

**Statistical Analysis of
Manual Therapists Funded by ACC:

Multiple Profession Claims**

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DRAFT REPORT 1

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Executive Summary

This study forms a in-depth followup to the broad scale market analysis of Scarrott (2009). Data from individual claims for the 2007-2008 financial year were kindly been provided by ACC. For each of the nearly half a million claims, the dataset contains the read code (injury type) and number of visits the claimant made to each of the manual therapy providers (osteopaths, acupuncturists, chiropractors and physiotherapists), general practitioners, radiologists and a general 'other' treatment provider. This report summarises the key results from an exploratory statistical analysis of this claim data.

Key messages:

1. Most claimants (93%) which use any form of manual therapy will use a single manual therapy profession, with only 6% using two professions and less 1% using more than two. This result provides further confidence in the interpretation of the broad scale market analysis of Scarrott (2009), as there is little chance of aberrations in the results due to claimants using multiple manual therapy professions.
2. Osteopaths generally have the fewest number of visits per claim than the three other manual therapy professions, shown by 65% of those claims which use a single manual therapy profession having a 'small' number of visits (1-4), as compared to 46% for physiotherapists, 33% for chiropractors and 31% for acupuncturists. They also have a smaller proportion of claims with an 'extreme' number of visits (17+) at 1% compared to 6-10% for the other manual therapy professions. See Figure 1.6 for details. This result confirms the evidence provided by analysis of other summary statistics of number of visits per claim in Scarrott (2009), given in Figures 1.7.2 and 1.8, the latter of which also takes into account the injury type.
3. There is a notably higher propensity for the number of visits to acupuncturists to be an even numbers of visits, particularly for claims which have a 'high' number of visits (8-16). This high propensity is also noticeable, but less so, for chiropractors, physiotherapists and osteopaths. See Figure 1.1 for details.
4. Acupuncturists, chiropractors and osteopaths (in decreasing order) have a substantially higher proportion of claims with 16 visits than 15 visits. Physiotherapists do not have the same feature in their number of visits per claim distribution. See Figure 1.3.
5. There is a higher propensity for claims which involve two or more types of manual therapy to include acupuncture, compared to what would be expected under random choice. The combination of acupuncturists with physiotherapist and osteopaths seeing the biggest increase over that expected (at roughly 10% of all the two manual therapy claims), followed by acupuncturists with chiropractors which consist about 3% above that expected. It is hypothesised that this could be due to either (i) claimants choosing acupuncture in combination with the other manual therapies due to it being very different form of treatment; or (ii) manual therapists from one profession recommending acupuncture in combination with their therapy. In relation to the latter, it is known that if a manual therapist is trained to provide two types of manual therapy, then one of these will typically be acupuncture. Therefore, the claimants may be using two types of manual therapy, but the treatments could be provided by the same therapist.

6. Of the claimants which use two types of manual therapy, if they have a ‘high’ number of visits (9-16) to an acupuncturist then will also tend to have a ‘high’ number of visits to the other type of manual therapist, compared to the general population. See Figure 2.17 for details. This feature could be due to claimants with serious injuries generally requiring more treatments from multiple providers, or possibly induced by claimants maximising the number of treatments under a single initial claim (upto 16). If the latter is the case, then it is possible the two types of treatment could be provided by the same therapist, as mentioned in previous statement.
7. Overall, of the claimants which use two types of manual therapy including acupuncture, there is a higher propensity for a ‘small’ number of visits to the acupuncturist compared to the general population, especially when the claimant only has a small number of visits to the other type of manual therapy profession. This suggests some claimants are trying out both types of manual therapy provider, but overall having a small to medium total number of visits for the entire treatment episode.
8. It is more likely claimants with spinal related injuries (neck, sacroiliac, lumbar and thoracic) will seek manual therapy (73-89%) compared to other injury types (coccyx, ankle, wrist, elbow and shoulder) at (29-64%). See Figure 1.4 for details.
9. Sacroiliac, lumbar and neck injuries have the highest proportion of claimants seeking more than one type of manual therapy at around 7-8%, closely followed by coccyx, shoulder and thoracic injuries at 6%, with other injury type at 3% or below. See Table 2.2 for details.
10. Claimants with spinal related injuries (neck, sacroiliac, lumbar and thoracic) are much less likely to visit a radiologist than the other injury types (shoulder, ankle, elbow, wrist and coccyx). Claims which only use only physiotherapists for manual therapy are the most likely to involve radiologists in their treatment, across almost all injury types. Of the spinal related injuries, claimants who use only osteopaths for the manual therapy have the lowest proportion of radiologists involved in treatment (at 94-96%), closely followed by chiropractors (at 92-94%) and acupuncturists (at 91-93%). See Figure 1.8 for details.

Chapter 1

Number of Visits Per Claim Analysis

1.1 Introduction

As a follow-up study to the statistical analysis of the manual therapy market funded by the Accident Compensation Commission (ACC) by Scarrott (2009), the Osteopathic Council of New Zealand (OCNZ) commissioned a more detailed investigation of the number of visits “per claim” to each of the treatment providers (manual therapists, general practitioners, radiologists and others) across all relevant injury types. The OCNZ specified the injury types and treatment providers of interest and have provided some directions of interest to the analysis. The results presented are a fair representation of the information in the available data, following an extensive exploratory data analysis.

This report describes the data provided by ACC, analysis techniques and key conclusions. All the analysis results are either included in the main text or in the Appendix for completeness. When discussing the key results a purely statistical interpretation is given, as the background contextual information will be provided in follow-on reports by OCNZ. If further information, clarification or additional results are required for follow-up study then please get in touch with the author at carl.scarrott@statsconsultancy.com.

1.2 Number of Visits Per Claim Data

ACC kindly provided the number of visits (on a per claim basis) to each of the following treatment providers during the financial year 2007-2008:

- Acupuncturists;
- Chiropractors;
- Osteopaths;
- Physiotherapists;
- General Practitioners;
- Radiologists;
- Others (e.g. specialists).

