**Supplemental Table 1 – Search strategy used in the literature review for MEDLINE (Pubmed, 1966 to 1 October 2016)**

| | | | |
|---|---|---|---|
| **1** | Vitamin D.tw. | **23** | Hemodialysis.tw. |
| **2** | Vitamin D2.tw. | **24** | Haemodialysis.tw. |
| **3** | Vitamin D3.tw. | **25** | CAPD.tw. |
| **4** | Cholecalciferol.tw. | **26** | CCPD.tw. |
| **5** | Colecalciferol.tw. | **27** | APD.tw. |
| **6** | Ergocalciferol.tw. | **28** | Hemofiltration.tw. |
| **7** | or/1-6 | **29** | Haemofiltration.tw. |
| **8** | Paediatric.tw. | **30** | Hemodiafiltration.tw. |
| **9** | Pediatric.tw. | **31** | Haemodiafiltration.tw. |
| **10** | Child*.tw. | **32** | CKD.tw. |
| **11** | Infant.tw. | **33** | CKF.tw. |
| **12** | Neonatal.tw. | **34** | CRD.tw. |
| **13** | Adolescent.tw. | **35** | CRF.tw. |
| **14** | or/8-13 | **36** | ESKD.tw. |
| **15** | Kidney disease.tw. | **37** | ESKF.tw. |
| **16** | Kidney failure.tw. | **38** | ESRD.tw. |
| **17** | Renal disease.tw. | **39** | ESRF.tw. |
| **18** | Renal failure.tw. | **40** | or/15-39 |
| **19** | Renal insufficiency.tw. | **41** | 7 (limited to systematic review) |
| **20** | Renal replacement therapy.tw. | **42** | 7 and 14 (limited to systematic review and clinical trial) |
| **21** | Dialysis.tw. | **43** | 7 and 14 and 40 |
| **22** | Pre dialysis.tw. | **44** | 7 and 40 (limited to systematic review and clinical trial)<br>7 and 40 (limited to systematic review and clinical trials |

**Supplemental Table 2A – Quality of evidence and strength of the recommendation**

| | | | | | |
|---|---|---|---|---|---|
| **Quality of evidence** | **High** | **A** | **Strength of recommendation** | **Level 1** | **Corresponds to "strong" in GRADE** |
| | **Moderate** | **B** | | | |
| | **Low** | **C** | | **Level 2** | **Corresponds to "weak or discretionary" in GRADE** |
| | **Very low** | **D** | | | |

**Supplemental Table 2B – Clinical practice implications of the level of recommendations**

Level 1 recommendation can be examined to determine their suitability for use in developing a clinical performance measure. On the other hand, a level 2 grade inherently indicates uncertainty, and future research may provide higher quality evidence or more precise estimates or yield opposing findings.

| **Level of Strength** | **Implications** | | |
|---|---|---|---|
| | **Patients** | **Clinicians** | **Policy** |
| 1<br>("We recommend") | Most patients would want the recommended course of action; only a small proportion would not | Most patients should receive the recommended course of action | The recommendation can be evaluated as a candidate for developing a policy of performance measure |
| 2<br>("We suggest") | The majority of patients would want the recommended course of action; but many would not | Different choices will be appropriate for different patients | There is a need for substantial debate and involvement of stakeholders |

**Supplemental Table 3 - Randomised controlled trials of native vitamin D therapy in children with chronic kidney disease – level of evidence:**

| Author, year | Sequence generation | Allocation concealment | Blinding of participants | Blinding of personnel | Blinding of outcome assessors | Incomplete outcome data | Selective outcome reporting | Other sources of bias | Funding source |
|---|---|---|---|---|---|---|---|---|---|
| Shroff; 2012[8] | Yes | Yes | Yes | Yes | Yes | No | No | No | Research charity |

**Supplemental Table 4 – Randomised controlled trials of vitamin $D_2$ vs vitamin $D_3$ supplementation in children without chronic kidney disease – level of evidence**

| Author, year | Sequence generation | Allocation concealment | Blinding of participants | Blinding of personnel | Blinding of outcome assessors | Incomplete outcome data | Selective outcome reporting | Other sources of bias | Funding source |
|---|---|---|---|---|---|---|---|---|---|
| Gallo; 2013[83] | Unclear | Unclear | Unclear | Unclear | Unclear | No | No | 73% on vitamin D supplement at baseline | Unclear |
| Thacher; 2010[85] | Yes | Yes | Unclear | Unclear | Unclear | No | No | Historic cohort of rachitic children treated with $D_2$ used as comparator | Government |
| Gordon; 2008[84] | Yes | No | No | No | No | No | No | Weekly $D_2$ dose is not a direct comparison on a IU per IU basis | Government Research charity |

