Exclusion criteria
- unable to take study medication;
- DNR/imminent death; hypercalcemia;
- nephrolithiasis, tuberculosis or sarcoidosis; pregnancy/lactation; other ongoing trial; consent refusal

Informed Consent
Randomization stratified by ICU and gender

Assigned to vitamin D (540,000 IU cholecalciferol)
Blood and urine draw

Assigned to placebo (oleum arachidis)
Blood and urine draw

Day 0: Inclusion
- Screening for inclusion/exclusion criteria
  - Vitamin D deficiency (25(OH)D<20ng/ml)
  - Patient > 18yrs
  - Expected ICU stay > 48h

Inclusion

Day 2-7
- Daily CRF (i.e. antibiotics, insulin…)
- Blood/urine draws on day 3 and 7

Day 8-28
- Distribution of study medication for home use
- Blood/urine draw at day 28 if feasible

Month 2-24
- 90,000 IU cholecalciferol or corresponding placebo monthly
- Monthly telephone calls to check for study medication intake and vital status
- 6 and 24 month-visit in two variants
  i. Follow-up by telephone
  ii. Visit at the clinic including blood/urine sample, clinical examination and dual X-ray absorptiometry