The first four of these professions are the manual therapy providers for the injury types of interest. Each claim is allotted a single ACC read code or injury type given by:

- Read Code S50.. - Ankle sprain;
- Read Code S510. - Coccyx sprain;
- Read Code S520. - Lumbar sprain;
- Read Code S550. - Neck sprain;
- Read Code S561. - Sacroiliac ligament sprain;
- Read Code S570. - Sprain of shoulder and upper arm;
- Read Code S571. - Sprain wrist ligament;
- Read Code S572. - Sprain, elbow joint, radial collateral ligament;
- Read Code S574. - Thoracic sprain.

Despite the 2008-2009 financial year data being available at the time of the data request, it was decided to use the 2007-2008 data for consistency with Scarrott (2009) which also has enabled direct cross-checking of many results.

1.3 Statistical Analysis

The data provided by ACC consists of 439,247 claims from the 2007-2008 financial year. The data were extracted from a single financial year as this will provide sufficient information to draw reliable inferences from the results presented in this report. Where the quantities of interest discussed are based on a relatively small number of claims, this will be explicitly noted in the text of the report.

We will assume in this report that if a claim has been closed then the injury has been remedied and the treatment was successful.

An exploratory statistical analysis of the number of visits per claim data is carried out, using tabular and graphical summaries of the data. A fair and broad collection of aggregations are considered, with only minor directions on possible aggregations provided by OCNZ to ensure fairness. Statistical interpretations of the results are drawn, but no formal statistical testing has been carried out.

Section 1.4 commences the analysis by investigating the distribution of the number of visits across all claims. Section 1.5 considers the number of types of manual therapy used within each claim. Section 1.6 considers whether the number of visits per claim varies according to how many types of manual therapist are visited and by injury type. Section 1.7 finishes the analysis by considering whether treatment by GP and/or radiologist is effected by manual therapy provider and injury type.

1.4 Number of Visits Per Claim

Figure 1.1 shows the distributions of the number of visits per claim, for each of the treatment providers separately. It is worth noting that these distributions need some careful interpretation as they show the “**general population**” of claims in the financial year 2007-2008, which includes those claimants which visit either a single manual therapist or multiple therapists or maybe none at all. However, we will see in Section 1.6 that if claims which only visit a single manual therapist are considered (see Figure 2.2), then the conclusions drawn in this section are reinforced.

In the previous broad scale market analysis by Scarrott (2009) the individual claim data were not available, instead ACC were asked to provide various summary statistics over all claims aggregated over a financial year, injury type and treatment provider basis. However, it is pleasing to observe that the summary statistics presented in the previous report (e.g. Figure 1.7 on page 15 of Scarrott, 2009) provide a reliable representation of the more detailed number of visits per claim distribution presented here in Figure 1.1. However, some additional features in the number of visits per claim can be observed in the more detailed distributions, which will be discussed below.

Before looking at the distributions in finer detail, it is worth looking at the proportion of claims which use each of manual therapists shown in Table 1.2 as this gives perspective as to the proportion of claims considering within each on the manual therapy profession plots in Figure 1.1. The first row of the table is the proportion of claims which have used each manual therapists at least once (but ignoring the information on the actual number of times). These proportions are the same as for ‘number of claims’ in the financial year 2007-2008 in Figure 2.3 of Scarrott (2009). The second row is the proportions of total number of visits per manual therapist profession. These proportions are the same as for the ‘number of visits’ in the financial year 2007-2008 in Figure 2.4 of Scarrott (2009).

	Acupuncturist	Chiropractor	Osteopaths	Physiotherapist
At least one visit	5	15	15	64
Total number of visits	7	20	11	63

Table 1.1: Proportion of all claims which visit each of the four manual therapists. First row is proportion of claims who visited the manual therapist at least once. Second row is proportion of total number of visits.

One of the concerns with interpretation of the results in Scarrott (2009) was the lack of information about how many claimants were trying multiple manual therapy providers. In Section 1.5 we will see that 93% of claims who use a manual therapist at all will use a single provider and in Section 1.6 we show that there are relatively small differences between those claims which use a single provider to those who use more than one. Therefore, we have confirmed the conclusions drawn from the broad scale market analysis in Scarrott (2009) are sound, as there is little chance of any aberrations being induced by the small number of claims which use multiple manual therapists.

Further, notice in Table 1.2 that the proportions of claims who visit each type of manual therapist, when they only visit a single type of manual therapist, are very similar to those

