Spherix Global Insights, in collaboration with 172 US nephrologists, analyzed the charts of 1,059 patients with chronic kidney disease in CKD Stages 3, 4 & 5 not on dialysis. The results were published in February 2018.

Gender and Common Co-Morbidity Breakdown Among CKD Patients

- Female, 41% (n=434)
- Male, 59% (n=625)

### Co-Morbidities: Obesity, Hepatitis, and Heart Failure

- **Obesity**
  - Female
  - Male
  - Total: 24%

- **Hepatitis C**
  - 2%

- **Heart Failure**
  - 15%

**Mean BMI: 30.0**

<table>
<thead>
<tr>
<th>BMI</th>
<th>n=1,059</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;25</td>
<td>20%</td>
</tr>
<tr>
<td>25 to 29.9</td>
<td>31%</td>
</tr>
<tr>
<td>30.0 and higher</td>
<td>49%</td>
</tr>
</tbody>
</table>

Patients with obesity (as indicated by their nephrologist, not BMI) are significantly more likely to also have concomitant dyslipidemia, T2D. Heart failure, gout, history of MI and family history of CKD. Those with diabetes and hypertension are more likely to be poorly controlled.

- **80% Genotype 1**
- **20% Genotype 2**
- **1% of patients had other concomitant liver conditions**
  - 3 liver transplant
  - 5 cirrhosis
  - 1 NASH
  - Hepatitis B
  - Fatty Liver
  - Hepatocellular cancer

#### Class Description

<table>
<thead>
<tr>
<th>Class</th>
<th>Description</th>
<th>n=158</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class I</td>
<td>No limitation of physical activity</td>
<td>19%</td>
</tr>
<tr>
<td>Class II</td>
<td>Some limitation of physical activity</td>
<td>55%</td>
</tr>
<tr>
<td>Class III</td>
<td>Marked limitation of physical activity</td>
<td>25%</td>
</tr>
<tr>
<td>Class IV</td>
<td>Unable to carry on physical activity</td>
<td>1%</td>
</tr>
</tbody>
</table>

*RealWorld Dynamix™: Chronic Kidney Disease* is based on a deep, robust patient chart analysis of 1,059 patients with CKD (eGFR<60) under the care of a nephrologist. Each nephrologist (n=172) completed an in-depth medical history of the most recent 3-7 patients who met the study inclusion criteria. For more information, contact: info@spherixglobalinsights.com

*RealWorld Dynamix™* provides deep insight into current management of patients with CKD along with the opportunity to explore various patient segments. RWD patient audits provide access to information not available in other sources such as laboratory values, treatment patterns by CKD stage, full range of co-morbid conditions and non-clinical demographics that correlate to patient care.
Diabetes is the leading underlying cause of CKD followed closely by hypertension. On average, audited patients have a mean age of 65 years and significantly more were male. About half of the patients in the audit were Caucasian.

Age, Race, Underlying Cause of CKD

- **Age Distribution**: Mean Age: 64.6
  - Above 80*: 14%
  - Under 50: 16%
  - 50 to 64: 27%
  - 65 to 80: 43%
  - *To comply with HIPAA Safe Harbor, patients 89 years or older were classified as ‘90’

- **Underlying Cause**:
  - Diabetes: 37%
  - Hypertension: 34%
  - GN: 10%
  - PKD: 7%
  - Other: 7%
  - Obstruction: 3%
  - AKI: 2%

Note: Specific cause of GN also captured

Race

- Caucasian, 54%
- Asian, 4%
- Hispanic, 12%
- Other, 1%
- African American, 28%

**Close to one in five patients referred from the ER/Hospital presents in Stage 5. Very few patients are referred to early stages 1&2 and those that do are typically not related to progressive CKD.**