**Supplemental Table 5 – Summary of recommendations for native vitamin D therapy in children with chronic kidney disease 2-5D**

| | CATEGORY | RECOMMENDATION | GRADE |
|---|---|---|---|
| 1 | ***Assessing vitamin D status*** | We recommend measuring serum 25(OH)D concentration for assessing the vitamin D status of children with CKD 2-5D. | not graded |
| 2 | ***Monitoring vitamin D levels*** | We suggest the following schedule for measuring serum 25(OH)D levels in children with CKD stage 2-5D:<br>- 6 – 12 monthly depending on CKD stage in children not on vitamin D treatment<br>- if normal levels, measure 6 -12 monthly (based on previous 25OHD level and stage of CKD). If vit D supplementation required – check levels after 3 months. If::<br>• normal levels, continue vit D supplements as above and measure levels 6-monthly<br>• low levels, consider one repeat course of 'intensive replacement treatment' as described below and repeat levels in 3-months | 2D |
| 3 | ***Defining target levels of vitamin D*** | We suggest that serum 25(OH)D levels are maintained above 75nMol/L (>30ng/ml) in children with CKD stages 2 – 5D. We classify vitamin D status as follows:<br>- Sufficiency > 75 nMol/L (>30 ng/ml)<br>- Insufficiency 50 – 75 nMol/L (20 – 30 ng/ml)<br>- Deficiency 12 - 50 nMol/L (5- 20 ng/ml)<br>- Severe deficiency <12 nMol/L (<5 ng/ml) | 2C |
| 4 | ***Target population*** | We suggest using native vitamin D supplements for the treatment of vitamin D deficiency in children with CKD stages 2-5D who have serum 25(OH)D concentrations below 75nMol/L. In children with CKD stages 2-3 native vitamin D supplements may be used for the prevention or treatment of secondary hyperparathyroidism. | 2B |
| 5 | ***Type of vitamin D supplementation*** | We suggest using either vitamin $D_2$ (ergocalciferol) or vitamin $D_3$ (cholecalciferol) treatment in children with CKD 2 – 5D to increase serum 25(OH)D levels to the target range. | 2D |
| 6 | ***Treatment schedule for native vitamin. D supplementation*** | We suggest using a treatment regimen, guided by age and vitamin D concentration, for the prevention and treatment of vitamin D deficiency in children with CKD 2-5D. Mega-dose vitamin D therapy is not recommended. | 2C |

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<tr><th colspan="4">Intensive replacement phase</th></tr>
<tr><th>Age</th><th>25(OH)D serum (nMol/L)***</th><th>Vitamin D supplementation dose (daily)</th><th>Monitoring</th></tr>
<tr><td><1 year</td><td></td><td>600 IU/ day *</td><td rowspan="4">- Serum Ca and urinary Ca levels 1-3 monthly based on CKD stage<br>- 25(OH)D levels after 3 months</td></tr>
<tr><td rowspan="3">>1 year**</td><td>< 12</td><td>8000 IU / day</td></tr>
<tr><td>12 - 50</td><td>4000 IU / day</td></tr>
<tr><td>50 – 75</td><td>2000 IU / day</td></tr>
<tr><th colspan="4">Maintenance phase</th></tr>
<tr><td><1 year</td><td rowspan="2">>75****</td><td>400 IU / day</td><td rowspan="2">- 25(OH)D levels 6-12 monthly</td></tr>
<tr><td>>1 year*</td><td>1000 - 2000 IU /day based on CKD stage</td></tr>
</table>
* In infants under 1 year a fixed dose is recommended irrespective of the level of 25(OH)D<br>
** Consider adjusting dose by body size (weight or body surface area)<br>
*** To convert nMol/L to ng/ml divide by 2.5<br>
**** If levels remain <75nmol/L, then give doses as per the ‘Intensive replacement’ schedule for a further course of intensive replacement and recheck levels
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<td>7</td>
<td>Vitamin D toxicity</td>
<td>We suggest that vitamin D supplementation is stopped at serum 25(OH)D concentrations above 120nMol/L (48ng/ml). Symptomatic toxicity from Vitamin D is defined as serum 25(OH)D above 250nMol/L with hypercalcaemia, hypercalciuria and suppressed PTH.</td>
<td>2D</td>
</tr>
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