Discussion 3: Injury Health States (GBD 'sequelae')

(as at 20 January 2009)

Background and status

Much of the effort during the past two months has been on finding words for the lay descriptions that are at least acceptable for the purposes of the project, while not losing too much face validity in terms of literature and clinical experience. I also got some useful input from the people who were at the group meeting in Washington DC in mid October. Louise Flood (who has had more input into this than anyone else) and I have gone through several loops of modification and consultation with Theo Vos, the member of the Core Team with responsibility for injury. I think (and hope) that this set is at least close to achieving that - I'll find out when we get reactions from the core team and from Josh Salomon in particular. (Whether these descriptions meet core team expectations is one thing. The conceptual and analytical model within which the lay descriptions are required to fit is another, and remains a matter about which a number of injury group members have expressed concerns. Kavi and I anticipate that there will be further discussion and appraisal in the group on the model in relation to injury, as it becomes more completely specified.)

This version of the document was submitted 'up the line', through Theo Vos on 4 December 2008. That doesn't mean that it's too late to make any changes, though some types will be more difficult to accommodate than others, and changes will be easier to make sooner than later. In particular, the changes that will be most difficult to make are those that will require splitting of the sets of ICD codes categories for a state, or moving codes from one state to another. This is because it has become urgent to start obtaining appropriately grouped morbidity data. It is the intention of the Data Hunt sub-group to start very soon to use code based on this list for that purpose. Much of this will be done by supplying the extraction code to a data custodian, and asking them to produce aggregate tables for provision to us. Since it will be difficult and inefficient to issue repeated requests to a custodian, this will soon place a strong constraint on changes to the ICD specifications.

The second constraint on changes is the sub-project to generate new GBD weights. The 'Lay Descriptions' in this document are our input into that process. No doubt there will be some more to-and-fro about wording, at least to ensure intelligibility and avoid ambiguity. But before very long (I don't know exactly when) it will be too late to make changes to the set of states that will go to field for the studies that Josh Salomon is leading.

Notes at the end of the attached document provide information on some of the issues and decisions that underlie this document. A Powerpoint presentation that I gave at the Washington meeting is another source (see second presentation at

http://sites.google.com/site/gbdinjuryexpertgroup/Home/meetings-and-other-activities). Here are a few additional points:

1. "Priority" states: This approach was used in some GBD work in Australia. It provides a way to deal with hospital data in which codes are present for more than one injury state: which should be chosen? The first-mentioned code will often be the most appropriate for GBD purposes, but not always. Acute care hospitals focus on conditions that present threat to life, and these are not always the best guide to later burden. A motor-cyclist might sustain intra-abdominal bleeding due to liver laceration and traumatic brain injury. The former presents the greater threat to life, but the latter presents the greater potential for persisting reduced heath status. The Priority states approach involves declaring some conditions as being important in this sense and deciding on their order of priority (that is the difficult step). The data extraction routine then scans records for occurrence of codes for priority states. The presence of a code for a higher ranked priority state 'trumps' a code for any lower ranked state. We have opted to limit scanning to the first three diagnosis fields, to minimise effects of differences between data collections in the distribution of numbers of diagnosis codes per record.

A second benefit of this approach applies to data coded to ICD-10 and its clinical modifications. As compared with ICD-9 and ICD-9-CM, ICD-10 is (in health informatics jargon) a little less pre-coordinated. For example, if a given case of head injury is coded according to ICD-9-CM and according to an ICD-10 clinical modification, then the latter is likely to result in more injury codes than the former. This is because ICD-9 provides categories that combine (pre-coordinate) conceptual domains such as presence of brain injury and presence of unconsciousness, while ICD-10 provides separate codes to capture each of these aspects of a case. An effect of this that is relevant to GBD is that the aspect of a head injury case that is most important in terms of likely generation of DALYs is not necessarily represented by the first-listed ICD-10 code in a record (e.g. a code for skull fracture quite often precedes a code for brain tissue damage or prolonged loss of consciousness. The priority injuries approach will largely account for this, and will help to avoid what would otherwise be a subtle difference in data extraction from ICD-9 vs ICD-10 based sources.

2. Body part and Nature as basis for specifying states: Many of you will know that a difference between the injury chapter in ICD-9 and in ICD-10 is that the conceptual hierarchy in the former is Nature of injury then Body part injured, while ICD-10 has the opposite order. The old GBD injury 'sequelae' list (i.e. as in Table 3 of the GBD2005 Operations Handbook) was written in the ICD-9 era. The injury categories reflect this, , most being framed in terms of nature of injury. The new list retains some of this approach (e.g. Injured nerves) but has a stronger emphasis on bodily location of injury (e.g. the categories for dislocation & soft-tissue injury of knee and shoulder). A potential benefit of a body part orientation is that something along these lines is commonly found in population surveys of injury (e.g. using an outline figure of a person), and we will be trying to use data from both hospitals and surveys.

3. You will see how the treated/non-treated distinction has evolved. It is still applied to only a minority of conditions. We have focused on those where there is reason to expect strong treatment effects and large differentials in proportions of cases receiving treatment (as defined). See the notes in the document for a bit more on this.

4. Please read Note 3 at the end of the document carefully, to ensure that you understand the project specifications within which we have had to work when writing the Lay Descriptions. These are NOT meant to describe the range of 'sub-states' that is in the scope of a specified state. We were required to produce a description (in few words and in non-technical language) of a typical or 'emblematic' case or state within that range. Some of our dilemmas in doing this are outlined in the notes column. Virtually every state is, in reality, quite diverse, tempting us to split the proposed ones and make more numerous and more homogenous states. But how far can we take this before we over-reach the potential of data sources and the person-time available for the project? We have increased the number of injury states (from 32 distinct ICD code ranges to about 40, and to about 60 in terms of subgroups defined in terms of treatment, long & short term aspects).

