**Supplementary Table 1. The ICD-9-CM codes**

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| **Variable/outcome** | **ICD-9 codes** |
| Primary biliary cholangitis | 571.6 |
| Autoimmune hepatitis | 571.42 |
| Hypercholesterolemia | 272.0 |
| Vitamin D deficiency | 268.9 |
| Osteoporosis | 733.00-733.03, 733.09 |
| Crohn’s disease | 555.0, 555.1, 555.2, and 555.9 |
| Ulcerative colitis | 556.0, 556.1-556.6, 556.8, and 556.9 |
| Sjögren’s syndrome | 710.2 |
| Systemic sclerosis | 710.1 |
| Rheumatoid arthritis | 714.0-714.2, 714.4, 714.81 |
| Systemic lupus erythematosus | 710.0 |
| Autoimmune thyroid disease | 245.2 |
| Psoriasis | 696.0, 696.1, 696.8 |
| Celiac disease | 579.0 |
| Non-dialysis dependent chronic kidney disease | 585.1-585.5, 585.9 |
| End-stage renal disease | 585.6, 399.5, 549.8 and exclude 584.5-584.9 |
| Ascites | 789.51, 789.59 |
| Variceal bleeding | 456.0, 456.20 |
| Portal hypertension | 572.3 |
| Hepatic encephalopathy | 572.2 |
| Hepatorenal syndrome | 572.4 |
| Spontaneous bacterial peritonitis | 567.23 |
| Septic shock | 785.52 |
| Respiratory failure | 518.81, 518.82, 518.84, and 799.1 |
| ERCP | 511.0, 511.1, 521.3, 511.4, 521.4, 518.4-518.8, 529.3, 529.4, 529.7, 529.8 |
| Liver transplantation | V427 |