



# Lower Value Care in Portugal



### I. EXECUTIVE SUMMARY

 This report analyses the magnitude and the geographical variation of utilisation of five procedures deemed lower-value care in international literature: Adenotonsillectomy, c-section in low risks deliveries, hysterectomy in non-oncologic conditions, non-conservative surgery in breast cancer and prostatectomy in benign prostatic hyperplasia.

These procedures are highly sensitive to clinical practice style (signature phenomenon, learning cascades) and supply factors (organisational and financial incentives)

 With the exception of adeno/tonsillectomy and hysterectomy in nononcologic conditions, utilisation rates of lower-value care in Portugal are relatively low compared to other ECHO countries. In terms of volume, adeno/tonsillectomy and hysterectomy in non oncologic conditions seem to be the most relevant too.

### Procedures eligible as "lower value"

- Those superseded by more cost-effective alternatives (non-conservative breast cancer surgery, Hysterectomy in non-oncologic conditions);
- There are defined types of patients for whom evidence of value is unclear (prostatectomy in BPH, c-section);
- Relatively ineffective procedures prone to over-use (adenotonsillectomy, c-section in low-risk births).

**Atlas Rationale**: The report analyses the actual utilisation rate per 10,000 inhabitants in each geographical area and compares it to 2 scenarios of "minimisation of Lower-value Care use":

- 1. All the areas in the country behave as those below percentile 10 of LVC utilisation (10% areas in the lower end of use)
- 2. All the areas in the country behave as those in the first quartile of LVC utilisation (25% areas in the lower end of use)

The potential for realignment is assessed as the difference between the number of procedures observed and those expected if LVC utilisation were minimised

Health Systems bear substantial opportunity-cost in using interventions deemed lower-value.

Quantifying the utilisation of this type of care and its systematic variation across policy-relevant geographical units offers at a glance insights about the local potential for enhancing efficiency (i.e. value-based provision of care).

In addition, geographical differences in residents' exposure to lower-value care might signal inequities in access to quality and safe care that should be tackled

- Though variation is significant for all LVC procedures examined (ranging from 4 to 47-folded chances of getting the procedure depending on the concelho of residence), the systematic component of it is relevant for certain ones, such as c-section in low risk deliveries (two times more variation than could be expected by chance), adeno/tonsillectomy and prostatectomy in BPH -26 and 23% of the variation detected across concelhoss cannot be deemed random. Regarding the utilisation of the other procedures, the behaviour across areas seems to be more homogeneous, with a bare 6 to 11% of the observed variation exceeding what would be expected by chance.
- With the exception of adeno/tonsillectomy, LVC utilisation rates have tended to be stable or slightly decrease over the period of analysis (2002-2009). A bit more substantial was the 24% decrease in c-section use in low risk deliveries.
- The systematic variation across concelhos has not suffered dramatic changes either. Only NCS in breast cancer and prostatectomy in BPH have experienced a genuine decrease in variation, signalling a relative convergence where those concelhos at lower intensity of use, have progressively increased their rates.
- The distribution of lower-value care utilisation seems to be quite homogeneous across different quintiles of Concelho average wealth. Only prostatectomy in BPH and NC breast surgery showed statistically significant differences between better and worse-off areas: for the whole period the rate was significantly higher in wealthier concelhos. Thus, for these procedures, higher average income seems to increase exposure to lower value care.
- In principle, utilisation of LVC is more often explained by local medical practices; however, regional framing may still play some role in other factors such as services availability and organisation of care paths, or incentives framework which may affect decisions locally made. Interestingly enough, the percentage of variation explained by the region is only 3 to 10 % for adeno/tonsillectomy, non-oncologic hysterectomy c-section and NC breast cancer surgery; but it goes up to 16% in the case of prostatectomy and 22% for c-section in low risk births.
- The analysis conducted, suggests that there is still room for enhancing value for money in the Portuguese system. Portugal shows low rates of LVC utilisation compared with the other ECHO countries and, generally, they have remained as such over time, while intensity of use has become progressively more homogeneous across concelhos. However, hysterectomy and

adeno/tonsillectomy utilisation have experienced some increase in the variation of intensity of use across concelhos; this suggests that, depending on the place of residence, populations' exposure to these LVC procedures has been diverging over the period. Also, Adeno/tonsillectomy high rates and increasing overall trend deserve special consideration. Focusing on local practices, particularly learning cascades and established medical practice styles, together with patient information and empowerment in decision making, will potentially have a major impact.

 Further analysis on institutional factors underpinning overexposure to LVC at concelho level, as well organisational and budgetary local contexts and regional framing, will serve as basis for recommendations to guide relevant decision makers in tackling this allocative inefficiency. SAVINGS ARE NOT WARRANTED, the aim is fostering "value for money" i.e. avoid non-efficient public expenditure



The magnitude and variation of lower-value care utilisation in ECHO health systems provides a wider perspective in assessing the relative need for specific activities focused in enhancing the value of health care provided, compared to other relevant countries

#### П. INTERNATIONAL COMPARISON

This section lays out the utilisation of selected lower-value care (LVC) procedures in Portugal compared to the other countries in the ECHO project.

Two dimensions are explored: the magnitude of the phenomenon, and the variation across the policy-relevant administrative areas in each country.

### Adenoidectomy and/or tonsillectomy

Portugal highest of shows the second age-standardised rates adeno/tonsillectomy across ECHO countries (Fig 1a); overall around 1 in 160 children below 14 years old underwent the procedure in 2009 i.e. about 2 times more than the country with the lowest rate -1 in 300 Danish children were intervened in 2009 (table 1 in Appendix 1).

The ratio between the highest and lowest rates in Portugal is moderately high for ECHO countries: there is a more than 3-folded chance of getting the procedure for children living in high rate concelhos; Spain and Denmark show larger differences, close to 4 or 5-fold. (Fig 1b. See also table 1 in Appendix 1), while England and Slovenia remain in the area of 2.5-folded probabilities comparing children living at high intensity areas to those at low. The systematic component of this variation has proven relevant in all countries examined, ranging from 9 to 66 % beyond what would be randomly expected.



tonsillectomy per 10,000 children (natural scale). Year 2009

tonsillectomy per 10,000 children (normalised scale). Year 2009

\* Each dot represents the relevant administrative area in the country (Concelhos for Portugal). The y-axe charts the rate per 10,000 inhabitants (up to 14 years old) The figure is built on the total number of interventions in 2009 in those countries. In Figure 1b utilisation rates have been normalised to ease comparison of the degree of variation across countries.

### Caesarean section in low risk pregnancies and deliveries

Portugal shows the lowest age-standardised C-section rate in low risk births across ECHO countries, ten times smaller than Denmark's; Danish figures (the highest) double English and Slovenian rates, while 5-folding Spanish (*Fig 2a and table 1 in Appendix 1*). Interestingly enough, regardless the size of the rate, variation for this procedure across the territory seems to be remarkable in all countries.