5. There are separate documents that provide supporting information for many, but not yet all of the states in this document. Some of these are updates of the documents on the web site. We have given priority to getting the lay descriptions and ICD code ranges done. We will now give attention to tidying up the supporting documents and putting them on the web site.

The table key and further notes are at the end of the document, after the table.

Priority health states (flagged if present in any of 1st 3 diagnosis fields; priority as listed)

Topic	Title of state	Long or short term?	Treated?	ICD-10	ICD-9	Lay Description	Notes

P1. Injured spinal cord							Treatment: US 'model SCI care' or equivalent. Includes rehabilitation and provision of aids.
Neck	1 Injured spinal cord at neck level (treated)	Both	Yes	S14, T06.0	806.0/1, 952.0	The person cannot move or feel his/her legs after an injury. He/she has severe limitation in arm movement. The person depends on others for bathing, eating, toileting and dressing. He/she has persistent pain and episodes of infections, pressure sores and low mood.	Treatment has strong effect on burden. Proportional assignment will be based on service availability. Some cases assigned these codes might have temporary or partial damage. This might warrant proportional assignment. The constraints imposed on the content of lay descriptions have prevented us from adequately representing the nature of most cases of SCI. The state on any day during its (typically) decades-long total duration is highly likely to be influenced by the absence of prospects of recovery, and by its duration to date. Being paralysed for (say) one day with expectations of complete recovery the next day is a different state to lifelong SCI, and likely to be rated differently. (Theo Vos advised of plans to include in the field studies some states with nominal durations shorter and longer than the study standard, which is one month. Inclusion of SCI as one of the states for this part of the project would be instructive.) To say that the typical person with a high level SCI is unable to use their arms is wrong. They will

							have severe limitation in the use of their arms ie they may just be able to move their fingers. Frequently persons with SCI will have areas of sensation but this has not been included in an attempt to write the 'typical state'
Neck	2 Injured spinal cord at neck level (untreated)	Both	No	S14, T06.0	806.0/1, 952.0	The person cannot move or feel his/her legs after an injury. He/she has severe limitation in arm movement. Arms and legs are in fixed, bent positions, and he/she has persistent pain. He/she depends on others for washing, eating, toileting and dressing. He/she frequently develops infections and pressure sores and becomes extremely unwell.	Some people who have had an injury coded to S14, T06.0 will have partial use their limbs and some sensation below the level of the cord damage. This is not captured in the emblematic 'typical case' required for the lay description. Likewise, the emblematic untreated case is described as having contractures and frequent infections & pressure sores; while many will, some won't. Breathing difficulty has not been mentioned in the lay description of an untreated case (i) on the premise that poorly treated cases with high lesions would die and (ii) as C6/7 region is the most common level.
Lower	3 Injured spinal cord below neck level (Treated)	Both	Yes	S24, S34, T06.1, T08, T91.3	806.2-9, 952.1-4/8/9	After an injury the person has severe limitation in leg movement and needs a wheelchair. He/she has long term pain. He/she has difficulty with toileting. The person has episodes of infections, pressure sores and low mood.	As for SCI at neck level. Cases of SCI not specified as to level are assigned to 'lower'. T91.3 does not distinguish level of injury. See note above about life long nature of SCI. The 'emblematic' case is described as needing a wheelchair; some cases do not.
Low	4	B	N	S24,	806.2-.9,	After an injury the person	

er	Injured spinal cord below neck level (Untreated)	oth	o	S34, T06.1, T08, T91.3	952.1-4/8/9	has severe limitation in leg movement and needs a wheelchair. He/she has long term pain. Legs are in fixed bent positions. He/she has difficulty with toileting. He/she frequently develops infections and pressure sores and becomes extremely unwell.	
P2. Moderate & severe TBI							
Moderate or severe	5 Moderate and severe traumatic brain injury, short term.	Short	Either	S06 except .00 and .02; T90.5	803.1-4; 803.6-9; 804.1-4; 804.6-9 850.2-854	The person has an injury to the head causing an episode of loss of consciousness or confusion for about a day. He/she is extremely unwell. After regaining consciousness, person has frequent headaches, memory problems, difficulty concentrating, dizziness and aggression.	This includes head injury that results in concussion lasting longer than one hour. This could be two hours, a day, a month, or indefinite. Those who regain consciousness (the great majority) will usually have some persisting symptoms, but the range is wide. It is not at all clear that describing an emblematic case with some particular duration of loss of consciousness is a good way to convey the nature of this condition in a lay description. Theo Vos advised (26 Nov 08) changing this category to indicate the less than perfect health that is likely to continue after consciousness is regained. In practice, the state in this sub-acute phase is diverse: some would be best described by each of the next two states. I have used the first of these, based on a guess that this