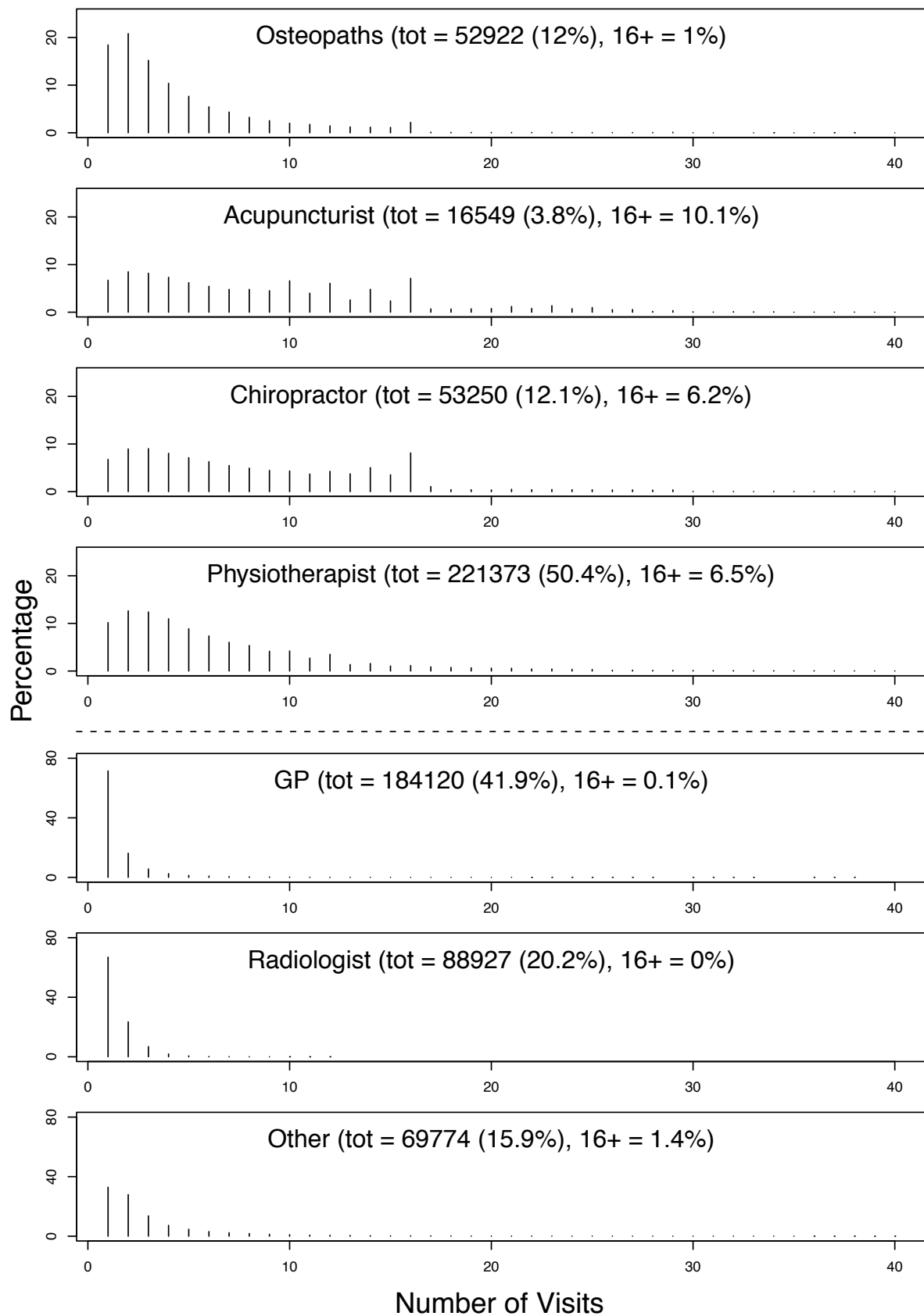


Figure 1.1: Bar chart of proportion of number of visits per claim by profession. All claims considered. A very small number of claims had more than 40 visits to any type of treatment provider so these are ignored. The top 4 charts have the same y-axis scale, as do the bottom 3 charts.

	Acupuncturist	Chiropractor	Osteopaths	Physiotherapist
At least one visit	3	15	14	68
Total number of visits	5	19	10	67

Table 1.2: Proportion of claims (who visit a single manual therapist) which visit each of the four manual therapists. First row is proportion of claims who visited the manual therapist at least once. Second row is proportion of total number of visits.

in the general population in Table 1.1 which includes those who see multiple types of manual therapist. The strongest difference in the tables is the higher propensity for visits to acupuncturists (5 and 7%) in the general population compared to those who see a single manual therapist (3 and 5%) respectively, with a corresponding decrease in the proportions to the other types of manual therapist. Section 1.6 will show that this feature is due to acupuncturists having a higher propensity for being visited when multiple providers are used, than would be expected by random choice.

1.4.1 Which Manual Therapist has Smallest Number of Visits?

Notice in Figure 1.1 that osteopaths have a much smaller percentage of their claims with over 16 visits (just 1%), as compared to the other manual therapists ranging 6.2-10.1% of their claims. As expected from Scarrott (2009) osteopaths have a much higher proportion of claims requiring only a small number of visits. This feature is highlighted in Figure 1.2 which shows the same distribution categorised into bin ranges for the number of visits:

- ‘small’ - 1-4;
- ‘medium’ - 5-8;
- ‘high’ - 9-16;
- ‘extreme’ - 17+.

These descriptors for the bin ranges will be used throughout this report.

Osteopaths have a far higher proportion in the ‘small’ number of visits 1-4 (at 65%), compared to all the other manual therapists (ranging from 31% to 46%). Correspondingly, osteopaths have a far smaller proportion in the high (13% compared to 20-38%) and extreme (1% compared to 6-10%) number of visit categories. This feature is also demonstrated in Section 1.6 when claims which only see a single manual therapist are considered in detail, thus confirming it is not an aberration due to claims which see multiple manual therapists using osteopaths for a small number of visits.

Figure 2.1 further decomposes the binned distribution of number of visits per profession in Figure 1.2 by all injury types. The large blue bars and small red bars for osteopaths highlight the generally small number of visits to osteopaths, compared to the other manual therapist types. There is no clear pattern in how the distribution of the number of visits varies over the different injury types, so this will not be discussed further.

In conclusion, osteopaths generally have a smaller number of visits per claim than other manual therapists.