In Portugal, women living in those concelhos with highest rates stand a 2-folded probability of bearing a c-section in a low risk birth when compared to residents in areas with the lowest rates. Actually, 131 out of 278 continental concelhos registered no cases in 2009 (47% of municipalities amounting to about 20% of Portuguese women in reproductive age); Spanish healthcare areas, on the other hand, show a much higher degree of variation, ranging between null cases and figures rising close to those found in Danish kommuners (*Fig 2b and table 1 in Appendix 1*). The systematic component of this variation is also large across the countries examined, exceeding what was expected by chance in a range from 50% to more than 6 times (*Fig 2. b and table 1 in Appendix*).



\*Each dot represents the relevant administrative area in the country (Concelhos for Portugal). The y-axe charts the rate per 10,000 inhabitants (women in fertile age 15-55.) The figure is built on the total number of interventions in 2009 in those countries. In Figure 2b utilisation rates have been normalised to ease comparison of the degree of variation across countries

### Hysterectomy in non-oncologic conditions

Portugal shows the second highest rate of hysterectomy in non-oncologic conditions (one in 466 adult women in a year); very similar to the Danish rate, this figure is far from those observed in the country with lowest rates -Spain, one in 677 women (*figure 3.a and table 1 in Appendix 1*).

Compared to other cases of LVC presented in this report, the variation of utilisation across countries seems less marked, ranging from 14.77 to 21.84 hysterectomies per 10,000 adult women; likewise, within country variation is smaller than for other LVC procedures, though still significant, particularly in Spain (*see Fig 3.b and table 1 Appendix*). However, the systematic component of this variation (beyond random variation) is low to moderate across them.



\* Each dot represents the relevant administrative area in the country (Concelhos for Portugal). The y-axe charts the rate per 10,000 inhabitants (women 18 years old and older.) The figure is built on the total number of interventions in 2009 in those countries. In Figure 3b utilisation rates have been normalised to ease comparison of the degree of variation across countries

### Non conservative surgery in breast cancer

The rate of non-conservative breast surgery in Portugal is above, though aligned with that in Slovenia and Spain (5.24 per 10,000 women) and far from the Danish rate, 8.14 per 10,000 women (*Figure 4a and table 1 Appendix 1*). In addition, women living in those concelhos with the highest rates have twice the probability of getting non-conservative surgery than those living at the bottom of the utilisation range; though utilisation rates are higher, the same is true for the differences stand by women in Denmark and England depending on their area of residence; the ratio increases to almost 4 times for Spanish and Slovenian women (*Figure 4b and table 1 Appendix 1*).

However, the systematic component of this variation is uniformly below 10% in all countries but Denmark, where almost 60% of the observed variation compared to ECHO areas cannot be deemed random (*Table 1 Appendix 1*).



<sup>\*</sup> Each dot represents the relevant administrative area in the country (Concelhos for Portugal). The y-axe charts the rate per 10,000 inhabitants (women) The figure is built on the total number of interventions in 2009 in those countries. In Figure 4b utilisation rates have been normalised to ease comparison of the degree of variation across countries

### Prostatectomy in benign prostatic hyperplasia

Portugal shows, one of the lowest age-standardised rates of prostatectomy in BPH -1 intervention in 786 adult men each year, far from the numbers observed in the countries with the highest rates, Denmark and Spain, around 1 in 500 adult men (*Figure 5a and table 1 Appendix 1*). Regarding the ratio between extreme areas, Slovenia shows the highest (6-folded) followed by Denmark and Spain with adult men living in the highest rate areas bearing 4 times more chances of getting a prostatectomy (*Figure 5b and table 1 Appendix*). The systematic component of this variation was relevant across all countries examined, ranging from 10 to almost 50% not amenable to randomness.



\* Each dot represents the relevant administrative area in the country (Concelhos for Portugal). The y-axe charts the rate per 10,000 inhabitants (men 40 year old and older) The figure is built on the total number of interventions in 2009 in those countries. In Figure 5b utilisation rates have been normalised to ease comparison of the degree of variation across countries

### **III. IN COUNTRY VARIATION**

With the exception of adeno/tonsillectomy and hysterectomy in non-oncologic conditions, utilisation rates of lower-value care in Portugal are relatively low compared to other ECHO countries. In terms of volume, adeno/tonsillectomy and hysterectomies in non oncologic conditions seem to be the most relevant too. (table 2 in appendix 2).

Though variation is significant for all LVC procedures examined (ranging from 4 to 47-folded chances of getting the procedure depending on the concelho of residence), the systematic component of it is particularly relevant for certain ones, such as c-section in low risk deliveries (two times more variation than could be expected by chance), adeno/tonsillectomy and prostatectomy in BPH -26 and 23% of the variation detected across concelhos cannot be deemed random-, while for the others, the behaviour across areas seems to be quite homogeneous, with a bare 6 to 11% of the observed difference exceeding that expected by chance.

Along the following pages, the geographical pattern of utilisation for each procedure will be presented, mapping out the two relevant tiers in the health system organisation: concelhos and regions.

Whenever possible, proxies of "burden of disease" or utilisation of related or alternative procedures have been included in the analysis to better characterise the observed phenomena.

The potential for minimisation of LVC utilisation is also mapped out; each geographical area is identified by their distance in excess-cases to the desirable benchmark; to this end, two scenarios have been adopted: the first takes as reference the behaviour of the concelhos with the lowest rates (10% bottom of the 278 continental concelhos); the other scenario, more conservatively, benchmarks against the 25% lowest rates in the country (percentile 25th of utilisation and below).

Variation in utilisation of each LVC procedure is represented using two geographical units: concelhos and regions. The first mapping is composed of 278 units and the second comprises 5 regions. Analysis by concelhos would be more linked to local medical practices, whilst regions could be considered a surrogate for regional policies affecting all the concelhos within.

The higher the rate of utilisation of low value care, the higher the room for enhancing efficiency.

The higher the systematic variation across areas, the larger the chances of inequitable exposure to lower-value care linked to the place of residence. Although, in principle, utilisation of LVC is more often explained by local medical practices, regions may still play some role in other factors such as services availability and organisation of care devices which may affect decisions made locally. Interestingly enough, the percentage of variation explained by the region is close to 0 for adenotonsillectomy but goes up to 16 and 22% for prostatectomy in BPH and c-section in low-risk births.

### Adenoidectomy and/or tonsillectomy

The highest quintile of age-standardised utilisation rates includes concelhos ranging between 100 and 242 interventions per 10,000 children while the lowest goes from 6 to 36. There is no clear geographical clustering of concelhos according to their utilisation level, however the areas around Lisbon tend to show lower rates while those at the western part of Faro, or around Coimbra or Porto seem to go in the opposite direction. Variation across utilisation extremes is considerable (6-fold between percentile 95 and 5<sup>th</sup>) and it is systematic, 26% of it could not be deemed random.



\* The darker the brown, the higher the exposition to adenotonsillectomy of children living there. concelhos are clustered into 5 quintiles according to their rate value (Q1 to Q5). –legend provides the range of standardised rates within each quintile.

