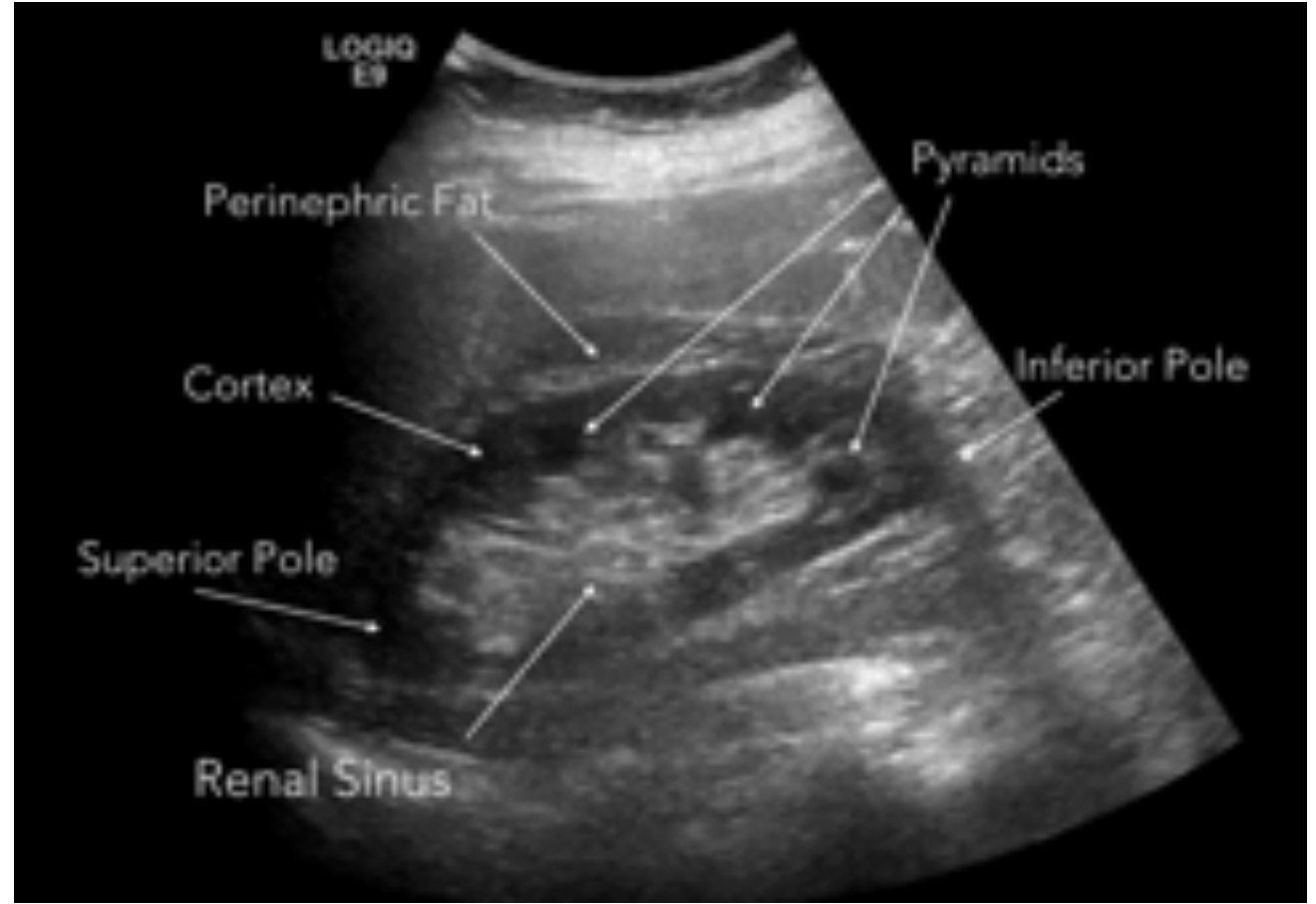
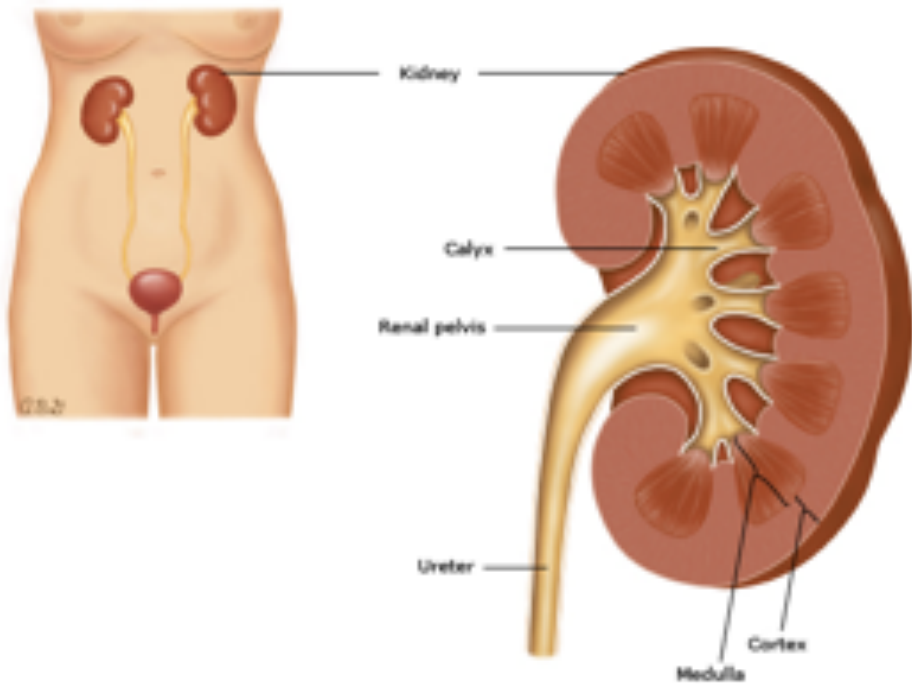