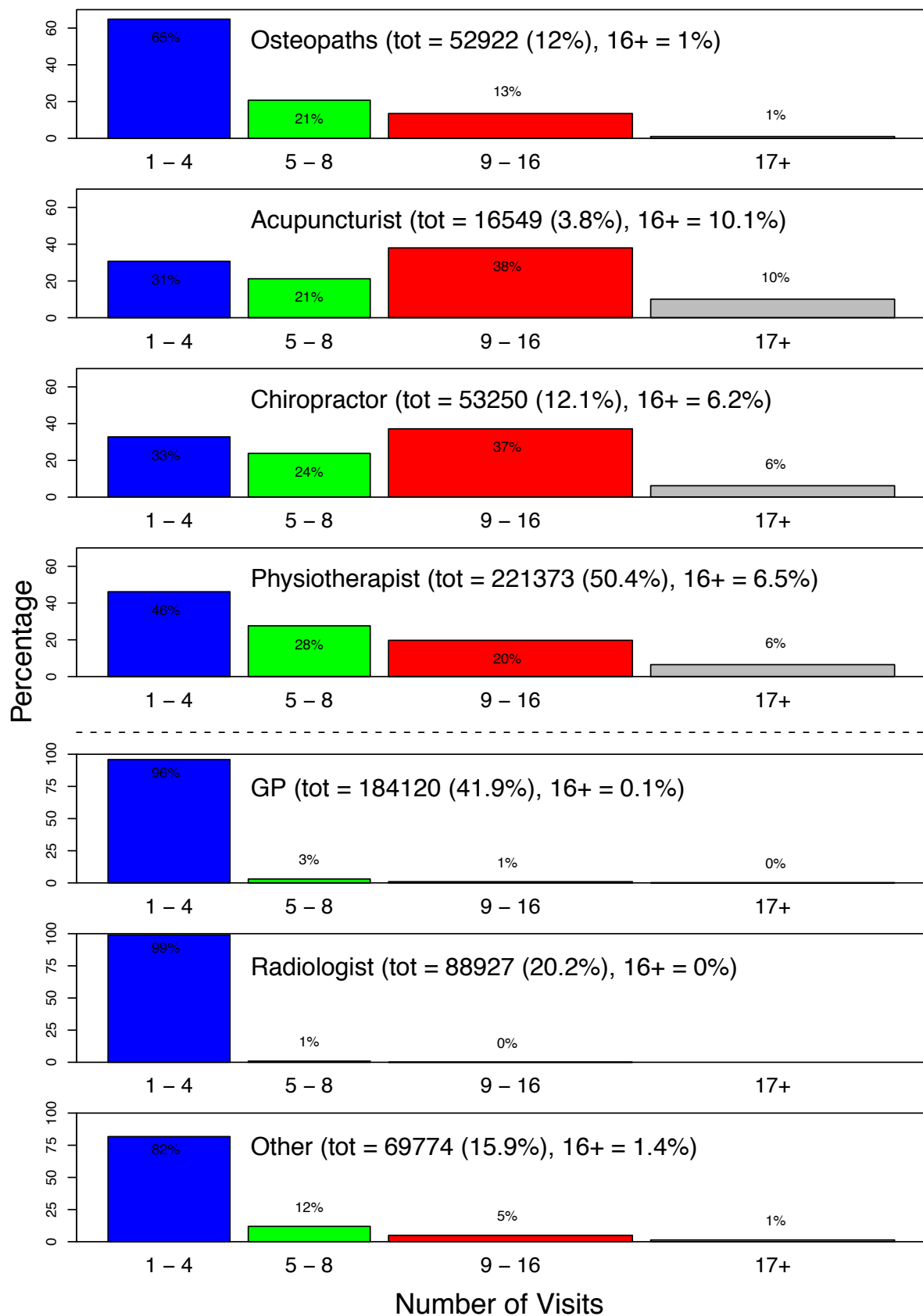


Figure 1.2: Bar chart of proportion of number of visits per claim by profession, grouped into bin ranges. All claims considered. The top 4 charts have the same y-axis scale, as do the bottom 3 charts.

1.4.2 Other Features

All the manual therapy providers have a notable drop in the proportion of claims which have 17 or more visits. This drop is likely due to a limit on the number of the visits (of 16) in the initial ACC claim application. Further visit would require an additional claim form to be completed.

There are a notable peaks in the acupuncturist distribution at even numbers of visits, which is less noticeable for the chiropractor and osteopath distributions and only slightly noticeable in the physiotherapist distribution at 10 and 12 visits.

Of particular note is a peak at exactly 16 visits observable in the distribution for all four types of manual therapist, with varying degrees of severity. Figure 1.3 magnifies the proportions of claims with 15 and 16 visits to each of the four manual therapists. If we consider all claims, physiotherapists do not appear to have a higher propensity for 16 visits over 15. In contrast, acupuncturists have 3 times as many claims with 16 visits compared to 15 visits, similarly chiropractors and osteopaths have roughly twice as many.

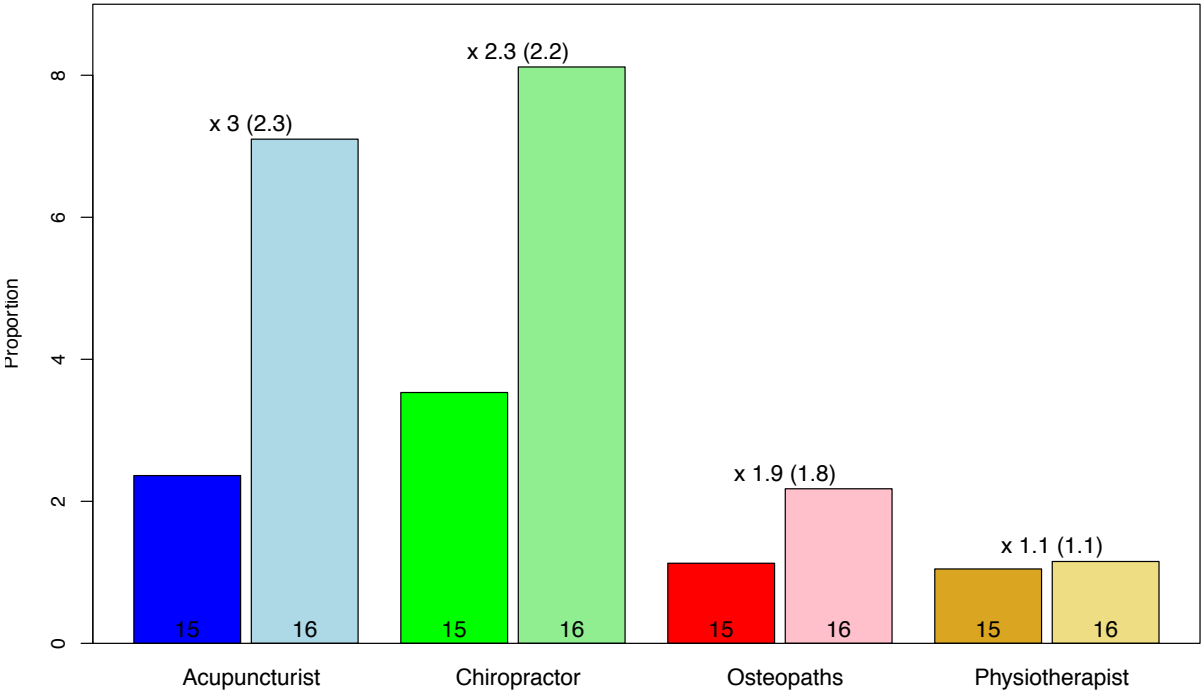


Figure 1.3: Bar chart comparing proportion of claims which had 15 and 16 visits for each of the four manual therapist professions. All claims considered. Number above each pair of bars is ratio of proportion between 16 and 15 visits, with the corresponding ratio for claims which only visited a single manual therapist in brackets.