When the analysis is performed by region, there seems to be a perfect gradient, utilisation decreasing to the south, with Lisbon setting apart with the lowest rate in the country. The regional level does only explain a 3% of the observed variation, suggesting that the main driver is medical practice at concelho level (table 2 in Appendix 2)



The larger opportunities for minimising the use of adenotonsillectomy tend to be found in the western part of the country (*figures 7 and 8*). In the most conservative scenario, those areas more in need of intervention to decrease utilisation would be performing up to 310 adenotonsillectomies in excess per year (353 when using the more demanding benchmark in scenario I). The overall number of excess interventions in the country in 2009 can be conservatively estimated around 5240 (*table 3 in Appendix 1*); half of them concentrated in region Norte (*figure 9.b*)



\* The darker the blue the larger the difference between the observed number of cases and the benchmark (expected number of cases if they behaved as those concelhos with the lowest utilisation rates –p10 and p25). Concelhos are clustered into 5 quintiles according to their level of excess cases (Q1 to Q5). –legend provides the range within each quintile.



\* The darker the green the larger the number of excess cases estimated at region level, if all the concelhos behaved as the benchmark of minimal utilisation -p10 and p25 -, legend provides values for each region.

### Caesarean section in low risk births.

C-section is considered a highly effective procedure in avoiding maternal and child mortality at birth as well as complications derived from foetal distress. However, in the last decade, literature is abounding in evidence of overuse, particularly misuse in lower-value indications such as low risk and normal births. Portugal shows the smallest rate of utilisation of c-section in low-risk births across ECHO countries (half the Spanish, the next smallest rate, and a tenth of the Danish)

First, a glance at c-section use in any condition in Portugal and how it relates to burden of disease -measured as rate of births with complications per 10,000 women (see definitions in Appendix 4). Figures 10 and 11 illustrate how burden of disease maps out across concelhos, both in absolute terms (standardised rates) and expressed in relative risk of exposure (ratio observed to expected). Excess incidence of this condition seems to concentrate in a few concelhos, mainly Central coastal areas, Lisboa and Algarve (blue shades in figure 11)



\* Map on the right: The darker the brown, the higher the risk of complications among women living there. Concelhos are clustered into 5 quintiles according to their rate value (Q1 to Q5). –legend provides the range of standardised rates within each quintile. Map on the left: relative risk for women living in the concelho compared to the expected average burden. Blue shades flag areas with excess risk (overexposure); pink shades denote risk below the expectation, thus relative protection or under-exposure compared to the rest of the country. White areas correspond to average relative risk (observed/expected=1)

An overlapping, even if imperfect, between the mapping of higher relative risk of births with complications and more intensity in utilisation of c-sections can be reasonably expected. However, the pattern revealed in figure 12 shows a certain degree of incongruence when compared with those arising in figure 10 and 11, particularly affecting the Alentejo. The conclusion that can be drawn is that the intensity of c-section performance in several concelhos in the country seems to be driven by factors other than need.

Exploring the degree of overlapping between c-section utilisation patterns and csection in low risk deliveries (lower value care) yields a much more matching picture (figures 11 and 12). This suggests that in most of those concelhos with high c-section rates women might be also bearing a higher rate of lower-value care (a worth noting exception, the concelhos in the Algarve with the highest csection rates but no lower-value indication cases). It is also noteworthy how most of the areas with low-medium intensity of c-section registered no cases of the lower-value indication, though there are some exceptions to this rule that seem to suffer higher levels of exposure to lower-value interventions.



\* The darker the brown, the higher the probability of getting the procedure among women in reproductive age living there. Concelhos are clustered into 5 quintiles according to their rate value (Q1 to Q5). –legend provides the range of standardised rates within each quintile.

The ratio across areas in the extremes of the utilisation range shows more than 46-folded probability of undergoing a c-section during a low risk delivery depending on the concelho of residence -or 5 times higher if we exclude tail-values and compare concelhos at 25<sup>th</sup> and 75<sup>th</sup> percentiles of utilisation *(table 2 appendix 2)*; this variation is more than 2 times higher than what could be randomly expected.

The regional level seems to explain 22 % of the detected variation across concelhos (table 2 in appendix 2). When the same analysis is conducted at regional level, there seem to be a good matching between burden of births with complications and intensity in use of c-section, with higher rates of both coexisting in Algarve and Lisboa (*figures 14 to 17*); The Alentejo region stands as problematic, despite a relative risk of a complicated birth 20 to 50% lower than average, it shows a relatively high utilisation of c-section and the highest in the country for the lower-value indication of the procedure. Conversely, the Algarve region, bearing a risk of complicated births 50% above average, shows the highest rate of c-section in Portugal, but amongst the lowest utilisations in low-risk births.



\* Map on the left: The darker the brown, the higher the exposition to complications among women in reproductive age living in that region –legend provides the actual values of the standardised rate. Map on the right: relative risk for women living in the region compared to the expected average exposure. Blue shades flag areas with excess risk (overexposure); pink shades denote risk below the expectation, thus relative protection or under-exposure compared to the rest of the country. White areas correspond to average relative risk (observed/expected=1)



The distance between the observed exposure to lower value c-sections and the optimisation benchmarks is drawn in figures 18 and 19 for the two tiers of health administration, concelhos and regions.

The most conservative scenario of minimisation (*figures 18.b and 19.b*) quantifies the excess lower value c-sections in Portugal in a year in almost 950 interventions (*table 3 appendix 2*). The distribution of those cases is, obviously, uneven across concelhos; figures 18.a and b map out in darker shades those municipalities that may be a priority target for interventions to reduce the utilisation of c-sections in low risk births (the maximum local potential for reduction estimated in between 6 and 143 interventions per year –Q4 in figures 18.a and b).

The same quantification for potential reduction in use of lower value c-sections was conducted at regional level *(figures 19 a and b)*. The most conservative scenario *(Fig 19.b)* estimates regional impact in potentially avoidable cases in between 9 and 390, while the more demanding setting ranges from 11 to 412 per year, depending on the region



\* The darker the blue the larger the difference between the observed number of cases and the benchmark (expected number of cases if they behaved as those concelhos with the lowest utilisation rates –p10 and p25). Concelhos are clustered into 5 quintiles according to their level of excess cases (Q1 to Q5). –legend provides the range within each quintile.



\* The darker the green the larger the number of excess cases estimated at region level, if all the concelhos behaved as the benchmark of minimal utilisation –p10 and p25 -legend provides values for each region.

### Hysterectomy in non-oncologic conditions

Hysterectomy is one of the safest and most appropriate procedures in dealing with uterus cancer. However, its indication for other gynaecological conditions such as bleeding or uterine myoma is controversial and not the first line approach. In those cases hysterectomy can be considered lower-value care.

Figures 20 and 21 allow for a comparison of the distribution of the two types of hysterectomy indication across concelhos in Portugal



rate value (Q1 to Q5). –legend provides the range of standardised rates within each quintile.