Stage at Referral Based on Specialty

- PCP (n=789): 25.2% Stage 1&2, 16.8% Stage 3, 4.4% Stage 4, 6.5% Stage 5
- ER (n=110): 47.5% Stage 1&2, 55.6% Stage 3, 69.6% Stage 4, 11.6% Stage 5
- Cardiology (n=48): 37.8% Stage 1&2, 40.0% Stage 3, 46.7% Stage 4, 10.0% Stage 5
- Endocrinology (n=45): 46.5% Stage 1&2, 46.7% Stage 3, 10.0% Stage 4, 12.0% Stage 5
- Other Neph (n=43): 7.0% Stage 1&2, 34.9% Stage 3, 40.0% Stage 4, 18.6% Stage 5
- Urology (n=30): 50.0% Stage 1&2, 46.7% Stage 3, 10.0% Stage 4, 9.4% Stage 5
- Other (n=30): 29.0% Stage 1&2, 20.7% Stage 3, 16.7% Stage 4, 33.3% Stage 5
- Total (n=1,056): 27.2% Stage 1&2, 35.3% Stage 3, 29.4% Stage 4, 9.1% Stage 5

Only 6% of the audited patients had a potassium level of 5.5mg/dL or higher at the time of referral. Nephrologists indicate that they will typically intervene when the level is above 5.7mg/dL. Surprisingly, there was not a significant difference in potassium levels based on whether or not the patient was taking ACE inhibitors, ARBs, or MRAs.

Abnormal Potassium Labs at Referral

- Patients with Type 2 diabetes and those with heart failure present with significantly higher potassium levels compared to patients without these co-morbid conditions

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OVERVIEW
Chronic kidney disease (CKD) affects millions of Americans, with many patients unaware they have the disease. CKD is a progressive disease that ultimately leads to the need for renal replacement therapy via dialysis or transplantation. This report analyzes the population of CKD patients that are under the care of a nephrologist and who have reached Stage 3 (eGFR<60). In addition to a host of clinical and non-clinical demographics, the report quantifies treatment rates for renal medications, distribution of key laboratory values used to assess CKD patients, co-morbid conditions, hospitalizations and number/frequency of office visits.

SAMPLE & METHODOLOGY
RealWorld Dynamix™: Chronic Kidney Disease is based on a deep, robust patient chart analysis of 1,059 patients with CKD (eGFR<60) under the care of a nephrologist. Each nephrologist (n=172) completes an in-depth medical history of the most recent 3-7 patients who met the study inclusion criteria. An excellent augmentation to claims data, RealWorld Dynamix™: Chronic Kidney Disease also captures the clinician’s perspective on the why behind treatment decisions. In addition to patient demographics and treatment history, patient origination and status at referral, clinical assessments, diagnostic tests and laboratory values are included to provide insight into the real world treatment patterns in CKD patients.

KEY QUESTIONS ANSWERED
• What are the treatment patterns for renal anemia by CKD stage? What percent of patients are treated with ESAs, IV iron and oral iron? What is the average ESA and IV iron dose by stage of CKD? Is ferric citrate currently being used as a treatment for IDA?
• What symptoms are most common in CKD patients? By most recent Hb level, what percent of patients report fatigue?
• What percent of patients by stage are treated with phosphate binders, active vitamin D and nutritional vitamin D? How is Rayaldee being incorporated into current practice patterns? Has the use of non-calcium binders changed considering recent KDIGO guideline updates? Which off these therapies, phosphate binders or active vitamin D, is typically initiated first? Is Sensipar used at all in this population?
• From what specialties are CKD patients most commonly referred and what is their presentation at referral including labs and other assessments? How often are patients seen by the nephrologist (by stage) and which other physicians are involved in the co-management of these patients?
• What is the opportunity for Veltassa in these patients? What percent of patients have a potassium level >5.5 and, among those, what percent are treated with either SPS or Veltassa? Why are patients who present with hyperkalemia not being treated with these agents?
• How do certain co-morbid conditions such as Type 2 diabetes, influence the treatment patterns? What is the Hba1c distribution across the population, what percent are treated with insulin, SGLT2s? How have nephrologists attitudes about SGLT2s and the treatment of DKD changed in the past year?

Related Reports 2018
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• RealWorld Dynamix™: Dialysis US
• RealWorld Dynamix™: Incident Dialysis Patients, Managing Transition
• RealTime Dynamix™ Renal Anemia US
• RealTime Dynamix™ Bone and Mineral Metabolism US
• RealTime Dynamix™ Hyperkalemia US
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