However, it should be noted that there is a higher propensity for claims which use multiple manual therapists to include acupuncturists in their choice of treatment providers. The larger ratio between 15 and 16 visits for acupuncturists is substantially reduced (from 3 to 2.3) when only claims who use a single manual therapist are considered, as shown by the number in brackets. In fact, the ratio is essentially the same as for chiropractors and osteopaths. The reason for the reduction in the ratio for acupuncturists, appears to be due

to a much larger number of claims using multiple providers than expected which include acupuncturists and, of these, they have a higher propensity for a ‘high’ number of visits which will be discussed in more detail in Section 1.6.

1.5 Number of Manual Therapy Types Per Claim

The proportion of claims which use manual therapists (or not) for each of the different injury types are shown in Figure 1.4 and Table 2.1. The overall proportion of claims who have not seen a manual therapist is 27%. However, there is substantial variation by read code. The majority of wrist (71%) and coccyx (61%) injury claims do not see a manual therapist, and similarly claims for elbow (46%), ankle (44%) and shoulder (36%) injuries do not seek as many manual therapists as often. The majority of sacroiliac (89%) neck (85%), thoracic (80%) and lumbar (79%) injury claims were seen by a manual therapist.

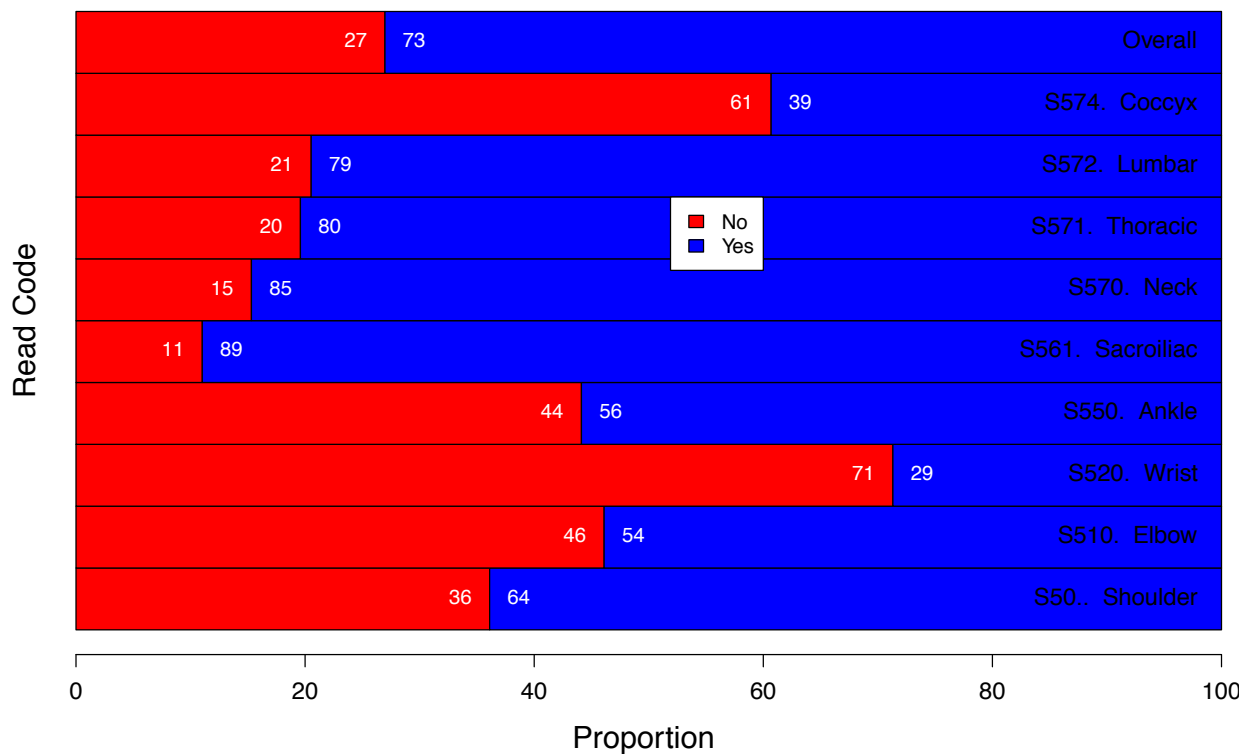


Figure 1.4: Proportion of claims using manual therapy or not classified by injury type.

It is clear from Figure 1.5 and Table 2.2 that the vast majority (93% overall) of claimants see a single manual therapist with overall just 6%, 0.5% and 0.03% seeing two, three and four manual therapists respectively. There is some variation across injury types. Ankle, wrist and elbow injury claims predominantly see a single provider (95-98%), with shoulder, coccyx, thoracic injury claims (93-94%) having a slightly higher proportion of claimants seeing two or more manual therapists. The sacroiliac, lumbar and neck injury claims have the highest proportion of two (5.8-8.4%), three (0.6-0.7%) and four (0.03-0.05%) manual therapists.