Note that utilisation rates for the lower-value indication are significantly higher overall than for the adequate one (concelhos with the highest hysterectomy utilisation rates in the cancer indication -5<sup>th</sup> quintile- range between 4 and 12 procedures per 10,000 adult women, escalating to 29 to 70 interventions for the lower-value indication).

Furthermore, excluding the cancer indication, the differences in women's probability to get a hysterectomy could be as large as 4 times, depending on their concelho of residence (table 2, appendix 2). Only 11 % of this variation can be deemed not random (systematic). The region where the concelho belongs seems to explain a discreet 10% of it, suggesting that the main role corresponds to local clinical practice, though regional strategies or planning of services may contribute to modulate it.

Using regions as the unit of analysis (figures 22 and 23), there is a perfect matching of the utilisation gradient between both hysterectomy indications: Algarve shows the lowest rates and Alentejo's utilisation heads the ranking of both cancer and lower-value hysterectomy.



The potential for minimisation of lower-value hysterectomy use at concelho level is summarised in figures 24.a and b, displaying the two usual scenarios: The most conservative one, benchmarking against those concelhos in the lowest quartile of utilisation, yields a range of excess cases per municipality between 1 and 173 per year.

Aggregated at Regional level, Norte and centro regions shows the larger potential for avoiding excess cases in the range of 1200 cases per year, far from Algarve that remains in the area of 88 lower-value hysterectomies in excess per year (figures 25.a and b)



<sup>\*</sup> The darker the blue the larger the difference between the observed number of cases and the benchmark (expected number of cases if they behaved as those concelhos with the lowest utilisation rates –p10 and p25). Concelhos are clustered into 5 quintiles according to their level of excess cases (Q1 to Q5). –legend provides the range within each quintile.



\* The darker the green the larger the number of excess-cases estimated at region level, if all the concelhos behaved as the benchmark of minimal utilisation –p10 and p25 -, legend provides values for each region.

### Non conservative surgery in breast cancer

The current therapeutic approach for breast cancer includes surgery, often followed by hormonal therapy and radiotherapy. Surgical treatment can be conservative (CS), which preserves part of breast glandular tissue, or nonconservative treatment (NCS) which entails total removal of breast glandular tissue, maintaining or not the skin tissue. Different studies show equal effectiveness for both surgical strategies in terms of long-term survival. However CS is recommended, at any stage of breast cancer on the basis of less complications and better quality of life, confining the use of NCS to those situations where the tumour's size relative to total breast mass prevents conservative resection. In specialised breast cancer are candidates for breast conserving therapy and 50 to 75% of them would prefer the conservative approach. Thus, in most situations, NCS is considered lower-value care as it has been superseded by the conservative alternative.

The previous section on international comparison highlighted how Portugal shows a relatively high NCS utilisation rate among ECHO countries, figure 26 shows how the national rate builds up from the intensity of use at individual concelhos.



\* The darker the brown shade, the higher the exposure to non conservative surgery of women living there. concelhos are clustered into 5 quintiles according to their rate value (Q1 to Q5). –legend provides the range of standardised rates within each quintile.

The range of age-standardised rates across the country is wide: depending on their concelho of residence women face up to a 5-fold difference in the probability of undergoing lower-value breast surgery (table 2 appendix 2). Only 6% of this variation exceeds what could be randomly expected, and the region where the concelho belongs merely explains 7% of it

The analysis at regional level points out Centro region with the higher NCS utilisation rate, barely above Alentejo and Algarve, but about two points larger than the smallest rate, found in Lisboa: roughly 1 in 1557 adult women vs 1 in 2217



An estimation of the local potential for minimising the utilisation of NCS shows that, conditional on how strict the benchmark set (*figures 28.a and b*), women are bearing an excess of this lower-value care in between 1 and 85 excess cases in a year depending on their concelho of residence. The same analysis performed at regional level (*figures 29.a and b*) yields that the excess NCS in Centro would be in the area of 500, while Algarve moves between 50 and 70 excess lower-value interventions per year.



\* The darker the blue the larger the difference between the observed number of cases and the benchmark (expected number of cases if they behaved as those concelhos with the lowest utilisation rates –p10 and p25). Concelhos are clustered into 5 quintiles according to their level of excess cases (Q1 to Q5). –legend provides the range within each quintile.



\* The darker the green the larger the number of excess-cases estimated at region level, if all the concelhos behaved as the benchmark of minimal utilisation –p10 and p25 -, legend provides values for each region.

### Prostatectomy in benign prostatic hyperplasia

Open prostatectomy is the oldest surgical method to treat heavily symptomatic benign prostatic hyperplasia (BPH). This method is still preferred if the prostate is very large but in general terms has been superseded by less invasive interventions, such as transurethral resection of the prostate (TURP) and should be considered lower-value care. However, there is growing evidence on overuse of surgical options in dealing with BPH and, in particular, misuse in asymptomatic or minor cases.

Portugal shows one of the lowest prostatectomy rate in BPH across ECHO countries (*see section II*). Variation within the country covers an array from about 1 in 7 thousand men to 1 in 200, depending on the concelho of residence (*Fig. 30*); this translates into men living in a concelho at the top utilisation rate bearing almost 10 times more probabilities to get their prostate removed than those residents in a bottom rate place.

Such differences are hardly amenable to differences in need. More than 20% of this variation exceeds what could be randomly expected; also, it seems that it is not entirely amenable to factors operating within each concelho, since the regional level contributes to explain 16% of that variation.

The estimation of excess cases in a year per concelho (*figures 32.a and b*) shows how if all areas were to converge to the lowest utilisation rate in the country (either the behaviour across the lowest 25% or 10%) the number of cases that could be avoided would be 1 or 2, for the concelhos already in lower utilisation intensity, and range from 10 to 200 in a year for those more prone to use it.



\* The darker the brown shade, the higher the exposition to prostatectomy of men living there. concelhos are clustered into 5 quintiles according to their rate value (Q1 to Q5). –legend provides the range of standardised rates within each quintile.





\* The darker the blue the larger the difference between the observed number of cases and the benchmark (expected number of cases if they behaved as those concelhos with the lowest utilisation rates –p10 and p25). Concelhos are clustered into 5 quintiles according to their level of excess cases (Q1 to Q5). –legend provides the range within each quintile.



\* The darker the green the larger the number of excess-cases estimated at region level, if all the concelhos behaved as the benchmark of minimal utilisation–p10 and p25 - legend provides values for each region. 27

With the exception of adeno/tonsillectomy, LVC utilisation rates have tended to be stable or slightly decrease over the period of analysis (2002-2009). A bit more substantial was the 24% decrease in c-section use in low risk deliveries.

