PREVALENCE OF CKD 4+

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Disclosure of Interests

- No relevant disclosures
Outline

• Stage 4 Prevalence
  • Percent of general population (crude)
  • By continent and country

• Stage 5 on RRT Prevalence
  • Stage 5 *not on RRT* - not reported
  • Per million population (crude)
  • By continent and country

• Time trends

• Limitations
Stage 4  Europe


KDIGO Controversies Conference on Advanced CKD  |  December 2-5, 2016  |  Barcelona, Spain
Stage 4   Africa

Morocco (2009-2011)

0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0

%  SOURCES: Benghanem Garbi M. Kidney Int 2016
Stage 4  Americas

SOURCES: USRDS Annual Report 2016

KDIGO Controversies Conference on Advanced CKD  |  December 2-5, 2016  |  Barcelona, Spain
Stage 4  Asia / Oceania

Stage 5 on RRT
Africa

Unadjusted prevalence in 2014 (pmp)

Tunisia (2010-2012?): 734
Tunisia, Sfax region: 678
Egypt (2010-2012?): 650
Algeria (2010-2012?): 475
Libya (2010-2012?): 323
Morocco (2010-2012?): 300
South Africa: 178

Stage 5 on RRT
Europe

Unadjusted prevalence
in 2014 (pmp)

SOURCES: ERA-EDTA Registry  Annual Report 2014
Stage 5 on RRT
Americas

Unadjusted prevalence in 2014 (pmp)

USA: 2076
Puerto Rico (2012): 1740
Jalisco (Mexico): 1568
Chile: 1301
Canada: 1291
Uruguay: 1122
Argentina: 856
Brazil: 773
Colombia: 604
El Salvador: 563
Venezuela (2012): 478
Panama (2012): 473
Ecuador (2012): 456
Peru (2012): 351
Costa Rica (2012): 330
Cuba (2012): 327
Bolivia (2012): 222
Dominican Republic (2012): 185
Honduras (2012): 180
Paraguay (2012): 177
Guatemala (2012): 134
Nicaragua (2012): 64

Stage 5 on RRT
Asia / Oceania

Unadjusted prevalence in 2014 (pmp)

SOURCES: USRDS Annual Report 2016
Data suggest

<table>
<thead>
<tr>
<th>Region</th>
<th>Stage 4 (%)</th>
<th>Stage 5 on RRT (pmp)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Europe</td>
<td>0.11 – 0.29</td>
<td>157 - 1824</td>
</tr>
<tr>
<td>Africa</td>
<td>0.25</td>
<td>178 - 734</td>
</tr>
<tr>
<td>Americas</td>
<td>0.40</td>
<td>64 - 2076</td>
</tr>
<tr>
<td>Asia &amp; Oceania</td>
<td>0.1 – 1.1</td>
<td>113 - 3219</td>
</tr>
</tbody>
</table>
Trends in CKD prevalence

Figure 1 | National surveys reporting trends over time of the prevalence of chronic kidney disease (CKD) stages 3 through 5. Data are from references 4, 12, 15, 16, and 32, as cited by Hallan et al.²

Figure 1.1 Prevalence of CKD by stage among NHANES participants, 1999-2014

Ten countries with highest % rise in RRT prevalence 2001-2014 plus US and Europe (developed countries)
Limitations

STAGE 5 Prevalence

• Stage 5 on RRT relatively straightforward
  • Reflects access to RRT – not ESRD disease burden
• Stage 5 not on RRT, however, is not being reported by registries
• Even in large general population based study samples numbers of Stage 5 CKD are low – CIs often lacking
• This makes it virtually impossible to report ESRD burden
Limitations

STAGE 4 Prevalence

• Problems
  • Sampling (not all population based, low response rates)
  • Use of different age ranges / categories
  • Even in large general population based study samples numbers of Stage 4 CKD are low – CIs often lacking
Table 1: Description of the method of general population sample selection per study. (Part 1)