							is more typical.
Moderate	6 Moderate traumatic brain injury, long term.	Long	Either	S06 except .00-.02; T90.5	803.1-4; 803.6-9; 804.1-4; 804.6-9 850.2-854	After having an injury to the head, the person has frequent headaches, memory problems, difficulty concentrating, dizziness and aggression. The person has episodes of anxiety, extreme mood swings and disordered thinking.	ICD-10-AM S06.00 means Concussion, .01 means Loss of consciousness of unspecified duration and .02 means LOC of brief duration (less than 30 minutes). Hence, the specified code range includes cases with LOC >30min, cases stated to involve TBI.
Severe	7 Severe traumatic brain injury, long term	Long	Either	S06 except .00-.02; T90.5	803.1-4; 803.6-9; 804.1-4; 804.6-9 850.2-854	Following a severe injury to the head this person is unable to function independently even for a day. He/she has problems with feeding, toileting, dressing or walking unassisted. The person has episodes of anxiety, extreme mood swings or disordered thinking.	
P3 Serious burns							Treatment: specialist burns unit
Lower airway burns	8 Lower airway burns, short term	Short	Either	T27.0/1,	947.1	The person has a burn involving his/her lower airway and experiences severe difficulty breathing. He/she feels anxious about the inability to breathe. This person is extremely unwell.	Should we include all T27? Only some data sources will record body area. See notes re T32
≥20% total burned surface area	9 Severe non-airway burn,	Short	Either	T31.2-9	948.2-9	The person has a burn involving more than a fifth of his/her body. Parts of the burned area are very painful and others have lost feeling. This person is extremely unwell.	See notes re T32

	short term						
≥20 % total burned surface area or ≥10 % total burned surface area if head/neck or hands/wrist involved	10 Severe burn, long term	Long	Yes	T31.2-9 or T31.1 with T20/3 or T26	948.2-9 or 948.1 with 940, 941 or 944	The person had a large burn involving more than a fifth of his/her body and is now left with scarring. The scarring interferes with self care such as dressing and toileting. The person has episodes of low mood and anxiety with flashbacks of the burning incident.	This approach only assigns burns as severe if area codes are available (i.e. T31; 948). We will have to use proportional assignment where these codes are not available. See notes re T32 This approach does not explicitly refer to degree/depth of burns. The assumption is that hospitalised large burns will normally be serious.
		Long	No	T31.2-9 or T31.1 with T20/3 or T26	948.2-9 or 948.1 with 940, 941 or 944	The person had a large burn and is now left with severe and disfiguring scarring and some joints that cannot be straightened. The scarring causes difficulty with self care such as dressing and toileting. The person has decreased self esteem, feels socially isolated, and has episodes of low mood and anxiety with flashbacks of the burning incident.	Dressing and toileting have been used as the self care examples here and above as these would be affected if upper or lower limbs were burned (unlike feeding or walking). The 'emblematic' untreated case in the lay description has contractures. Should we state which part of the body was burned and which joints have contractures? That is, of course, relevant to the impact of the condition, but which to choose? And would doing so add to the effectiveness of the lay description?
P4 Frac							Combines former long-term and short term femur

tured Femur							fracture.
Neck of femur	11 Fractured neck of femur, short term fracture	Short	Either	S72.0/1/2	820	The person has fallen and broken a hip bone. He/she has pain at the break and cannot stand or walk. The person is dependant on others for washing, dressing and toileting.	Following discussion with Theo (26 Nov 08) the femur fracture categories were split into short and long term. Surprisingly, the person often has only mild pain. .
	12 Fractured neck of femur fracture, long term (untreated)	Long	No	S72.0/1/2	820	The person fell and broke his/her hip bone, which was not fixed by surgery. The break has not united. The person now bedridden. He/she is depends on others for washing and toileting.	In an attempt to create the 'typical case' the assumption has been made that she has reduced mobility long term. See report on untreated fractures in former soviet union.
	13 Fractured neck of femur fracture, long term (treated)	Long	Yes	S72.0/1/2	820	The person fell and broke a hip bone, which was fixed by surgery. The person now does not go out much because of fear of falling again. He/she is only able to walk short distances, has discomfort when walking, and is less able to look after him/herself than previously.	In an attempt to create the 'typical case' the assumption has been made that she has reduced mobility long term
Part of femu	14 Femur	Sho	Either	S72.3/4/7/8/	821	The person has broken his/her thigh bone through injury. He/she has severe	Includes other specified, unspecified and multiple # femur.

r other than femoral neck	fracture other than femoral neck, short term	rt		9		pain and swelling near the break, and cannot walk.	
	15 Femur fracture other than femoral neck, long term (untreated)	Long	No	S72.3/4/7/8/9	821	The person had an injury that broke his/her thigh bone. This was poorly treated and he/she now has a limp and discomfort when walking.	Treated/long-term is assigned to the treated fractures category.
P5 Severe chest injury							
	16 Severe chest injury, short term	Short	Either	S11.0, S22.4 S22.5, S25, S26, S27, S28, S29.7, T91.4	860, 861, 862, 901, 807.0/1/4/6 but excluding 807.0/1 with 5th digit 1. 874.0/1	The person has a chest injury. He/she has severe pain in the chest. He/she is extremely breathless and anxious and feels light-headed. He/she is extremely unwell.	Open wound of larynx and trachea included here as although not necessarily in the chest person would experience similar symptoms. Single rib fracture and sternal fracture are included in the non-priority section.