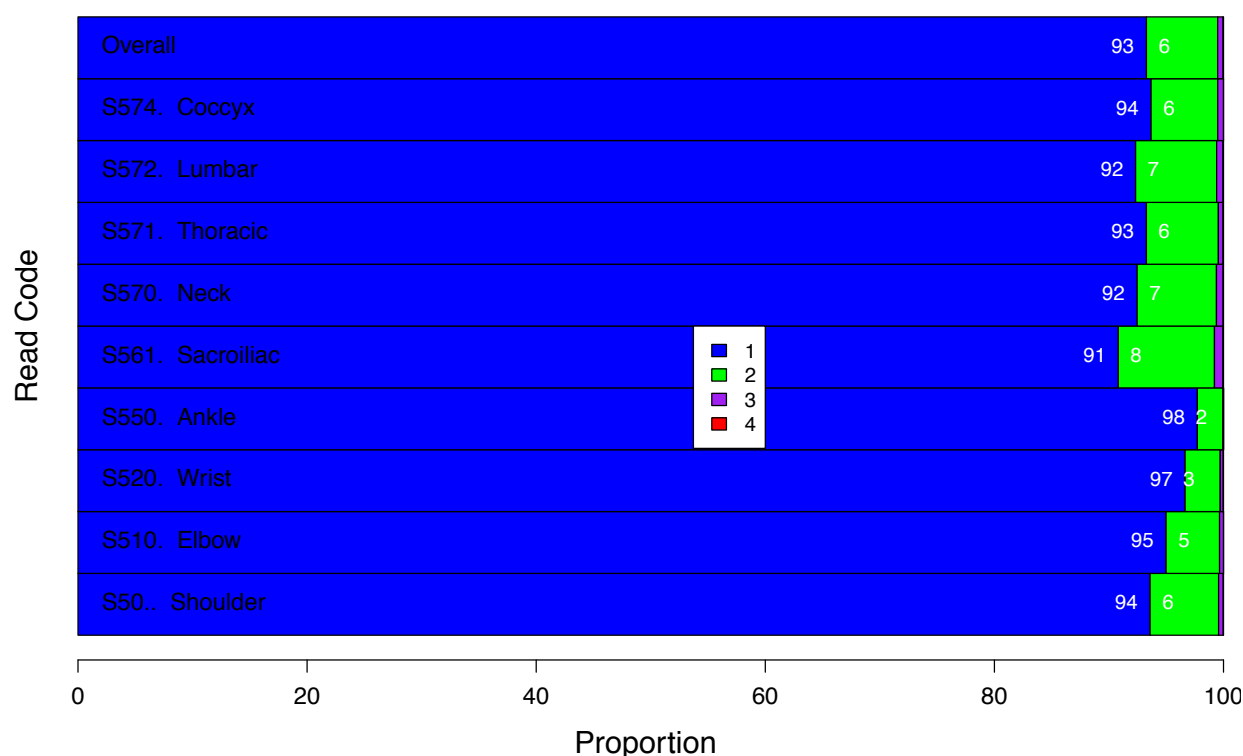


Figure 1.5: Proportion of claims who visit one or more (upto 4) manual therapist professions classified by injury type.

1.5.1 Two Manual Therapists

Table 2.2 showed that overall 93% of claims which visited a manual therapist used a single provider, leaving 6% (19,945), 0.5% (1532) and 0.03% (104) that use two, three and four providers respectively. Table 1.3 gives the difference in the observed proportions who have visited the 6 combinations of two manual therapist providers and what would have been expected if the patients were making a simple random choice. The estimated number of claims represented by the differences in the proportions are obtained from multiplying by them by the number of claims using two manual therapists.

The proportions expected by random choice used probabilities of visiting each type of manual therapist based on the proportions observed for those visiting a single manual therapist in Table 2.2. This table was reproduced with these probabilities replaced by the proportions of claimants within the general population which visited each type of manual therapist, but no substantive difference in the results was obtained.

It is clear that the combinations of physiotherapist with acupuncturist is the most popular paired combination (+9.8%) followed very closely by osteopaths with acupuncturists (+8.5%), with small excesses for chiropractors with acupuncturists (+2.8%) and osteopaths with chiropractors (0.8%). Overall, acupuncturists see a higher propensity of being used in combination with all the other manual therapists, than would have been expected by random choice. Overall, acupuncturists were involved in roughly 4,200 more claims in combination with other manual therapists than would have been expected under random choice.

	Acupuncturist	Chiropractor	Osteopaths	Physiotherapist
Acupuncturist	-	0.03 (559)	0.09 (1698)	0.10 (1960)
Chiropractor	-	-	0.01 (175)	-0.11 (-2141)
Osteopaths	-	-	-	-0.11 (-2250)
Physiotherapist	-	-	-	-

Table 1.3: Difference in proportion of claims observed to visit 6 combinations of pairs of manual therapy providers and expected number if claimants making a random choice. The approximate number of claims these proportion differences correspond to are shown in brackets.

1.5.2 Three Manual Therapists

Similar differences in observed versus expected proportions for the combinations of triplets of manual therapy professions is shown in Table 1.4. Notice that the triplet which excludes acupuncturists has substantially less claims than we would have expected, suggesting that the triplet which include acupuncturists with two of the other manual therapists has a much higher propensity than would have been expected by random choice. Further, the triplets which combine physiotherapists have lost the most claims (29% and 13% for combinations with osteopaths and chiropractors respectively and acupuncturists), whereas the combination which precludes physiotherapists has not lost many claims. These combinations are consistent with what appears to be the non-random choices made by the claimant who use two manual therapy professions above.

Not Acupuncturist	Not Chiropractor	Not Osteopaths	Not Physiotherapist
-0.48 (-737)	0.29 (443)	0.13 (198)	0.06 (96)

Table 1.4: Difference in proportion of claims observed to visit 4 triplet combinations of manual therapy professions and that expected if claimants making a random choice. The approximate number of claims these proportion differences correspond to shown in brackets.

1.6 Number of Visits Detailed Analysis

1.6.1 Number of Visits to a Single Manual Therapist

Figures 1.6 and 2.2 compare the distribution of number of visits within the general population of all claims versus those claimants that use a single manual therapy profession. Note that the claims for a single provider represented in each sub-graph are all different claimants, whereas for the general population some claims (approx 7%) span multiple professions and therefore multiple bar charts.