Focused renal PoCUS

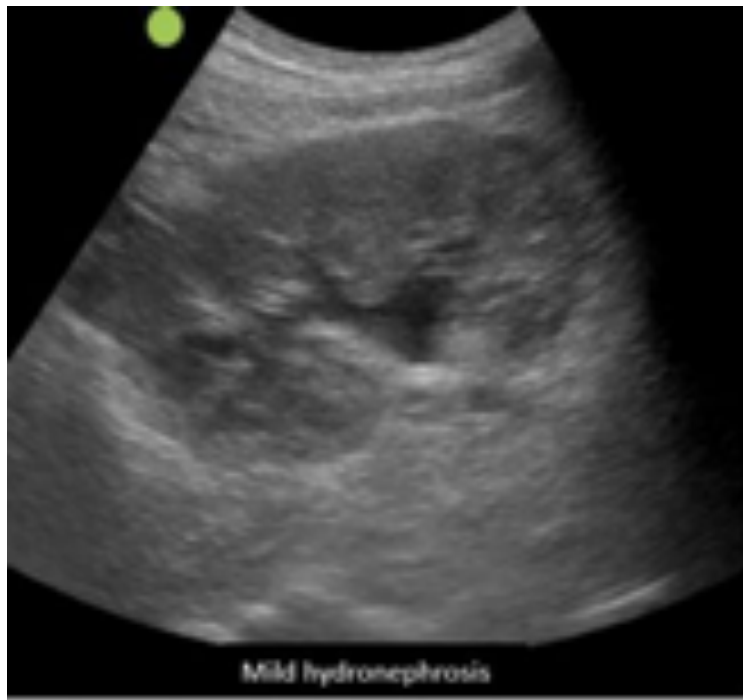
Hydronephrosis

72 M presents with 3/7 RLQ pain and gross haematuria

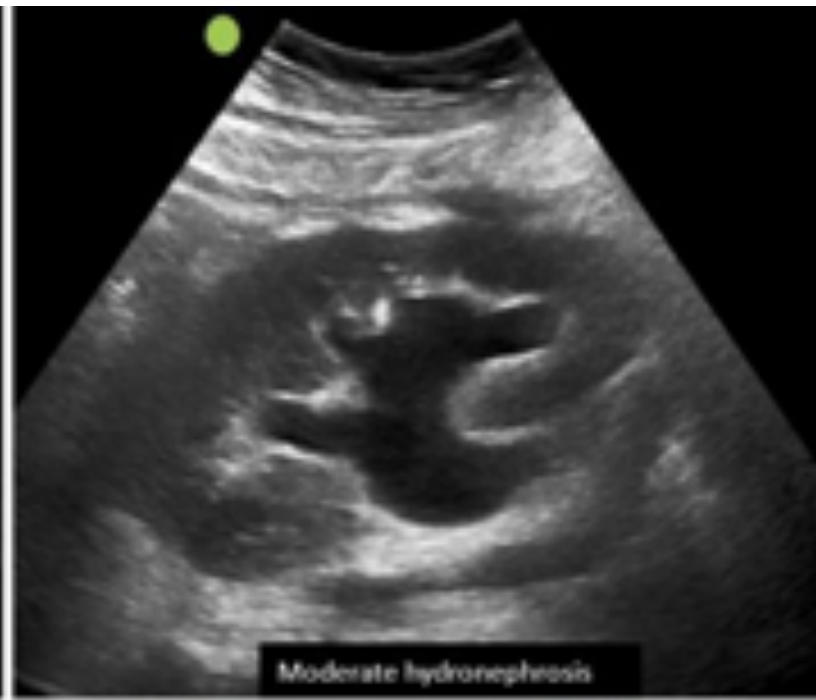
- BIB ambulance from a cruise ship
- HPC:
 - Renal colic, nausea, gross haematuria
 - No dysuria, no increased frequency
- PMHx:
 - Colon cancer stage 4 with hepatic mets – Avastin infusion (maintenance)
 - Previous nephrolithiasis x2 on L) – stent + conservative therapy