	17Severe chest injury, long term	Long	Either	S11.0, S22.4 S22.5, S25, S26, S27, S28, S29.7, T91.4	860, 861, 862, 901, 807.0/1/4/6 but excluding 807.0/1 with 5th digit 1. 874.0/1	The person sustained a serious chest injury that has now healed but he/she continues to be breathless when walking. He/she has episodes of chest discomfort.	It has been changed from 'may experience' to experiences breathlessness in an attempt to create a 'typical case'. However this would really only be the case for heart and lung injuries ie blood vessel injury (which is uncommon) would probably not cause breathlessness on exertion. Reduced endurance has been removed 1) to shorten the lay description, 2) as this is similar to breathlessness 3) as it may be hard to convey.
P6 Abdominal injuries & pelvic organ injury							
	18 Abdominal injuries & pelvic organ injury	Both	Either	S35-S37, S38.1 S39.6, T91.4/5	863-868; 902	The person has severe pain in the abdomen and pelvic region following an injury. He/she feels sick and has intermittent vomiting. He/she is extremely unwell.	T91.4/5 are sequelae of abdominal and pelvic organ injury
P7 Pelvis fractures							

	19 Pelvic fracture, short term	Short	Either	S32.1; S32.3-S32.8 T02.1	808; 805.6/7	The person has a severe injury to the pelvis breaking the bone. He/she has severe pain and cannot walk. The person has swelling and bruising around the pelvis. He/she is extremely unwell.	# sacrum has been included here, because if is part of the pelvic ring (but coccyx (S32.2) has been omitted, due to its lower severity). Often associated with intra abdominal or pelvic organ damage or bleeding (which would place them in P6 above). Probably don't need to split into treated or untreated as if not treated properly then most will die.
	20 Pelvic fracture, long term	Long	Either	S32.1; S32.3-S32.8	808; 805.6/7	Some time ago, the person sustained a broken pelvis. He/she now walks with a limp, has episodes of pain in the back and pelvic region and has discomfort on prolonged sitting. He/she has difficulties with urination.	This is a good candidate for a treated versus not treated split, with definition of treated level 1 trauma hospital. Urinary problems are common. After unstable pelvic fracture 40% will have discomfort on sexual intercourse.

Other health states (i.e. all not included as Priority Injuries)

	Title of state	**Long or short term?**	**Treated**	**ICD-10**	**ICD-9**	**Lay Description**	**Notes**
Burns							
<20% total	21 Minor	Sh	Eith	T31.0;	948.0; 948.1	The person has a burn	Proportional reassignment b/w serious/other if area codes (i.e. T31,

burned surface area without lower airway burns	burns, short term.	ort	er	T31.1 if T27.0/1 not present; or T20-T30 without T31	if 947.1 is not present; or 940-947, 949 if 948 is not available	involving up to one fifth of his/her skin. Parts of the burned area are very painful and others have lost feeling.	948) are not available. See notes re T32
<20% total burned surface area or <10% total burned surface area if head/neck or hands/wrist involved	22 Minor burns, long term.	Long	Either	T31.0; T31.1 if T20 and T23 are not present; or T20-T30 without T31	948.0; 948.1 if 940, 941 and 944 are not present; or 940-947, 949 if 948 is not available	The person had a burn involving up to one fifth of his/her skin that has healed leaving in scarring.	See notes re T32 The more severe cases in this group might have difficulty with self care such as dressing, episodes of low mood or anxiety and flashbacks of the burning incident. The emblematic case in the Lay Description does not mention these on the basis that most cases are less severe. The case chosen for the Lay Description does not involve the face or hands.
Minor TBI							
	23 Minor traumatic brain injury, short term.	Short	Either	S06.00, S06.02	850.0, 850.1	The person has an injury to the head with a short period (less than 1 hour) of confusion or loss of consciousness. After this the	See P2, above, for differences between ICD-9 and ICD-10. This is head injury/concussion of really short duration. Some cases of this type will have additional symptoms, such as dizziness, episodes of aggression, anxiety, mood swings or disordered

						person has episodes of headaches, memory problems, difficulty concentrating.	thinking.
	24 Minor traumatic brain injury, long term.	Long	Either	S06.00, S06.02	850.0, 850.1	After having an injury to the head this person has episodes of headaches, memory problems, and difficulty concentrating.	Some cases of this type will have additional symptoms, such as dizziness, episodes of aggression, anxiety, mood swings or disordered thinking.
Injury to eyes							Severity will be assigned proportionately on the basis of literature. Need to check with blindness envelope team to ensure that divisions match.
Short term	25 Short term injury to eyes	Short	Either	S05, T90.4, T15	870.3/4 871, 950 918.1/2 921.2/3/9 930	The person has an injury to one eye which results in pain and decreased vision in the eye for a period of several days.	Codes include injuries to one or both eyes. Emblematic case involves one, on the basis that unilateral injury is more frequent than bilateral.
Monocular low vision/blindness	26 Long term monocular low vision/blindness from injury	Long	Either	S05, T90.4, T15	870.3/4 871, 950 918.1/2 921.2/3/9 930	The person had an eye injury which has resulted in blindness in the affected eye. He/she has difficulty judging distances.	Note that monocular low vision/blindness is not in the non-injury vision loss categories.
Binocular low vision	27 Long term binocular low	Long	Either	S05, T90.4, T15	870.3/4 871, 950 918.1/	The person had an injury to both eyes which has resulted in	

	vision from injury				2 921.2/ 3/9 930	persistent low vision. He/she has difficulty reading and avoiding obstacles.	
Binocular blindness	28 Long term binocular blindness from injury	Long	Either	S05, T90.4, T15	870.3/4 871, 950 918.1/2 921.2/ 3/9 930	The person has an injury to both eyes resulting in blindness. He/she has difficulty with independent living.	
Injured nerves							
	29 Injured nerves (short term)	Short	Either	S04, S44, S54, S64, S74, S84, S94, T06.2, T11.3, T13.3, T14.4	951, 953-957	The person has an injury to a nerve or nerves. He/she is has reduced movement and feeling in the affected part.	It's difficult to write a lay description as the included nerve injuries cover such a wide variety of locations, severities, etc., which vary a lot in potential impact. Choosing one to be emblematic would be particularly unsatisfactory for this state. ICD codes don't distinguish motor vs sensory, complete vs incomplete, etc.
	30 Injured nerves (long term)	Long	Either	S04, S44, S54, S64, S74, S84, S94, T06.2, T11.3, T13.3, T14.	951, 953-957	The person has a previous injury to a nerve or nerves. He/she has persistent reduced movement and feeling in the affected body part. He/she often injures the affected part, because	Probably a strong treatment effect (microsurgical repair). Difficult to write lay description (see previous). We've mentioned sensory and motor effect in the description, though a particular real case might have one or other or both. One could argue that some should be moved to the Priority list? (e.g. brachial plexus injuries)