The most substantial difference in the distributions is for acupuncturists. The proportion of claims which visit the acupuncturists a ‘small’ and ‘medium’ number of times is much less than in the general population, and correspondingly the proportion of claims which visit acupuncturist a ‘high’ and ‘extreme’ number of times is increased. The predominant

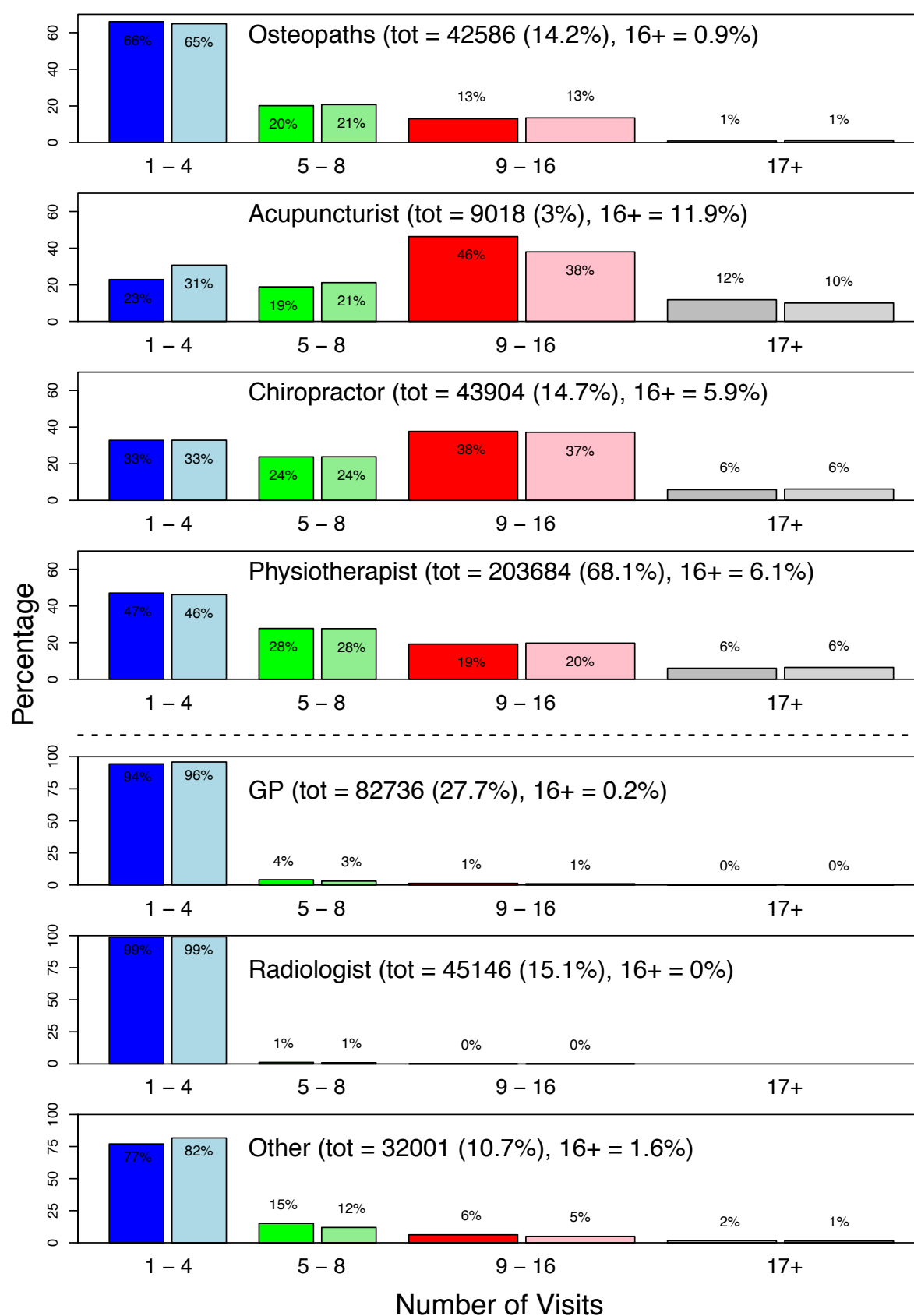


Figure 1.6: Bar chart of proportion of number of visits per claim by profession, grouped into ranges. Claims using a single manual therapist (lefthand bright coloured bars) are compared to all claims (righthand light coloured bars). The top 4 charts have the same y-axis scale, as do the bottom 3 charts.

reason for this difference is, as noted in the previous section, that acupuncturists are more often seen in combination with other manual therapist than expected by random choice, thus causing a difference in the distribution between those in the general population (which includes those seeing multiple providers) and those that see a single provider. The finer details of the impacts are discussed in Section 1.6.3.

1.6.2 Number of Visits to Two Manual Therapists

Figures 1.7 and 2.3 compare the distribution of number of visits within the general population of all claims versus those who use a two or more manual therapy providers. The higher propensity for acupuncturists to be visited in combination with other manual therapists is shown by the difference in distribution amongst the claimants which use two types of manual therapist compared to the general population

Further, notice that the distributions for osteopaths and chiropractors have changed very little. Whereas the distribution for number for visits to physiotherapists has changed substantially. The detailed analysis of why the proportions in some bins for acupuncturists and physiotherapists have gone up whilst others have gone down is discussed in the following section.

1.6.3 Number of Visits to Multiple Manual Therapists in Detail

Section 1.5 showed that acupuncturists are far more likely to be combined with with physiotherapists or osteopaths (and sometimes chiropractors) than all the other possible pairings of two types of manual therapists. In this Section we can explore whether the distribution of the number of visits, for claimants which use exactly two types of manual therapist, change as well. Many subtle changes in the distribution of number of visits will be highlighted, which lead to the difference noted in Section 1.6.2

Analysis by Which Manual Therapist Profession is Not Visited

Figure 2.19 in the Appendix shows the distribution of the number of visits made by claimants who visit exactly two types of manual therapist but **excluding physiotherapist**, i.e. who visit two of: acupuncturists, osteopaths and chiropractors. This distribution is compared to that of the general population of all claims. It is very clear that these claimants have a higher propensity to see acupuncturists for a small number of visits, than would be expected by random choice. This feature is shown by high proportion in the acupuncturist bar chart within the ‘small’ number of visits bin range and the corresponding reduction in the proportion in the ‘high’ number of visits bin range.

