a strictly random selection out of these strata, VKI achieved in our opinion a well balanced and representative random sample of the GP workforce in Vienna despite the small sample size of 21 GPs.

After judging the sampling process robust enough, we sought for the most appropriate type of analysis of this data. The two observations dealing with one GP were not independent and thus were "clustered at the level of the GP".

We adjusted for this by two types of analysis: Correcting for the clustering effect and using multilevel-modelling. By multilevel-modelling we could also estimate intra-class effects at the GP level, as proposed in the literature [41] [36].

Validity of clinical cases

Two ISP clinical cases were constructed by VKI health experts on the basis of the Austrian PHE guideline ~~handbook~~, available in print and Internet download since 2005. [23] [21] The guideline ~~handbook~~ was intended to be used by health service administrators (such as screening programme managers at local and regional level) to organise the preventive service activities of GPs in their area, similar to guidelines by other professional bodies. [42] [26] [26] [27] With the support of medical journalists, the guideline ~~handbook~~ was written to be understandable to a broader audience than GPs, although it includes evidence-based references. [43] [28] The high amount of detail in the

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guideline ~~handbook~~ allowed VKI experts to develop the two clinical cases for the ISPs in such a manner as to elicit clearly observable actions by the GPs during the PHE.

Both the male and the female ISPs were over 65 and presented complex clinical screening cases. The predominant critical screening task of the male was the detection of his high cardiovascular risk and of the female her clearly problematic alcohol consumption. However, the task involved screening for nearly all 15 target conditions of the Austrian PHE.

Apart from the clinical case history the two ISPs presented the GP with fabricated laboratory data, tailored to their cases. For example, the woman reporting problematic alcohol consumption had elevated levels of serum liver enzymes (Gamma GT: 65 U/l, GOT 44 U/l, GPT 35 U/l). Before the fieldwork, the ISPs rehearsed with the help of the outpatient facility of the Vienna public social insurance medical service, where also their laboratory details were fine-tuned. A more detailed description of the clinical case construction is included as additional file (see additional file 2 – "ISP_Cases")

Assessment of data collection by ISPs

The two ISPs each arranged visits with 21 GPs. At the GP's office each ISP completed the standardized evidence based health information sheet (HIS), a questionnaire which all GPs offering reimbursed PHE are obliged to provide. [44~~29~~] They also completed the AUDIT-GMAT, an Austrian version of the WHO questionnaire "AUDIT" for problematic alcohol consumption, when offered. [45~~30~~] The ISP training had included completion of the HIS and AUDIT-GMAT as well as presentation of their history personally to the GP. At the end of the consultation they each collected the standardized health summary sheet (HSS), which the doctor is also

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obliged to complete and provide in copy to his/her client. More information about the standardized medical records set for the Austrian PHE is detailed below in the results and has been published elsewhere. [46~~31~~]

Immediately after having left a GP's office the ISPs noted their experience using a standardized note form. At the VKI office an independent person extracted data for the calculation of scores. The data coding was explicitly defined for the GP test in advance by specifically written instructions called "Regeln für die Eingabe/Beurteilung in TestRev" (rules for data entry and assessment into TestRev). We were provided with these specific coding rules. TestRev is the routine software and database VKI applies for storing, analysing and reporting on the numerous tests they perform in all fields of industry and services. For data handling, an in-house quality management handbook exists, and this was also applied for the PHE test. VKI holds an official state quality certificate for its testing procedure. [33~~15~~] After data entry a second person compared the extracted results in TestRev with the protocol notes of the ISP. In the case of disagreement a third independent senior person decided as to the correct interpretation and coding.