				4		it is numb.	
Fractures							Treated (where distinguished) means 'achieved adequate bone alignment'.
Skull fracture	31 Skull fracture	Both	Either	S02.0/1/7/9, T90.2	800 to 801 803.0, 803.5; 804.0, 804.5	The person has an injury to the head which breaks the skull bone, but does not cause significant brain injury. He/she has pain and swelling at the break	Presence of TBI as a priority condition means that this is 'skull # with no or slight TBI'. We should expect that its DW will be higher than that of skull fracture in the previous GBDI study, which included some TBI.
Face bone fracture	32 Face bone fracture	Both	Either	S02.2/3/4/5/6/8	802; 873.63	The person sustains an injury to the face which breaks the cheek bones, the nose and some teeth. The person has swelling and severe pain at the break, and is left with a crooked nose.	Includes all of S02 that is not in skull fracture: cheek bones, nose, mandible and teeth. Can't separate entirely. Although in persons with a nasal fracture, nose likely to be crooked long term.
Vertebral column fracture	33 Vertebral column fracture	Both	Either	S12 S22.0/1, S32.0, T91.1	805.0-5; 805.8-9	The person has an injury to the back which breaks bones in the spine but does not cause spinal cord or nerve injury. He/she has pain at the break.	Presence of SCI as a priority condition means that this is vertebra fracture without SCI. Emblematic case has 'bask' injury; scope of category also includes neck. # sacrum has been put in # pelvis Surprisingly spinal fractures are often not that painful (compared to e.g. rib fractures)
Sternal fracture	34 Sternum fracture	Short	Either	S22.2, S22.3,	807.01, 807.11,	The person has an injury and breaks a rib or the	Fracture of more than 2 ribs is included in severe chest injury. Due to severe pain persons usually need help with dressing or other self

&/or fracture of one rib	or one rib fracture				807.2/3	breast bone. He/she has severe pain in the chest especially when breathing in. The person has difficulty with self care such as dressing.	care whether or not they require hospitalisation. 1-2 Rib and sternal fractures usually will not require operation and usually will heal well.
Clavicle, scapula or humerus fracture	35 Clavicle, scapula or humerus fracture	Both	Either	S42, S49.7	810-812	The person has an injury to the shoulder and upper arm which breaks the bone. He/she has pain and swelling at the break. The person is unable to use his/her arm and has difficulty with self care such as dressing.	Should fractured humerus or elbow disruption be put into a separate category? Clavicle and humerus fractures usually will not require operation and usually will heal well. Scapula fractures are unusual and usually indicate energetic mechanisms and often are associated with other severe injuries (i.e. severe chest trauma or other priority trauma).
Radius or ulna fracture	36 Radius or ulna fracture (short term)	Short	Either	S52, S59.7, T10, T92.1	813	The person has an injury that breaks the forearm bones of one arm. He/she has severe pain at the break and limited forearm movement. He/she requires a cast or operation to keep adequate alignment of bones while they heal.	Adequately treated radius/ulna fracture has not been assigned a separate category ‘long term’ category. This is included in ‘treated fractures’.
	37 Radius or ulna	Lon	No	S52, S59.7,	813	The person broke the bones of one	Dressing rather than eating has been used as the self care example as this is more likely to be a problem in

	fracture (long term)	g		T10, T92.1		forearm and this injury has not healed properly, causing moderate pain in the forearm and stiffness and limited movement in the elbow and wrist joints. This interferes with self care such as dressing.	anyone with reduced range of movement of the elbow or wrist.
Hand & wrist fracture	38 Hand & wrist fracture	Both	Either	S62, S69.7, T92.2	814-817	The person has an injury to the hand or wrist which breaks the bone. He/she needs a cast or operation to ensure alignment of the broken bone. The person has pain and swelling at the break. The break heals leaving some stiffness and a weakened grip.	
Patella, tibia or fibula or ankle fracture	39 Patella, tibia or fibula or ankle fracture (short term)	Sh ort	Either	S82, S89.7, T12.0/1	822, 823, 824	The person has an injury to the ankle, shin or knee which breaks the bone. He/she has severe pain and limited mobility. The person needs a cast or operation to	Tibia/fibula and ankle fractures have been combined.

						ensure adequate alignment of bones	
	40 Patella, tibia or fibula or ankle fracture (long term)	Long	No	S82, S89.7, T12.0/1	822, 823, 824	The person had an injury and broke the ankle, shin or knee bones and it has not healed properly. He/she has moderate pain and stiffness in the knee or ankle joint. He/she has difficulty walking.	Adequately treated ankle fracture has not been assigned a separate category (included in 'treated fractures')
Foot bones fracture	41 Foot bones fracture	Both	Either	S92, S99.7	825, 826	The person has an injury to the foot which breaks the bone. He/she has pain and swelling at the break. The person needs an operation or cast to ensure adequate alignment of bones.	
Other fractures	42 Other fractures	Short	Either	T02 (except T02.1), S32.2, S22.8, S22.9	809; 819; 827-829	After an injury the person had a broken bone, causing pain at the site and restricted use of the affected part of the body.	
Fractures	43 Fractur	Lo	Ye	T02 (exc	809; 819;	The person had a broken	This is a generic category for most fractures, if adequately treated. The