The systematic variation across concelhos has slightly increased for hysterectomy adeno/tonsillectomy; and otherwise, it has tended to decrease, particularly in the case of non conservative breast cancer surgery, suggesting that concelhos' intensity of use of those procedures has been converging over the period

### IV. EVOLUTION OVER TIME

Between 2002 and 2009, utilisation rates of lower-value care show different trends depending on the procedure, but the general feature seem to be relative stability in the rates over the period (*fig 38 and 39*): some downwards trend (2% decrease in non-oncologic hysterectomy, 1% in NC breast surgery), or slightly upwards (around 3% increase in prostatectomy BPH ); A bit more substantial were the changes in c-section use in low risk deliveries, which decreased by 24%, and in adeno/tonsillectomy, which went 22% higher (see tables 4 to 8 in appendix 2)

Systematic variation, on the other hand, has only increased for Hysterectomy and adeno/tonsillectomy; otherwise, it has tended to decrease for the other procedures examined (no matter the baseline degree of non-random variation), particularly in the case of non conservative breast cancer surgery, suggesting that concelhos' intensity of use of that procedure has been converging over the period and especially since 2007.

Graphs in this section provide information on two issues: the evolution of the utilisation rate (blue lines representing the standardised rate) and the evolution of the non-random variation (green dots representing the systematic component of variation), over time.

We should look first at the utilisation trend –upwards would mean bad evolution, regardless how variation had changed. The desirable change would be a simultaneous decline in utilisation and variation. A decrease in utilisation concurrent with larger variation entails more divergence in local behaviours, i.e. certain populations systematically more exposed to lower-value care, which, in turn, warrants the identification and specific targeting of those concelhos more deviant from the desirable minimal utilisation.



Individual trends for concelhos at both extremes of lower-value care utilisation (2002 – 2009)

The insights outlined in considering overall trends in utilisation rate and systematic variation can be confirmed by looking at the individual behaviour of individual concelhos over the period of analysis.

This section offers only a few selected examples, but Individual concelhos' evolution over time can be tracked in their original dynamic charts at

http://www.echo-health.eu/handbook/quintiles lvc por.html

Besides the specific examples of change in intensity of lower-value care use, it is also relevant to consider the spread of bubbles in 2009. Since they all started at the same utilisation quintile in 2002, the variety of colours they have taken up by the final year (one for each quintile of utilisation intensity), provides a flavour of how established might be the medical practice underpinning such utilisation and how homogeneous or diversely shaped over time and across concelhos.

Regarding adeno/tonsillectomy Figure 40.a tracks concelhos which, at the beginning of the period, were in the lowest quintile of interventions per 10,000 children in the country (quintile 1); of the 2 municipalities selected, their behaviour starts diverging from 2004 with children in Vila Franca increasing their probability of receiving the intervention while their colleagues in Seixal remained among the lowest rates for the whole period. Figure 40.b portraits the same phenomenon, but for concelhos starting in the opposite side, at the top of the utilisation range. The resulting array of bubbles in 2009 shows how a good share of the concelhos starting in quintile 1 have tended to escalate their utilisation level by two or three quintiles; conversely, those already starting in the upper utilisation level have remained at the same intensity.

For c-section in low risk births the majority of those concelhos in the bottom level of intensity have moved up one or two levels, while those in the upper bound have tended to remain at the upper utilisation quintiles.



\* All figures chart Standardised utilisation rates per 10,000 and time in years. Bubbles represent individual concelhos, the size being proportional to population. Colours reflect a ranking of utilisation: Q5 corresponds to the highest quintile of utilization, Q1 the lowest. Bubbles change colour over time according to the changes in their relative intensity of use compared to the others (quintile of utilisation); the absolute value of the standardised rate each year is marked by the position in y-axis. The array of bubbles represented on 2009 reflects only those concelhos which in 2002 where in the same utilisation quintile as the two tracked in the figure.

Those areas at both ends of extreme utilisation rates of NCS in breast cancer, show a variety of paths; by the end of the period they had spread through the whole array of quintiles of intensity. The same is true for the places starting at the extremes of hysterectomy utilisation in non-oncologic conditions and Prostatectomy in BPH: The spread of individual concelhos by 2009 for those starting in quintiles 1 and 5 has stretched to cover the whole range of intensity of use (*Figures 42 to 45*)



All figures chart Standardised utilisation rates per 10,000 and time in years. Bubbles represent individual concelhos, the size being proportional to population. Colours reflect a ranking of utilisation: Q5 corresponds to the highest quintile of utilisation, Q1 the lowest. Bubbles change colour over time according to the changes in their relative intensity of use compared to the others (quintile of utilisation); the absolute value of the standardised rate each year is marked by the position in y-axis. The array of bubbles represented on 2009 reflects only those concelhos which in 2002 where in the same utilisation quintile as the two tracked in the figure.

### V. SOCIAL GRADIENT

The distribution of lower-value care utilisation seems to be quite homogeneous across different quintiles of concelho wealth for the whole period. The only exception regards women's exposure to NC breast surgery and men's to prostatectomy in BPH, which seems to increase when they live in wealthier areas.

In the first case, though, utilisation rates have been converging over the period of analysis, moving slightly downwards in wealthier areas while rising in those deprived, till differences actually become non statistically significant by 2009.

C-section shows an interesting behaviour in both general and lower value indications. The trends at both ends of income seem to switch relative positions from 2004 with those better-off bearing higher rates. However, differences across levels of wealth only become significant by the end of the period; It is worth noting, how the period of higher utilisation of c-section in low risk births for all levels of income, 2002-2005, coincides with the peak of higher exposure for less affluent areas but, when utilisation starts to decline it does it most sharply for the more deprived, leaving the wealthier to lead the utilisation rate comparison.

LVC utilisation rates are compared across concelhos clustered into quintiles of average income level. Each line in the graphs corresponds to one of those quintiles.

The wider the gap between most and least affluent quintile lines, the more inequitably distributed the exposure to low value care will be. Such eventual gap could be widening, narrowing or maintained over time.

Besides the relative position of the lines over time, it is relevant to keep track of the 95% confidence intervals (whiskers drawn around annual rate) for quintiles 1 and 5. Only those not overlapping represent a statistically significant difference between wealthier and deprived areas.

The desirable pattern will show no statistically significant differences across concelhos amenable to their wealth. If such differences were present, a positive time trend will consist in progressively narrowing the gap till, eventually, disappearing.

However, given the nature of the type of care examined, a concern about the direction of convergence is due. The suitable evolution should tend to minimise lower-value care provision for all levels of wealth. Horizontal equity at high levels of lower-value care utilisation could hardly be considered a good performance sign.

Only prostatectomy in BPH and NC breast surgery showed statistically significant differences between better and worse-off areas: for the whole period the rate was significantly higher in wealthier concelhos. In those cases, lower average income seems to decrease exposure to lower value care.



### VI. POLICY IMPLICATIONS

The conceptual framing of the analysis presented above is pretty simple: utilisation of lower-value care entails a loss of value-for-money in the health system (allocation of resources that leads to lower quality and safety of care i.e. inefficiency). Typically, these phenomena occur at local level, giving way to differential exposure or access to services depending on the place of residence (often coined as "post-code lottery").