<table>
<thead>
<tr>
<th>First author, (ref)</th>
<th>Study</th>
<th>Country</th>
<th>Time period</th>
<th>N</th>
<th>Age range</th>
<th>Sample frame</th>
<th>Sample design</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aumann, (17)</td>
<td>SHIP</td>
<td>Germany</td>
<td>2001-06</td>
<td>2830</td>
<td>25-88</td>
<td>ns</td>
<td>multistage sampling</td>
<td>69%</td>
</tr>
<tr>
<td>Bongard, (18)</td>
<td>MONA LISA</td>
<td>France</td>
<td>2006-07</td>
<td>4727</td>
<td>35-75</td>
<td>electoral rolls</td>
<td>age and sex stratified</td>
<td>ns</td>
</tr>
<tr>
<td>Browne, (19)</td>
<td>SLAN</td>
<td>Ireland</td>
<td>2007</td>
<td>1098</td>
<td>45+</td>
<td>other (Geodirectory)</td>
<td>multi-stage random sample: by area &amp; region</td>
<td>66%</td>
</tr>
<tr>
<td>Capuano, (20)</td>
<td>VIP</td>
<td>Italy</td>
<td>1998-99, 2008-09</td>
<td>2400</td>
<td>25-74</td>
<td>electoral rolls</td>
<td>age and sex stratified</td>
<td>ns</td>
</tr>
<tr>
<td>Christensson, (21)</td>
<td>GAS</td>
<td>Sweden</td>
<td>2001-04</td>
<td>2815</td>
<td>60-93</td>
<td>census</td>
<td>stratified, age, sex &amp; urban/rural location</td>
<td>60%</td>
</tr>
<tr>
<td>Chudek, (22)</td>
<td>PolSenior</td>
<td>Poland</td>
<td>2007-11</td>
<td>3793</td>
<td>65+</td>
<td>ns*</td>
<td>ns*</td>
<td>32%</td>
</tr>
<tr>
<td>Cirillo, (23)</td>
<td>Gubbio Pop.</td>
<td>Italy</td>
<td>ns</td>
<td>4574</td>
<td>18-95</td>
<td>ns*</td>
<td>ns*</td>
<td>ns</td>
</tr>
<tr>
<td>Codreanu, (24)</td>
<td>**</td>
<td>Moldova</td>
<td>2006-07</td>
<td>973</td>
<td>18-77</td>
<td>ns</td>
<td>ns</td>
<td>ns</td>
</tr>
<tr>
<td>De Nicola, (25)</td>
<td>CARHES</td>
<td>Italy</td>
<td>2008</td>
<td>4077</td>
<td>35-79</td>
<td>electoral rolls</td>
<td>age and sex stratified</td>
<td>45%</td>
</tr>
<tr>
<td>Delanaye, (26)</td>
<td></td>
<td>Belgium</td>
<td>2008-09</td>
<td>1992</td>
<td>45-75</td>
<td>ns</td>
<td>voluntary nature</td>
<td>ns</td>
</tr>
<tr>
<td>Donfrancesco, (27)</td>
<td>MATISS</td>
<td>Italy</td>
<td>1993-96</td>
<td>2924</td>
<td>20-79</td>
<td>random sample</td>
<td>age and sex stratified</td>
<td>60%</td>
</tr>
<tr>
<td>Formiga, (28)</td>
<td>Octabaix</td>
<td>Spain</td>
<td>2009</td>
<td>328</td>
<td>85</td>
<td>ns*</td>
<td>ns</td>
<td>ns</td>
</tr>
<tr>
<td>Fraser, (29)</td>
<td>HSE</td>
<td>England</td>
<td>2009-10</td>
<td>5799</td>
<td>16+</td>
<td>random 2 stage sample</td>
<td>ns*</td>
<td>ns</td>
</tr>
<tr>
<td>Gambaro, (30)</td>
<td>INCPIE</td>
<td>Italy</td>
<td>2006</td>
<td>3629</td>
<td>40+</td>
<td>GP list</td>
<td>random sample</td>
<td>62%</td>
</tr>
</tbody>
</table>

N= Number of subjects with creatinine measurement, ns= not specified. Gubbio Pop.= Gubbio population Study. * authors refer to previous publication. ** Early Detection and Intervention Program for Chronic Renal and Cardiovascular Disease in Rep Moldova.

Brück K et al. Methodology used in studies reporting CKD prevalence; NDT 2016
Limitations

STAGE 4 Prevalence

• Problems
  • Sampling (not all population based, low response rates)
  • Use of different age ranges / categories
  • Even in large general population based study samples numbers of Stage 4 CKD are low – CIs often lacking
  • Different types of eGFR formulas used
  • Different creatinine measurement methods
  • General population studies are not using the chronicity criterion to diagnose CKD

This makes many studies unsuitable for assessment of CKD prevalence and/or for international comparison.
Room for improvement

1. Quality assessment for studies examining the prevalence of CKD

Panel: Quality assessment criteria for studies examining the prevalence of chronic kidney disease

High quality
For studies of the highest quality, assessors should answer yes to the following ten questions

1. Subject sampling and precision
   A. Are the included people representative of the general population? (Comment: if people were included on the basis of hospital records, insurance claims, or health-care facilities then they should not be considered representative of the general population.)
   B. People are not included or excluded on the basis of specific risk factors. (Comment: high risk people such as those with diabetes, HIV, or hypertension should not be sought out specifically for inclusion or exclusion.)
   C. Is the sample size adequate to address the question of prevalence in the studied population?

2. Sampling technique
   A. Were the people recruited at random? (Comment: methods should address the issue of enrolling consecutive participants, people likely to have the disease or at high risk, and convenience sampling)

2. Towards Reporting Standards for studies reporting prevalence of CKD