In this way VKI gathered in its electronic dataset detailed and summary statements such as the ISPs' subjective impressions (satisfaction), but mostly VKI gathered more objective observations on activities the GPs performed or omitted. These more objective ISP observations can be considered in the health care quality field as "patient experience", more amenable to effectively improving quality of care than the more subjective "patient satisfaction". [47~~32~~ 48-50~~33-35~~] VKI condensed the ISP notes into 45 statements/judgements per visit. This 45 items VKI dataset was made available to us. We were not provided with the notes taken by the ISPs. However, as the strict rule-based coding system of VKI allows the condensed statements/judgements to be

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re-expand to the detailed observations we could interpret the performance of each GP to a greater degree than the 45 items would suggest. For example, problematic alcohol consumption should be screened for. VKI coded "+ +" (very satisfactory) when the AUDIT-GMAT questionnaire was handed over to the ISP, "o" (average) when the questionnaire was not used but the GP did discuss alcohol consumption with the ISP, and "- -" (not satisfactory) when the topic was not even raised verbally.

We found the VKI method to be reliable in reporting on the ISPs' experience of GP interventions which should have been performed during the PHE. For this first publication we restricted ourselves to analysing data on waiting and consultation time, and GP performance during the medical history taking phase, compared to guideline recommendations.

Detection rate of ISP

Detection of ISP by the observed physician can be an important obstacle in ISP studies,[88] leading to bias and confounding. We are confident that all ISP visits went undetected and physician behaviour was not distorted by the idea that the client could be an expert observer with a constructed clinical case. The age of both ISPs was the same as in the presented clinical cases. Great care was taken to ensure that there was no observable difference on signs. The responsible researcher at VKI stressed in the first interview with us in October 2008 that none of the 40 ISP visits had been detected. We asked her again in February 2009 to interview the two ISPs to determine if they had any suspicion that any of the GPs could have detected them. The response was again negative. One ISP even replied on that occasion that the only GP who had seemed to be a little suspicious had just sent a personal invitation letter to return for the next annual PHE.

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Results of step two: Secondary analysis

In our secondary analysis we focused primarily on observational experience data. The satisfaction data has been published by VKI in its own magazine.[22~~11~~] We received data on 40 of 42 arranged ISP visits, the same number as reported in the VKI test report publication in 2008. Two ISP visits were rejected by two GPs, one "private" the other "contracted". The reasons given by the two GPs for rejection were in one case an administrative GP error (a misunderstanding of the use of the electronic insurance patient access card), and in the other that the pre-prepared laboratory results were not ordered by the GP herself. However, both GPs were visited by the other ISP.

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Service delivery time

For the completed visits the average consultation time was 46 minutes (95% CI 37 – 54 minutes). For the male ISP it was 38 minutes (CI 33 – 43) and for the female ISP 54 minutes (CI 40 – 67). The difference of 16 minutes between the two ISP cases was not significant, when applying a survey/panel data method adjusting for the clustering effect at GP level, but was significant in the full adjusted multilevel model (Coefficient 15,6; CI 4,9 – 26,3, see figure 2).

Figure 2 – The full adjusted multilevel model (GLM, REML)

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Female GPs offered longer consultations, with an average of 47 minutes (CI 38 – 57), than males, with an average of 38 minutes (CI 19 – 58). The observed difference of 11

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minutes in our sample is not significant, when applying the survey/panel method adjustment for multilevel modelling or the full adjusted model (see figure ~~1~~2).

Using multilevel analysis we estimated the proportion of variance explained by the intraclass effect versus the difference between the GPs. If a high proportion of variance is explained by one variable, then this variable has a strong effect on the outcome of interest. 62% of the variance for waiting time was determined by the GP intraclass effect compared to 30% for consultation time. These variance estimates result from a conservative monovariate random effect GLS regression model with the GPs as explanatory variable. Further adjusting for the two different ISP case types increased the variance proportion for consultation time explained by the GP by one third, to 45%. The same adjustment did not significantly change the variance proportion in waiting time (slightly increased from 62% to 67%). As could be expected, the intraclass and adjustment effects were even more pronounced in the fixed random effect model.