The analysis yields two types of knowledge useful for action: on the one hand, it quantifies the magnitude of the problem, setting it in reference to other relevant European countries; on the other, it actually identifies those areas within the country with higher potential for realignment into value-based provision of care on the basis of national benchmarks (less prone to cultural and organisational biases, so relevant in this cluster of care)

The 2 scenarios of minimising use of LVC are somewhat arbitrary. They are only intended to provide some reasonable reference for the potential for improvement on the basis that, when it comes to lower-value care, *the lesser the better*. Overall, the minimisation of use of the 5 LVC procedures examined is worth 13,000 excess-interventions in a year for the conservative scenario and 16,500 in the drastic one. The estimation is summarised in the following table:

	Estimated excess-interventions				
	Conservative p25	Drastic p10			
Adeno and/or tonsillectomy	5240	6450			
C-section in LRD	949	1016			
Hysterectomy non-oncologic	3487	5053			
NC breast cancer surgery	1284	1617			
Prostatectomy BPH	2044	2380			
Total	13,004	16,516			

Policy-wise the key will lay in understanding the situation in those concelhos standing as outliers, to appropriately tailor any intervention aimed at limiting the use of lower-value care. Factors that had been often highlighted as underpinning these phenomena and maybe worth analysing in Portugal include:

- Local schools of practice that lead to well established clinical styles that may involve lower-value care. Learning cascades and the leadership of prestige figures play a paramount role here.
- The lack of clinical guidelines has been reported as fostering utilisation of low-value care. But also existing clinical guidelines/protocols locally or regionally issued should be analysed. They could weight in two opposite directions:
  - Perfectly adequate guidelines may have no impact on clinical practice if they are not binding and/or the general perception is that they lack legitimacy to meddle with daily practice. This could be either because the recommended courses of action are not locally available -no contextualising effort is acknowledged- or, simply, because professionals had felt excluded from the elaboration and, thus, do not accept them as relevant
  - Local protocols of care for certain conditions may have adapted to limited availability of cost-effective conservative alternatives, consolidating certain practice styles. Such alternatives often involve more intense follow-up and consultation and/or coadjuvant therapies, which may be more difficult to display in certain settings, such as disperse populations entailing considerable, direct and indirect, travel costs.
- Since all the procedures analysed can be considered "elective" surgery, patient's preferences could be most relevant. The choice or acceptance of lower-value care might stem from insufficient, and even inadequate, information about consequences and alternative courses of action. This eventual misinformation has been often reported, particularly in relation to prostatectomy and c-section. Patients' empowerment and adequate exposure to complete information may change their views.

The analysis conducted, suggests that there is still room for enhancing value for money in the Portuguese system. Portugal shows low rates of LVC utilisation compared with the other ECHO countries and, generally, they have remained as such over time, while intensity of use has become progressively more homogeneous across concelhos. However, hysterectomy and adeno/tonsillectomy utilisation have experienced some increase in the variation of intensity of use across concelhos, suggesting that, depending on the place of residence, populations' exposure to them has been diverging over the period.

Also, Adeno/tonsillectomy high rates and increasing overall trend deserve special consideration. Focusing on local practices, particularly learning cascades and established medical practice styles, together with patient information and empowerment in decision making, will potentially have a major impact..

Further analysis on institutional factors underpinning overuse of LVC at concelho level, as well as social, organisational and budgetary local contexts, will serve as basis for recommendations to guide relevant decision makers in tackling this allocative inefficiency. SAVINGS ARE NOT WARRANTED, the aim is fostering "value for money" i.e. avoid non-efficient public expenditure

### Tables InternationalComparison 2009

### Table 1. Summary Utilisation rates and statistics of variation per country 2009 per indicator

	Adenotonsillectomy children up to 14 years old								
	DENMARK	ENGLAND	PORTUGAL	SLOVENIA	SPAIN				
Cases	3261	37301	9597	2354	30076				
Stand. Rate	33.38	39.75	62.29	83.67	53.93				
EQ5-95	3.86	2.50	3.42	2.46	4.80				
SCV	0.21	0.09	0.34	0.66	0.23				

	C-section in low-risk deliveries									
	DENMARK	ENGLAND	PORTUGAL	SLOVENIA	SPAIN					
Cases	5356	26982	1140	1106	9287					
Stand. Rate	43.41	20.30	4.32	21.81	8.95					
EQ5-95	2.29	4.51		3.51	49.44					
SCV	6.34	0.80	0.69	0.81	0.47					

	Hysterectomy non-oncologic conditions								
	DENMARK	ENGLAND	PORTUGAL	SLOVENIA	SPAIN				
Cases	4897	39948	9166	1568	24367				
Stand. Rate	21.84	19.01	21.44	18.18	14.77				
EQ5-95	1.98	2.27	1.83	2.34	2.95				
SCV	0.14	0.07	0.09	0.04	0.09				

	Non-conservative surgery breast cancer								
	DENMARK	ENGLAND	PORTUGAL	SLOVENIA	SPAIN				
Cases	2187	15472	2746	490	8821				
Stand. Rate	8.14	6.22	5.24	5.00	4.31				
EQ5-95	1.93	1.90	2.32	3.96	3.77				
SCV	0.56	0.10	0.04	0.06	0.07				

	Prostatectomy benign prostatic hyperplasia								
	DENMARK	ENGLAND	PORTUGAL	SLOVENIA	SPAIN				
Cases	2330	16197	3120	458	16422				
Stand. Rate	22.09	15.04	12.73	12.53	18.20				
EQ5-95	4.38	3.33	3.94	6.37	4.13				
SCV	0.47	0.10	0.18	0.23	0.18				

\*sR: Age-sex Standardised Rate per 10,000 inhabitants (Reference population: ECHO countries 2009); EQ: Extremal Quotient; SCV:Systematic Component of Variation;

### Tables Portugal2009

				Non-	Prostatectomy
		C-section	Hysterectomy	conservative	benign
	Adenoton	Low Risk	Non-oncologic	Surgery	prostatic
	sillectomy	Delivery	condition	breast cancer	hyperplasia
Cases	9,597	1,140	9,166	2,746	3,120
Population	1,528,075	2,780,126	4,490,587	5,235,446	2,409,458
Crude Rate	66.35	3.74	21.6	5.43	13.25
Stand. Rate	68.18	7.02	22.72	5.81	13.39
sR Min.	5.58	0.33	4.2	0.7	1.36
sR Max.	242.47	49.5	69.78	16.43	51.27
sR. P5	21.08	0.59	10.25	2.1	3.13
sR. P25	40.12	1.73	16.78	3.8	6.84
sR. P50	59.94	3.67	21.48	5.26	11.79
sR. P75	91.03	9.41	27.34	7.55	17.76
sR. P95	132.79	27.62	39.35	10.66	30.07
EQ5-95	6.3	46.66	3.84	5.07	9.6
EQ25-75	2.27	5.45	1.63	1.99	2.6
CSV	0.26	2.19	0.11	0.06	0.23
ICC	0.03	0.22	0.10	0.07	0.16

Table 2. LVC procedures standardised utilisation Rates per 10,000 and statistics of variation in Portugal, year 2009