– treated	es – treated	ng	s	ept T02.1), S32.2, S22.8, S22.9	827-829	bone, which has now healed. He/she has minor pain and a lump in the bone at the break site.	lay description refers to minor conditions. We think that this is worth including in the field study, largely to obtain a weight for a rather trivial state.
Amputations							Treatment means: good stump preparation, access to prosthesis with good fit & instruction on its use.
Traumatic amputation of one upper limb through injury	44 Traumatic amputation of one upper limb through injury	Both	Either	S48, S58.0/1/9, S68.3/4/8/9, T11.6	887.0-5	The person loses part or all of one arm through injury. He/she has pain and tingling in his/her absent arm and in the stump. He/she requires help with lifting objects and self care such as cooking. The person has decreased self esteem and episodes of, low mood, severe anxiety and flashbacks of the injury.	Excludes cases limited to digit loss. 'Likely' has been removed in an attempt to create the 'typical case'. Will try to allow for re-attachment of some amputated limbs on a proportional basis.
Traumatic amputation of both upper limbs through injury	45 Untreated traumatic amputation of both upper limbs through injury	Both	No	T05.0/1/2	887.6/7	The person loses part or all of both arms through injury. He/she is fully dependant on other people and needs help with self care such as toileting and eating. He/she has pain and	Treated proportion to be based on service availability. The person does not have access to comfortable prosthesis or has a poor stump.

						tingling in his/her absent arms and in the stumps The person has decreased self esteem and episodes of, low mood, severe anxiety and flashbacks of the injury.	
Traumatic amputation of both upper limbs through injury	46 Treated traumatic amputation of both upper limbs through injury	Both	Yes	T05.0/1/2	887.6/7	The person loses part or all of both arms through injury but has two comfortable prostheses. He/she needs help putting on and taking off the prostheses but is otherwise largely independent. He/she has pain and tingling in his/her absent arms and in the stumps. The person has decreased self esteem and episodes of, low mood, severe anxiety and flashbacks of the injury.	Acquired absence (Z89.1 Z89.2, Z89.3) not included. Include?: T87.0 [Complications of reattached (part of) upper extremity] & also other codes in T87;T92.6 [Sequelae of crushing injury & traumatic amputation of upper limb]
Thumb	47 Traumatic amputation of thumb(s) through	Long	Either	S68.0	885	The person loses one thumb through injury. He/she has severely reduced hand function. The person	Category includes all or part of one or both thumbs; Emblematic case is loss of one thumb.

	injury					requires help with self care such as cooking. He/she has pain and tingling in his/her absent thumb(s) and stump(s).	
Finger(s) (excluding thumb)	48 Traumatic amputation of finger(s) (excluding thumb) through injury	Long	Either	S68.1/2	886	The person has lost part of fingers of one hand through injury. He/she has reduced hand function. He/she has pain and tingling in the absent fingers and stumps.	Separate short term category not included due to the likely dominance of the long term phase in terms of impact. Issues: amputation varies in terms of proportion of digit lost; whether reattachment and its success; number of digits amputated, whether unilateral or bilateral.
Traumatic amputation of one lower limb through injury	49 Untreated traumatic amputation of one lower limb through injury	Both	No	S78, S88, S98.0/3/4, T13.6 T05.6	8960/1 897.0-5	The person loses part of one leg through injury. He/she has pain and tingling in the absent leg and stump. He/she has frequent pressure sores. He/she uses crutches as he/she does not have a comfortable prosthesis. The person has decreased self esteem and episodes of, low mood, severe anxiety and flashbacks of the injury.	This includes amputation of foot, but not amputation limited to toes.
Traumatic	50 Treated	Bot	Ye	S78, S88,	8960/1	The person has lost part or	This includes amputation of foot, but not amputation limited to toes.

amputation of one lower limb through injury	traumatic amputation of one lower limb through injury	h	s	S98.0/3/4, T13.6, T05.6	897.0-5	all of one leg through injury but has a comfortable prosthesis and little limitation of mobility. He/she has pain and tingling in the absent leg and stump. The person has decreased self esteem and episodes of, low mood, severe anxiety and flashbacks of the injury.	
Traumatic amputation of both lower limbs through injury	51 Untreated traumatic amputation of both lower limbs through injury	Both	No	T05.3/4/5	896.2/3 897.6/7	The person loses part or all of both legs through injury. He/she has pain and tingling in his/her absent legs and stumps. He/she has frequent pressure sores. The person has poor mobility as he/she does not have comfortable prostheses. The person has decreased self esteem and episodes of, low mood, severe anxiety and flashbacks of the injury.	ICD-10 codes distinguish between amputation at level of foot and level of leg. This category includes amputation of both legs, one leg and the other foot, and both feet.
Traumatic	52 Treated	Bot	Ye	T05.3/4/	896.2/3	The person loses part or	

amputation of both lower limbs through injury	traumatic amputation of both lower limbs through injury	h	s	5	897.6/7	all of both legs through injury. He/she has minimally reduced mobility as he/she has two comfortable prostheses. He/she has pain in his/her absent legs and stumps. The person has decreased self-esteem and episodes of, low mood, severe anxiety and flashbacks of the injury.	
Dislocations							
Hip	53 Injury related dislocation of hip	Long	Either	S73.0	835	The person has an injury to the hip and the hip comes out of joint. He/she has severe pain in the hip. The person is unable to move his/her leg. It urgently needs to be put back in place. After it is put back, the person walks with a limp and needs a walking stick.	We found evidence for persisting effects of hip dislocation. Takes 2-3 months to heal. May be associated fractures (in which case would be in priority section). May be associated with nerve damage or avascular necrosis of femoral head. (Is this description appropriate for un-treated? Treated? Both?)
Soft-tissue injuries of							