Table 2 - Proportion of all variance explained by intraclass (GP) variation in multilevel analysis on waiting and consultation time

Regressed on GP only

Time	Random effect (conservative)	Fixed effect (strong assumption)
Waiting	0.621*	0.686
Consultation	0.298	0.493

Regressed on GP and ISP (adjusted for ISP case type)

Time	Random effect	Fixed effect
Waiting	0.668	0.718

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Consultation	0.445	0.562

After adjustment for ISP case type the intraclass effect of waiting time did increase a little, whereas for consultation time the effect increased from 0.30 to 0.45 in the random effect model. The conservative random effect model seems to us most appropriate for this kind of data, especially due to our small sample size.

* rho: proportion of all variance explained by intraclass (GP) variation

-------- *End of Table 2* --------

~~***Move to discussion !!:***~~

~~The intraclass effect at the individual GP level as persistence could be caused by several factors influencing typical consultation time of a GP. Non GP factors, like patient load per day or usual severity of cases, depending on the area a GP works may influence actual waiting times. A study found that pPrivate GPs attract other patients, especially patients who expect that the private GP will devote more time than the contracted GP. A private GP will tend to comply to this patient expectations. Also beside the private and working also strong in alternative medicine field interpreted as so-called "practice style", a term usual in the quality management literature for characterizing typical and constant patterns of office routines of individual service providers. [9] Practice style as a result of multiple physician factors influencing routine physician behaviour. These include education and training, those are itself realated to age and years of practice of GPs {lit like Jan Mainz, NIVEL ??}.~~

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~~In summary, the practice style of GPs had a strong influence on waiting time and a lesser influence on consultation time. Consultation time was dependent on the type of ISP case, but waiting time was not. GPs reacted to the specific cases in adjusting their consultation time.~~

We also found a difference of 22 minutes in average consultation time between private and contracted GPs. The difference was significant. “Private GPs” provided 60 minutes (CI 50 – 71), “contracted GPs” 38 minutes (CI 26 – 49) on average. The difference remained significant using a fully adjusted multivariate model which included the two ISP case types, GP gender, GP insurance type and the clustering on the GP level (generalized linear modelling statistics incorporated in Stata 11.0) (see also additional file 9: STATA-Commands(selected).txt)

Quality of service

For this publication we compared observed GP history taking performance with the evidence-based recommendations. According to the officially published guideline, the PHE should include a structured general history taking supported by the HIS and questions regarding alcohol use, supported by the AUDIT-GMAT. We classified five performance levels in respect to general history taking adherence to the guideline before analysing the data. The five HIS-scores ranged from “0” (=below minimal) to “4” (=perfect history). The maximum general HIS score of four was achieved when the HIS was offered and all medical domains were addressed during the consultation. Omission of 1 of the 8 medical domains was tolerated in our data interpretation as possible measurement error on the part of VKI. A score of “3” was achieved when the HIS was offered but not all domains were touched on additionally verbally. No HIS,

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but raising at least 7 of the 8 required domains verbally scored “2”. A score of “1” was given when there was no HIS and 2 or 3 domains were missing. No HIS and 4 – 8 domains not addressed scored “0”. As the general PHE contract with the GPs requires that the HIS proforma be completed we considered HIS scores of “2” or less below standard. 51;52~~36;37~~

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Screening for problematic alcohol consumption should start with completion of the AUDIT-GMAT questionnaire by the client. For this screening activity we scored the performance into two categories. Care according to guideline provided the AUDIT-GMAT (we scored “1”), otherwise we scored “0”.

A HIS was offered in 53% (CI 34% - 71%) of all visits. Among the GPs offering a HIS a proportion outperformed the requirements of the guideline if they additionally addressed nearly all the medical content of the HIS during the consultation phase of the PHE (HIS score “4”). In 20% of all visits GPs scored “4”, indicating perfect general medical history taking (CI 9% - 39%).

The AUDIT-GMAT was offered in 38% (CI 19% – 56%) of all visits. There was no difference between “private” and “contracted GPs” (p=0.89) and no difference between the female and male ISPs (p=0.73). All GPs who offered an AUDIT-GMAT had also offered a HIS (see also additional file 5: HIS- and AUDIT-scores crosstable n=40 cases).