 - Atrial fibrillation
 - HTN
- O/E:
 - Afebrile, 179/90, 90 irregular irregular, alert GCS 15
 - Abdomen soft, + RLQ tenderness, no renal angle tenderness
- Ix:
 - Urinalysis – haematuria, pyuria
- PoCUS:
 - R kidney:
 - Moderate hydronephrosis
 - Cyst



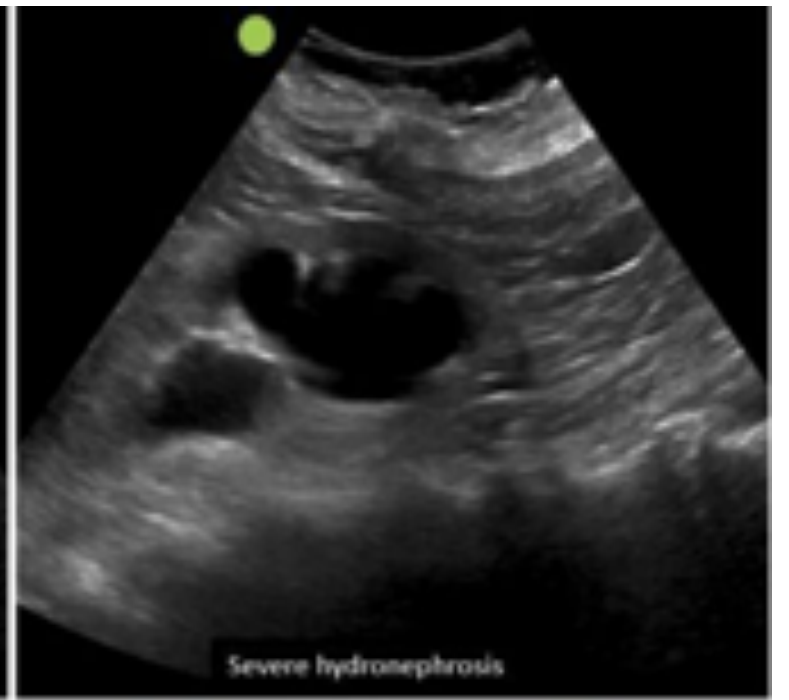
https://edus.ucsf.edu/sites/edus.ucsf.edu/files/wysiwyg/UCSF%20ED%20US%20Protocol%20Renal_Final.pdf