\*sR: Age-sex Standardised Rate per 10,000 inhabitants (Reference population: national); sR Px: percentile x of sR distribution; EQ: Extremal Quotient;

Tables Portugal 2009

Table 3. Excess-cases (Observed-Expected) of lower-value care in Portugal, year 2009, drastic scenario (benchmark the 25 percent of concelhos with the lowest standardised utilisation rate)

	Adenoton sillectomy	C-section Low Risk Delivery	Hysterectomy Non-oncologic condition	Non- conservative Surgery breast cancer	Prostatectomy benign prostatic hyperplasia
Total EC25 EC25 min	5240 1	949 1	3487 1	1284 1	2044 1
EC25 max	310	143	173	64	195
Q1	133	46	133	99	97
Q2	334	38	333	122	132
Q3	843	103	640	298	358
Q4	3930	762	2381	765	1457

\*EC25:Excess number of cases using as benchmark percentile 25 of the distribution of standardised utilisation rate per Local Authority (observed-expected); Qx: quartile of the EC25 distribution;

Table 4. Excess-cases (Observed-Expected) of lower-value care in Portugal, year
2009, less conservative scenario (benchmark the 10 percent of concelhos with the
lowest standardised utilisation rate)

				Non-	Prostatectomy
		C-section	Hysterectomy	conservative	benign
	Adenoton	Low Risk	Non-oncologic	Surgery breast	prostatic
	sillectomy	Delivery	condition	cancer	hyperplasia
Total FC10	6450	1016	5053	1617	2380
EC10 min	1	1	1	1	1
EC10 max	353	144	222	85	215
Q1	129	51	182	112	87
Q2	427	46	480	142	172
Q3	1068	123	858	280	415
Q4	4826	796	3533	1083	1706

\* EC10:Excess number of cases using as benchmark percentile 10 of the distribution of standardised utilisation rate per Local Authority (observed-expected); Qx: quartile of the EC10 distribution;

## Tables PortugalEvolution over time2002-2009

#### Table 5

	Adenotonsillectomy							
	2002	2003	2004	2005	2006	2007	2008	2009
Cases	8348	9629	9420	9438	9285	10183	10239	9597
Stand. Rate	52.01	62.09	60.89	58.36	57.76	65.15	69.6	63.63
sR Q1.	54.18	56.22	56.97	55.75	56.09	54.53	60.96	55.56
sR Q5.	50.28	59.47	56.63	56.15	57.20	67.83	67.85	61.38
SCV	0.2	0.2	0.22	0.23	0.21	0.24	0.32	0.25

\* sR: Age-sex Standardised Rate per 10,000 inhabitants (Reference population: national 2002); sR Qx: quintile of sR distribution; SCV:Systematic Component of Variation;

### Table 6

_								
	C-section Low Risk Delivery							
_	2002	2003	2004	2005	2006	2007	2008	2009
Cases	1569	1673	1850	1655	1627	1572	1334	1140
Stand. Rate	9.39	9.59	10.82	10.63	7.7	9.01	6.57	7.07
sR Q1.	9.36	10.02	9.95	10.96	3.88	3.53	1.27	2.84
sR Q5.	5.39	6.42	7.14	6.10	5.14	5.37	4.84	3.49
SCV	2.69	2.36	2.98	3.94	1.28	2.12	1.34	2.26

\* sR: Age Standardised Rate per 10,000 inhabitants (Reference population: national 2002); sR Qx: quintile of sR distribution; SCV:Systematic Component of Variation;

#### Table 7

	Hysterectomy Non-oncologic condition							
	2002	2003	2004	2005	2006	2007	2008	2009
Cases	9816	10394	10330	10011	9853	9588	9264	9166
Stand. Rate	23.2	24.79	24.89	23.4	23.23	23.56	22.92	22.65
sR Q1.	23.05	25.00	22.09	21.79	22.10	21.86	21.37	21.23
sR Q5.	24.28	25.22	25.60	24.01	23.13	23.36	22.24	22.57
SCV	0.05	0.07	0.08	0.06	0.05	0.07	0.08	0.07

\* sR: Age Standardised Rate per 10,000 inhabitants (Reference population: national 2002); sR Qx: quintile of sR distribution; SCV:Systematic Component of Variation;

### Table 8

# Tables PortugalEvolution over time2002-2009

	Non-conservativeSurgery breast cancer							
	2002	2003	2004	2005	2006	2007	2008	2009
·								
Cases	2931	2837	2792	2758	2702	2881	2778	2746
Stand. Rate	5.77	5.97	5.44	5.12	5.29	5.89	5.62	5.69
sR Q1.	3.32	4.10	2.50	3.13	2.81	3.18	4.09	4.48
sR Q5.	7.27	6.29	6.80	6.75	6.03	6.80	5.93	6.06
SCV	0.17	0.24	0.23	0.2	0.18	0.24	0.15	0.06

sR: Age Standardised Rate per 10,000 inhabitants (Reference population: national 2002); sR Qx: quintile of sR distribution; SCV:Systematic Component of Variation;

### Table 9

	Prostatectomy benign prostatic hyperplasia							
	2002	2003	2004	2005	2006	2007	2008	2009
Cases	2937	3175	3277	3204	3264	3210	3166	3120
Stand. Rate	13.07	13.26	14.02	12.82	13.29	13.42	13.77	13.41
sR Q1.	6.63	7.29	8.83	7.81	8.74	8.02	8.25	8.45
sR Q5.	14.81	14.53	15.08	15.13	15.19	15.07	16.76	15.70
SCV	0.22	0.16	0.17	0.13	0.17	0.17	0.17	0.17

\* sR: Age Standardised Rate per 10,000 inhabitants (Reference population: national 2002); sR Qx: quintile of sR distribution; SCV:Systematic Component of Variation;

### **Technical note**

Utilisation of lower-value care is measured as geographical indicators within the ECHO performance model.

This fact entails some implications, both for methodology and in interpreting results. The report is based on ecologic analyses –data aggregated at a certain geographical level which becomes the unit of analysis for this report; thus, the correct interpretation of the findings highlights the risk of being exposed to lower-value care for the population living in a certain area (as opposed to the risk for an individual patient).

### Main endpoints:

This report maps out standardised utilisation rates per geographical area. As a summary measure of variation, the report includes the classical statistics Ratio of Variation between extremes and Component of Systematic Variation. The other variable consistently mapped through out the report is the excess cases per area in two scenarios of minimised utilisation

When burden of disease or activity calibrators were available, the report has also included their standardised utilization rates and ratios

Instruments:

Being an ecological study, each admission was allocated to the place of residence of the patient, which in turn is referred to a meaningful geographic unit – the 278 concelhos and the 5 Regions composing Portugal.

The operational definitions for each indicator are detailed in the coding table in appendix 4. Indicators are based on those used in the international arena. For its use in the analysis of variations across countries they were subject to a construct validity process developed by the Atlas VPM project in Spain and cross-walking across different diseases and procedures classifications underwent a face-validation carried out as a task within the ECHO project.