major joints & associated structures							
Shoulder	54 Soft tissue injury of shoulder and associated structures	Long	Either	S43	831, 839.61, 839.71, 840.0/1/2/4	The person injures a shoulder. He/she has pain and reduced movement in the shoulder. He/she has difficulty with self care such as dressing and cooking.	This includes soft-tissue injuries and dislocations of the shoulder girdle and associated structures.
Knee	55 Soft tissue injury of knee and associated structures	Long	Either	S83	836, 844	The person injures a knee. He/she has pain and reduced movement in the knee, which sometimes gives way. He/she needs crutches for walking and has difficulty with self care such as dressing.	This includes soft-tissue injuries and dislocations of the knee joint and associated structures. (Is this description appropriate for un-treated? Treated? Both?)
Other injuries							
Other injuries of muscle and	56 Short term: Other injuries	Short	Either	S03.4/5, S16, S29.0,	832; 840.3/5-9; 841-843;	The person has an injury and strains a muscle and sprains a	ICD version issue: ICD-9 includes sprains and strains of joint capsule and ligament in its 'sprains and strains' categories (840-848). ICD-10 includes most 'sprains and strains' in

tendon (includes sprains and strains and most dislocations (not hip)).	of muscle & tendon (includes sprains & strains & most dislocations (not hip)).			S39.0, S46, S56, S63, S66, S73.1, S76, S83.4/7, S86, S93.4/6, S96, T06.4, T11.5, T13.5, T14.6, T92.5, T93.5	845-848;	tendon. He/she has pain and swelling at the site.	its 'injury of muscle and tendon' categories (Sn6) but <u>excludes</u> sprains and strains of joint capsules and ligaments from these categories, assigning them to its 'Dislocation, sprain and strain of joints and ligaments' categories (Sn3). The Lay Description is not very specific, reflecting the diversity of the conditions included here. needs more work.
	57 Long term: Other injuries of muscle & tendon (includes sprains & strains & most dislocations (not hip)).	Long	Either	S03.4/5, S16, S29.0, S39.0, S43, S46, S56, S63, S66, S73.1, S76, S86, S93.4/6, S96, T06.4, T11.5, T13.	[as above, less codes included in dislocation & soft-tissue injuries of hip, shoulder and knee]		Currently large residual group of soft-tissue injuries. Could make a case to break out: ● whiplash assoc. disorder (S13.4; 847.0), (but is it admitted often enough to be workable, given our likely reliance on hospital admissions data?) ● Achilles tendon rupture (strong treatment effect)

				5, T14.6, T92.5, T93.5			
Open wound	58 Open wound due to injury (short term)	Short	Either	S01, S08, S11.1, S15, S21, S31, S41, S45, S51, S55, S61, S65, S71, S75, S81, S85, S91, S95, T01, T11.1/4, T13.5, T14.6, T90.1, T92.5, T93.5	870.0/1/2/8/9; 872; 873.0-62; 873.64-72; 873.74-9; 874.2-9; 875-884; 890-894	The person has pain from a cut to the skin due to an injury. The person has numbness immediately next to the cut.	Wounds have been left in a single category on the basis that most heal with little residual problem, and so have not been assigned a Long-term category. Open wound of chest/abdomen is included here. If case also has a code for heart or lung or intra-abdominal injury it would be included in priority category. Open wound of larynx and trachea was moved to severe chest injury priority category (although in the neck rather than the thorax) because the person would experience similar symptoms.
Crush injury	59 Crush injury		Either	S07, S17, S38.0/2/3, S47, S57, S67, S77, S87, S97,	925-929	The person sustains a crushing injury, with pain in the crushed part. Surgery may be essential for survival. The condition leaves the person with	Some crush injury is in more specific groups (e.g. pelvic fracture). Should crush injury involving abdomen or pelvis be in priority section (P6)? Difficult, as external genitalia crush probably should not be but then what to do with T04.1? Crushed chest is in severe chest injury

				T04, T14.7, T92.6, T93.6		tingling or decreased feeling immediately in the affected body part.	
Poisoning	60 Poisoning	Both	Either	T36-T65, T96, T97	960-989	The person is exposed to toxic effects of medicines or non-medicinal substances. He/she may experience sleepiness, abnormal heart rhythm, vomiting, pain or bleeding. The person may be extremely unwell.	Numerous and highly diverse. Poisoning medicinal and non-medicinal combined. The Lay Description is for poisoning by a diverse range of substances, and with a wide range of severities. Hence it is framed rather broadly.
Drowning & non-fatal submersion	61 Drowning & non-fatal submersion		Either	T75.1	994.1	The person experiences a drowning incident. He/she feels breathless and anxious. The person has a persistent cough. He/she has recurrent vomits.	In most cases the person recovers with little or no obvious residual effects. Some sustain hypoxic brain injury, the effects of which may be permanent, and can range from trivial to catastrophic. It's hard to come up with an emblematic lay description.
Residue	Other & unspecified injuries						
Other & unspecified injuries	62 Other & unspecified injuries	Both	Either	S03.0-3, S13, S23, S33, S53, S93.1-3,	807.5; 895 830, 833-834, 836-839.59; 839.69	[Broad residual category]	Other cases with first/main/principal diagnosis codes in the injury range. Includes (inter alia): Superficial injuries (Sn0) Amputation of toes S18=decapitation 'other & unspecified injuries' (Sn9) – with some exceptions