Mild hydronephrosis

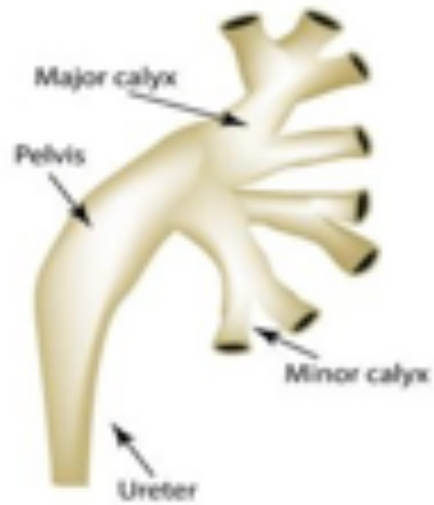


Moderate hydronephrosis



Severe hydronephrosis

Illustration of the renal collecting system



Normal Kidney



Mild Hydronephrosis



Moderate Hydronephrosis



Severe Hydronephrosis

Right kidney



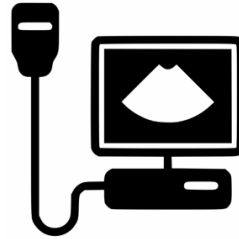
https://edus.ucsf.edu/sites/edus.ucsf.edu/files/wysiwyg/UCSF%20ED%20US%20Protocol%20Renal_Final.pdf

Focused renal PoCUS



Patient position

supine



Probe position

Curvilinear probe in longitudinal (coronal) plane



In hindsight:

Systematic approach:

- Scanned both kidneys + bladder (ureteric jets)
- Fanned through the kidney
- Two planes (long and short axis)

Image acquisition:

- Turning down the gain with colour doppler
- Centered kidney on the screen
- Made small probe adjustments

6 sonographic findings consistent with dx of acute ureteral stone:

1. Hydronephrosis/ hydroureter
2. Presence of intrarenal stone (not usually causing symptoms)
3. Perinephric fluid collection (suggesting increase in pressure in collecting system, specific for acute stone)
4. Presence of stone at UPJ/proximal ureter
5. Presence of stone UVJ/ bladder stone
6. Absence of ureteric jet (theoretical than practical, as partial obstruction may still present with jet)

What is hydronephrosis?

- Hydronephrosis – dilation of the urinary collection system of the kidney
- Unilateral vs bilateral
- Acute vs chronic
- Cause:
 - Young adults – calculi
 - Older patients – prostatic hypertrophy or carcinoma, retroperitoneal or pelvic neoplasms or calculi
 - Main cause – kidney stones, ureteral stones (moderate hydronephrosis)

Hydronephrosis

- Sensitivity 84%
- Specificity 89%
- User dependent:
 - Emergency physicians with ultrasound fellowship training detected hydronephrosis with significantly greater accuracy than other emergency clinicians.
 - Attendings, experienced residents, inexperienced residents, mid level providers were moderately accurate at detecting hydronephrosis in patients with suspected renal colic.
- Moderate and severe hydronephrosis > mild hydronephrosis