This report is based on the hospital admissions registered in the National Health Service (Ministério de Saúde). Cross- and in-country sections were built upon 2009 discharges, whereas time-trends and social gradient analyses used 2002 to 2009 data.

Social gradient data and data for concelhos on average family annual income (both based in transfers and available) were obtained from the National Statistics office (INE Portugal).

### Definitions of indicators

	Diagnosis and Procedures codes ICD9-CM								
	Primary diagnosis		Secondary di	agnosis2-30	Procedures				
	Inclusions	Exclusio ns	Inclusions	Exclusio ns	Inclusions	Exclusions			
Non concernative	85.33 85.34 85.35				174.*				
surgery in breast	85.36 85.41 85.42				233.0				
surgery in breast	85.43 85.44 85.45				V10.3				
Women	85.46 85.47 85.48								
					60.21				
Duo stata stauru in					60.29 60.3				
prostatectomy in					60.4 605				
Male population	185.* 233.4 236.5				60.61				
aged 40 or older					60.62				
					60.69				
Prostatectomy in					60 3 60 4				
benign prostatic					60 5 60 6				
hyperplasia Male population aged 40 or older	60.0				00.5 00.0				

	Diagnosis and Procedures codes ICD9-CM								
	Primary diagn	osis	Secondary diagno	osis2-30	Procedures				
	Inclusions	Exclusions	Inclusions	Exclusions	Inclusions	Exclusions			
	641.11 641.21 641.31		641.11 641.21 641.31						
	641.81 641.91 642.01		641.81 641.91 642.01						
	642.51 642.61 642.71		642.51 642.61 642.71						
	644.20 644.21 646.61		644.20 644.21 646.61						
	651.00 651.01 651.03		651.00 651.01 651.03						
	651.10 651.11 651.13		651.10 651.11 651.13						
	651.20 651.21 651.23		651.20 651.21 651.23						
	651.30 651.31 651.33		651.30 651.31 651.33						
	651.40 651.41 651.43		651.40 651.41 651.43						
	651.50 651.51 651.53		651.50 651.51 651.53						
	651.60 651.61 651.63		651.60 651.61 651.63						
	651.80 651.81 651.83		651.80 651.81 651.83						
	651.90 651.91 651.93		651.90 651.91 651.93						
	652.20 652.21 652.23		652.20 652.21 652.23						
	652.30 652.31 652.33		652.30 652.31 652.33						
Births with	652.40 652.41 652.43		652.40 652.41 652.43						
complications (CB)	652.60 652.61 652.63		652.60 652.61 652.63						
Women	652.71 654.01 654.11		652.71 654.01 654.11						
Aged between 15	654.20 654.21 654.23		654.20 654.21 654.23						
and 55	654.31 654.41 654.51		654.31 654.41 654.51						
	654.61 654.71 656.31		654.61 654.71 656.31						
	656.40 656.41 656.43		656.40 656.41 656.43						
	656.81 658.11 658.21		656.81 658.11 658.21						
	659.01 659.11 659.31		659.01 659.11 659.31						
	660.01 660.11 660.21		660.01 660.11 660.21						
	660.31 660.41 660.50		660.31 660.41 660.50						
	660.51 660.53 660.61		660.51 660.53 660.61						
	660.71 660.81 660.91		660.71 660.81 660.91						
	662.30 662.31 662.33		662.30 662.31 662.33						
	663.01 663.11 663.21		663.01 663.11 663.21						
	665.01 665.11 665.31		665.01 665.11 665.31						
	668.01 668.11 669.01		668.01 668.11 669.01						
	669.11 669.61 668.10		669.11 669.61 668.10						
	668.11 668.13 042		668.11 668.13 042						
	649.8*		649.8*						
Cesarean section					74.0 74.1				
rate					7/ 2 7/ /	7/ 01			
Women					74.274.4	/4.71			
Aged between 15 and 55 years old					74.99				

	Diagnosis and Procedures codes ICD9-CM								
		Primary diagnosis	Seco	ondary diagnosis2-30	Procedures				
	Inclusions	Exclusions	Inclusions	Exclusions	Inclusions	Exclusions			
		641.11 641.21 641.31 641.81 641.91 642.01 642.51 642.61 642.71 644.20 644.21 646.61 651.00 651.01 651.03 651.10 651.11 651.13 651.20 651.21 651.23 651.30 651.31 651.33 651.40 651.41 651.43 651.50 651.51 651.53 651.60 651.61 651.63 651.80 651.81 651.83		641.11 641.21 641.31 641.81 641.91 642.01 642.51 642.61 642.71 644.20 644.21 646.61 651.00 651.01 651.03 651.10 651.11 651.13 651.20 651.21 651.23 651.30 651.31 651.33 651.40 651.41 651.43 651.50 651.51 651.53 651.60 651.61 651.63 651.80 651.81 651.83	74.0 74.1 74.2 74.4 74.99				
Cesarean section rate in low risk deliveries Women Aged between 15 and 55 years old		651.90 651.91 651.93 652.20 652.21 652.23 652.30 652.31 652.33 652.40 652.41 652.43 652.60 652.61 652.63 652.71 654.01 654.11 654.20 654.21 654.23 654.31 654.41 654.51 654.61 654.71 656.31 656.40 656.41 656.43 656.81 658.11 658.21 659.01 659.11 659.31 660.01 660.11 660.21 660.31 660.41 660.50 660.51 660.53 660.61 660.71 660.81 660.91 662.30 662.31 662.33 663.01 663.11 663.21 665.01 665.11 665.31 668.10 668.11 668.13 669.01 669.11 669.61 043	2	651.90 651.91 651.93 651.90 651.91 651.93 652.20 652.21 652.23 652.30 652.31 652.33 652.40 652.41 652.43 652.60 652.61 652.63 652.71 654.01 654.11 654.20 654.21 654.23 654.31 654.41 654.51 654.61 654.71 656.31 656.40 656.41 656.43 656.81 658.11 658.21 659.01 659.11 659.31 660.01 660.11 660.21 660.31 660.41 660.50 660.51 660.53 660.61 660.71 660.81 660.91 662.30 662.31 662.33 663.01 663.11 663.21 665.01 665.11 665.31 668.10 668.11 668.13 669.01 669.11 669.61 043	2	74.91 72.* 73.* 75.*			

younger

	Diagnosis and Procedures codes ICD9-CM								
Pr	Primary diagnosis		dary diagnosis2-30	Procedures					
Inclusions	Exclusions	Inclusions	Exclusions	Inclusions	Exclusions				
179 180		179 180		68.3 68.4 68.5					
182 233.1 233 2		182 233.1 233 2		68.6 68.7 68.8 68 9					
ιγ									
/ IS ISIS	Cancer in female genital organs or uterus. Abdominal trauma (Annex 7)		Cancer in female genital organs or uterus. Abdominal trauma (Annex 7)	68.3 68.4 68.5 68.6 68.7 68.8 68.9					
	630-677		630-677						
om ıy				28.2 28.3 28.6					
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