We considered the acceptable overall history taking service standard level to be a HIS offered (HIS score “3” or higher) plus the alcohol topic addressed at least verbally. 30% (CI 12–48) of all visits were performed below this standard. The difference in proportion of “private GPs” (21%) and “contracted GPs” (35%) was not significant in the full multilevel model (p> 0.05).

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We found a significant intraclass effect at the GP level: For a given GP the Odds Ratio was 60% (CI 0.03 – 91) that their consecutive next ISP would also get the same level of medical history performance. This intraclass effect indicates that GP practice style was a determinant of history taking performance.

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Discussion

Our study is the first using direct observation via ISPs of routine preventive service GP performance compared to standards in an evidence-based structured national PHE programme. We have been unable to find any similar previous studies which used secondary data collected by mystery patients, ISPs engaged by a consumer organisation. The Austrian consumer organisation (VKI) evaluated GPs' performance in Vienna in delivering preventive care, specifically the highly standardized Austrian PHE for which a curtailed evidence based guideline is published in German since 2005[23]. The random sampling process for GPs appears to have been sound and produced a representative sample. The clinical cases for the ISPs fitted well to the physical appearance of the two ISPs, one male and one female around 65 of age. In none of the 40 completed visits was there any evidence that the ISP had been detected by the GP. The 40 cases were clustered at the level of 21 GPs. The GP sample had two strataification levels. The first strata level stratification was "contracted GPs" and "private GPs". The "private GPs" were slightly over-sampled (by three GPs) as their proportion was 33% in the sample and 20% in the sampling population of 1069 GPs with PHE contract in 2008.

The second level, Vienna city districts, improved the sampling quality further, as the random sampling procedure within the city district blocks was found to be robust. Generalisation of the findings to the Viennese GP work-force delivering the PHE is reasonable within the statistical limits of the small sample.

Limitations and strength

One limitation of our study is the small sample size of 40 completed ISP cases for 21 GPs in the VKI dataset. In a recent systematic literature review of good quality SP studies by Rethans,[88] a median 39 GPs were visited across the 20 studies reporting on

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GPs since 1985. There has been a trend to smaller studies since 2000, with a median of 27 GPs. Our small sample size means that the estimates have wide confidence intervals, especially when considering subgroups, such as "private GPs". Only when effect sizes are large, e.g. in our case when expected values differ dramatically from observed ones, can we rule out chance.

Measurement error on the part of the ISPs is an important potential threat to validity. Rethans proposes that this can be overcome by thorough ISP training, case preparation and robust documentation processes. In the VKI study the two ISPs were highly experienced, having worked more than two decades in consumer testing of many service industries. The VKI tests run now in the thousands – the test of the Viennese GPs on the PHE is just one of the assessments they have performed. More than 80 tests are conducted each year, the organisation has existed for more than three decades and is internationally recognised among European consumer organisations. It has an ISO quality certificate for its testing procedures and constant internal quality checks. The data has to be well documented and robust, as legal cases are common, with tested providers or producers often appealing to the courts. [33~~15~~] In summary, our primary data collection was embedded in a high-volume routine with sound quality assurance, and collected by highly trained professionals, and thus the data is likely to be reliable.

The data collectors themselves (ISPs) were blinded to our (implicit) study hypotheses, such as expected duration of consultations being 5-10 minutes. It could be argued that consumer associations may be especially critical of doctors and that this might have affected the study design and data collection. In this case, however, the Austrian VKI test report signalled satisfaction with GPs' PHE performance (translated title: "PHE in

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good hands") – in contrast to ~~its~~ their repeated reports of ISPs observing ~~on~~ pharmacies.[22~~11~~]