Utilisation of hydronephrosis

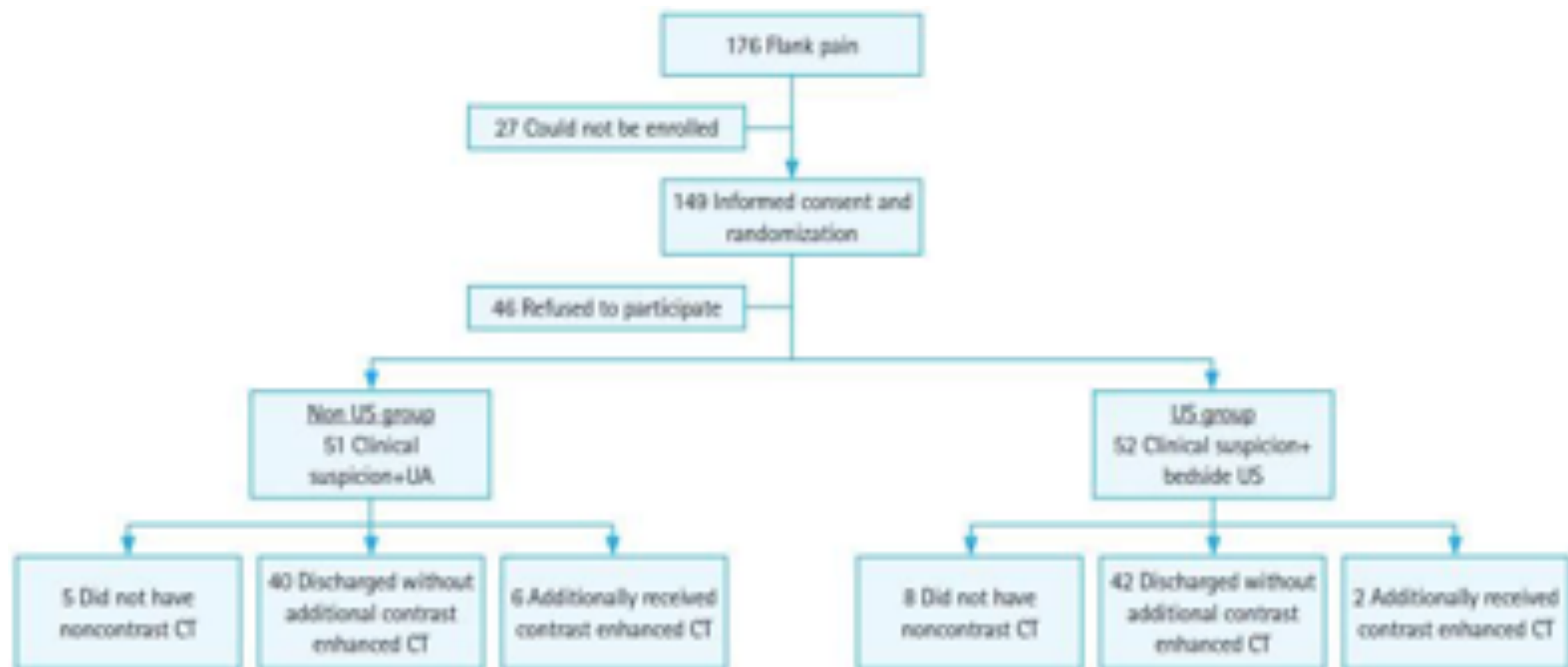
- Identification of a surgical emergency for example:
 - Renal obstruction in a solitary kidney
 - Renal obstruction + signs of infection
- May increase likelihood of:
 - Nephrolithiasis in patient p/w renal colic
 - Post renal (obstructive uropathies) causes in patient p/w AKI

Differential diagnosis hydronephrosis

- Stones
- Tumour

Does the use of bedside ultrasonography reduce emergency department length of stay for patients with renal colic? Park et al. 2017

- Prospective randomized controlled pilot study from October to December 2014 in patients with acute flank pain.
- Non contrast CT was selected based on:
 - Non ultrasonography group (NUSG)
 - Clinical features + haematuria in the urinalysis
 - Ultrasonography group (USG)
 - Clinic features + hydronephrosis on PoCUS
- Primary outcome measured:
 - ED length of stay
- Secondary outcomes:
 - Radiation exposure
 - Amount of analgesics
 - Proportion of patients with diseases other than ureteral calculus
 - Proportion of patients with unexpected ED revisits within 7 days



Results

- Length of stay:
 - USG – 89 minutes
 - NUSG – 163 minutes
 - Statistically significantly shorter ($p < 0.001$)
- No significant differences between the secondary outcome measures.
- Conclusion:
 - The use of early bedside ultrasonography for patients with acute flank pain could:
 - Reduce ED length of stay (approximately 74 minutes)
 - Without increasing unexpected ED visits

Limitations

- Short study duration – 3 month flank pain cohort
- Unblinded study – healthcare professionals may have subconsciously discharged patients in the USG prematurely
- Measurement bias – decision regarding presence of hydronephrosis may have been affected by the sonographer
- Factors affecting the ED length of stay (e.g. ED overcrowding and level of patient satisfaction) were not assessed
- Cost effective analysis was not conducted