				T03, T11.2, T13.2,T14.3, T92.3, T93.3 Sn0, T00, T09, T11.0, T13.0, T14.0, T90.0 T07, S18 T91.2 S98.1/2 Sn9 except: S29.0/7 S39.0/6 S49.7 S59.7 S69.7 S89.7 S99.7 T15-T19 T66-T75.0; T75.	; 839.79-839.9; 869 818 900; 903-924; 931-939; 958-959; 990-994.0; 994.2-994.9 996-999		ICD-9: could assign some of 905-909 (late effects) to other categories. ??include some parts of 995 996-999 is compl. of care nec

				2-T79 T33-T35 T80-T88			

Key
Abbreviations of ICD codes and code ranges: S03.0-3 means S03.0, S03.1, S03.2 or S03.3. S83.4/7 means S83.4 or S83.7. Sn9 means S09, S19, S29, etc to S99. 850.2-854 means all four or five digit categories from 850.2 to 854.

Long or short term: 'Both' means that a single state has been provided for all phases of the condition.

Treated: 'Yes' means received the type and level of treatment specified in the table for the condition. 'No' means any lesser treatment or no treatment. 'Either' means that the treated/not treated distinction has not been applied to the state.

Notes:

1. Further information on many (eventually all) of the states, including references consulted, is given in files that are available at [insert url here].
2. It is not possible to find a perfect balance between number of categories ('few' is good for ease of data finding and analysis) and their specificity & homogeneity ('many' is good, provided they are framed to be more homogenous for burden than broader equivalents).
3. A Lay Description is *not* intended to describe all cases that fit within the conceptual scope of a state. Rather, the description is intended to be emblematic, and to represent a 'typical' case that fits into the state category. This is what we were required to provide to meed the requirements of the field study phase of the project. The task is (of course) impossible to do perfectly, because there is considerable breadth in the scope of all of the states, despite the greater number of subdivisions made in this table than were present in the equivalent list for the previous study. It is especially impossible for the residual category ('other and unspecified'), and also for several categories that refer to a 'nature' of injury that can involve many variations (e.g. poisoning) or parts of the body (e.g. nerve injury). In principal, these problems of heterogeneity can be dealt with by creating more and more specific states. However, the benefits of doing this must be weight against the additional challenges that this will present for data collection (and, to a lesser extent, analysis and reporting).
4. Treatment effect: treatment has much potential to influence the long term burden of fractures, burns, SCI and some other injuries. Availability of treatment differs a lot through the world. With this in mind, we have distinguished 'treated' from 'untreated' for some states. This requires declaration of what is deemed to comprise 'treatment'. This differs between conditions. Considerations were: what aspect or level of treatment has the most difference on long-term state; and the plausibility of being able to estimate % 'treated' (by region, age and sex). In each instance, we handled treatment as a binary state, treated or not. This simplification was made to avoid a blow-out in the number of states too be analysed.
5. Many distinctions that are important for burden cannot be made in terms of ICD codes. Examples are the extent of vision impairment that results from eye injury and whether the injury is bilateral, the how much of a limb or digit has been lost by amputation, whether amputated digits or limbs have been re-attached, and with what success, whether fractures involve one or both arms or legs, etc. Some distinctions can be made using some data sources, but not others. For example, if ICD-10 coded hospital data uses code T31, then we should be able to split burns according to size,

but not all collections include this information. Our only options are to ignore such differences or to try to estimate them based on other information, chiefly literature, and this is what we intend to do.

6. ICD version issues are quite a challenge. Some of the ICD-10 code lists look complicated, but this is largely a consequence of the ICD-9 orientation of the old list of sequelae, on which this one was based. The 'natural' way to frame broad groups in terms of ICD-10 is by body region (e.g. head injury, S00-S09), while the 'natural' way in ICD-9 is by nature of injury (e.g. fractures, 800-804). This should be (and often is) less troublesome for more specific groups, framed in terms of both nature and body part, but sometimes not. For example, injuries of joint capsules and ligaments are grouped with 'sprains and stains' in ICD-9 and with 'dislocations' in ICD-10. This complicates efforts to break out 'important' sub-types of joint and soft-tissue injuries. For example, a case could be made for having a 'knee disruption' category. If we put aside cases involving fractures as part of the disruption, then this could be defined in ICD-10 as S83 (Dislocation, sprain and strain of joints and ligaments of knee). ICD-9 category 836 (Dislocation of knee) has narrower scope, but combined with 844 (Sprains and strains of knee and leg) it has approximately the same scope. However, some sub-categories of 836 distinguish open from closed dislocations. This distinction cannot always be made in ICD-10. The WHO version does not specify a way to do this for S83. The Australian clinical modification allows this, by multiple coding (i.e. by assigning S81.82 to qualify S83). [TBI is a more important instance of version difficulties.] [open/closed is another example]
7. Clinical vs "mortality" versions of ICD-10: A few of the categories as specified in this table require specificity that goes beyond the 'basic' version of ICD-10 (i.e. the version published by the WHO and mainly used to code mortality). The additional specificity is in the clinical modification of ICD-9 (ie ICD-9-CM) and in most, perhaps all, clinical modifications of ICD-10 that have been published. The most important categories affected by this issue are the TBI categories, which use duration of loss of consciousness to separate minor from more important cases.
8. References to T31 also apply to T32. (Both are area measures of burns. In ICD-10 they apply to thermal and chemical burns, respectively. In ICD-10-AM, T31 fills both roles, and T32 is an unused code.) [To do: Check other clinical mods of ICD-10 re use of T32.]
9. Involvement of the airways contributes much to the short term severity of burns, but was not previously mentioned.