However the satisfaction of VKI can only be a weak proxy for a real satisfaction study, as a further limitation of ISP studies is, that they cannot measure an important component of quality outcomes: patient satisfaction. It can only by assessed from real patients, e.g. by surveys. In the case of PHE, satisfaction will be important, as satisfied clients tend to return, and follow up at the recommended screening intervals. Several large surveys, although most probably not representative due to a low response rate of around 30%, have been done by others recently for the new Austrian PHE and signal a satisfaction level of 41% being very satisfied with the quality.[53;54] The measurement of satisfaction levels has its own limitation in international comparability, when self-developed questionnaires are applied locally, as observed satisfaction levels are highly depending on the content and framing of the questions.[55] Several other important aspects of quality of care, like communication skills of GPs and knowledge of GPs on prevention have not been looked at by the ISP and cannot be addressed in our study.[56]

A ~~further~~ strength of our data, in contrast to many other ISP studies, is that all ISP visits were undetected. Furthermore, our study was not distorted by a self-selection bias of voluntarily participating GPs. In other studies, around 40% of physicians on average decline to participate, leading to a severe self-selection bias among physicians.[1~~+~~ 8~~8~~] We were able to completely avoid this bias by using the anonymous data collected by VKI, as GPs were selected by a strict and sophisticated random sampling procedure. The Viennese Chamber of Physicians agreed collectively to participate, and single GPs could not exempt themselves from the random VKI visits. The visits to few of around 1500 GPs were announced to all by their Viennese

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medical chamber, without giving an exact date. However, the VKI never asks permission at the individual service provider level.

"Lack of time" barrier

One of the main obstacles or barriers named by GPs worldwide to delivering preventive care is the lack of time.[55] Among others factors, administrative arrangements including financial factors are important to consider when routine GP practice needs to be changed.[57,38,26,27] The average consultation time of 38 minutes among the "contracted GPs" (§ 2 Kassenarzt) is much longer than the 10-15 minutes we expected when the PHE reform was set in motion by one of us (FP) in 2003. Austria has a kind of capped fee-for-service system for "contracted GPs" which results in high volumes of services and high turnover of patients.[29,12] We estimate the average consultation time to be in the range of Germany with its 7.6 minutes, found in the most recent comparative, but not representative, study in Europe.[58,39] No study using representative data has been published in a peer-reviewed journal on this issue for Austria.

The 60 minute consultation time with "private GPs" in this study is extraordinary, especially as these consultations are available free of charge to the eligible population. However, it was difficult for the ISPs to secure an appointment with "private GPs" – they had to contact 21 to make appointments with 7 (1:3 ratio). Thus the PHE is a scarce commodity in private practice and its widespread uptake would likely result in waiting lists.

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The long average consultation time of 46 minutes may also be attributable to the complex ISP cases, as increased severity of cases leads to longer consultation all over the world. [5940] Less complicated cases, especially among younger clients, would be more the norm and these may be handled in a shorter time. The consultation duration for less complicated cases is unknown and requires further research in Austria.

The Austrian model, developing guidelines accompanied by standardised report cards in combination with a generous reimbursement system based on special contracts for prevention (the PHE contracts) could obviously overcome the barrier of limited time available in Vienna general practice. [4631]

Service quality – times typical for GPs

In addition to the sufficient time spent on average to perform the PHE we observed intraclass effects at the individual GP level for consultation and waiting times. The GP-effect was stronger on waiting time than on consultation time. In other words each GP tended to have a typical waiting and less so consultation time, being repeated with the second visitor. Such a typical behaviour, which we called in accordance with the quality management literature "practice style", is thought to formed over longer times by various factors [60 61]. These may be Non GP factors, like patient load per day or usual severity of cases, depending on the area a GP works. We have found "private GPs" being highly concentrated in the richest districts of Vienna, whereas "contracted GPs" were distributed according to population per district (see results on sampling above). From the social gradient of patient health status follows, that "contracted GP" tend to have poorer, sicker, less educated patients, as only the well-off can easily afford a "private GP". The service of a "contracted GP" is free, whereas the out of pocket payment at the "private GP" is only refunded to a small part by the health

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insurances. As all patients are insured in Austria, the richer ones can ~~consume~~visit the "private GPs" in addition to the "contracted GPs". The contracted GPs have usually fuller waiting rooms and much more patients per day to serve. The main motive to visit a "private GP" is to buy and get longer consultation times according to a recent Austrian study [32].

GP-factors like age, training-level and guideline adherence should be typical for the Vienna GP workforce and should not differ among our study subjects systematically, as random sampling should even out those differences. However the sample was intentionally stratified on contract status of GPs, and "private GPs" were oversampled by VKI, as the consumer organisation hypothesized a major difference in the delivery of preventive care based on GP contract status.

Income is a further important contributing factor for physician behaviour.[62;63] However as all "private GPs" in our sample lack only a general insurance contract, but hold a PHE-contract, they do not get any out-of-the-pocket payment for their PHE service. The PHE reimbursement is the same at 75 Euro (around 100 USD) for both GP contract types. Thus the observed tendency of "private GPs" to counsel longer than "contracted GPs" cannot be attributed to a direct financial incentive for this service. It seems more to be the "habit" or patient management style of "private GPs", which we short named "practice style" above, as a higher income per case allows "private GPs" to spent more time per visit. [32]

The results that (a) waiting time was mainly influenced by the GP, and (b) consultation time was mainly influenced by the clinical case presented, are also congruent with ~~common~~ knowledge from quality management on practice styles and results from health services research. [9 58~~39~~]

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In summary, the practice style of GPs had a strong influence on waiting time and a lesser influence on consultation time. Consultation time was dependent on the type of ISP case, but waiting time was not. GPs reacted to the specific cases in adjusting their consultation time.

~~The observed tendency of "private GPs" to counsel for longer duration than "contracted GPs" can be attributed to their general practice style, and not to direct financial incentive. The PHE reimbursement is the same 75 Euro for GP contract types, and the client does not have to make out-of-pocket payments, even to "private GPs".~~

Service quality – guideline adherence

Overall history taking standards were missed by 21% of "private" versus 34% of "contracted" GPs. This difference was not significant. Multilevel analysis revealed that performing below standard history taking was consistent at the GP level between the two ISP visits. This finding is a~~n~~ further indication of the existence ~~importance~~ of GP personal practice styles influencing service quality, and indicates ~~it provides~~ an opportunity for improvement through training and feedback.

The use of the standardised assessment of a history of problematic alcohol consumption, the AUDIT-GMAT questionnaire, is highly recommended in the guideline for the PHE.[~~64~~44] Yet in 2005 there was strong opposition voiced against the routine use of this questionnaire by unionized doctors (medical chamber). They considered the questionnaire to be too intrusive and were concerned that it would discourage potential clients. When in 2003 one of us (FP) led the development team for the new PHE it was expected that only a minority of GPs would apply the

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AUDIT-GMAT. However, in this study it was used in nearly 40% of visits, with no significant difference between "private" and "contracted GPs". Many GPs may consider screening for problematic alcohol consumption to be important in a country like Austria with high alcohol consumption.

Conclusion and outlook

Using ISPs is a well-established but complex method for health service research. Using data not designed for research is also complex. However, the increase in complexity is outweighed by the reduced bias from un-announced visits. Our study was the first to report physicians' routine preventive performance under direct observation of experienced ISPs applying standardized quality-assured documentation in a nationwide PHE programme ~~Austria~~. This study mainly reports research ~~on the~~ methods and length and variation in consultation times and guideline adherence in regard to alcohol screening and ~~the quality of~~ medical history taking. Some better than expected results were found, such as the long consultation times and the relatively high completion rate of the Alcohol screening ~~AUDIT-GMAT~~ questionnaires. "Private GPs" and "Contracted GPs" did differ more in waiting time, than in consultation time and not in regard to Alcohol screening. This leads us to a new hypothesis that there is little relevant difference in the medical quality of the service of "private" and "contracted GPs". Further research on the clinical part of our secondary data should help to clarify this issue. ~~We~~ We hope that this paper will stimulate ~~further~~ health service research on the quality of service ~~of the~~ of annual ~~Austrian~~ PHEs provided to many ~~around~~ of a national population ~~850,000 adults~~ each year.

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