This feature is confirmed when we consider the corresponding bar charts of claimants who have visited two manual therapist professions, but not osteopaths and chiropractors in Figures 2.4 and 2.9 respectively. Again there is a higher propensity to visit acupuncturists for a small number of visits. However, we also see a higher propensity to visit physiotherapists for a ‘high’ or ‘extreme’ number of visits and corresponding reduction in the proportion seeing physiotherapists for a ‘small’ number of visits, suggesting these claimants are tending choose to visit physiotherapists for a ‘high’/‘extreme’ number of visits.

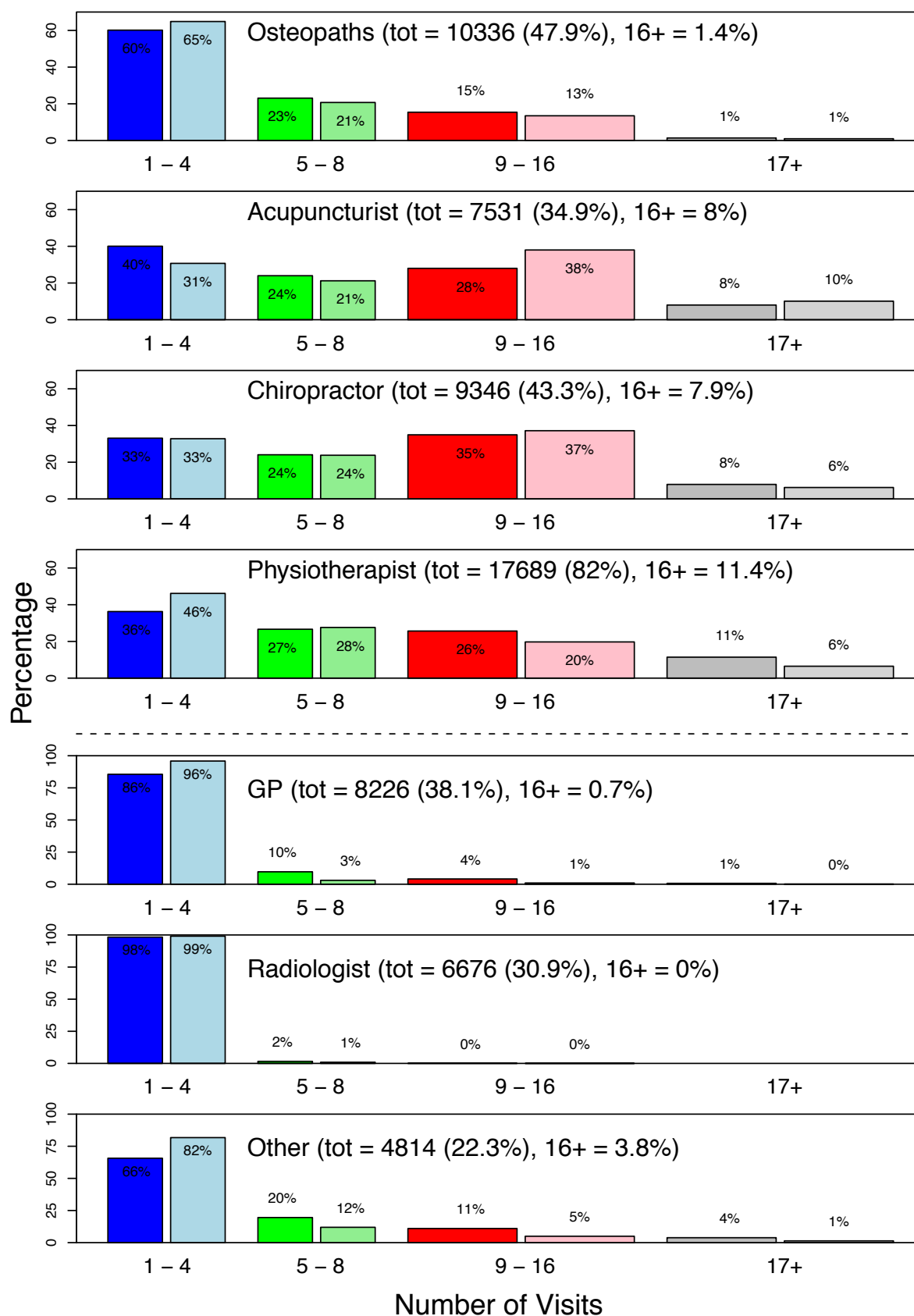


Figure 1.7: Bar chart of proportion of number of visits per claim by profession, grouped into ranges. Claims using a two or more manual therapists (lefthand bright coloured bars) are compared to all claims (righthand light coloured bars). The top 4 charts have the same *y*-axis scale, as do the bottom 3 charts.

Figure 2.14 consider those claimant who use two types of manual therapist but do not visit an acupuncturist. Notice that the proportions with each bin range for the osteopaths and chiropractors are similar to the general population, suggesting those claimants which chose not to visit an acupuncturist are making similar decisions about whether to use osteopaths and chiropractors within their treatments compared to the general population. However, you will note the large proportion within the 'high' and 'extreme' number of visits range for physiotherapists, suggesting these claimants are tending choose to visit physiotherapists for a 'high'/'extreme' number of visits.

Analysis by Each Manual Therapist Visited

The remaining figures in the Appendix show the distribution of the number of visits to the each of treatment providers, conditional on having visited a certain manual therapist profession, within certain a bin ranges for number of visits. For example, Figure 2.5 considers only claimants who have visited an osteopath for a 'small' number of visits and shows the distribution of the number of visits they subsequently made to the other treatment providers, and in particular to their other choice of manual therapist (i.e. acupuncturist, chiropractor or physiotherapist).

Therefore, of the claimants who saw exactly two type of manual therapist including osteopaths for a small number of visits, each one will subsequently only show up once in a bar chart for another manual therapist. There is no overlap of claimants between the other manual therapist bar charts. This lack of overlap simplifies interpretation of the distributions for each manual therapist.

Figures 2.5, 2.6, 2.7 and 2.8 consist claimants who have visited osteopaths as part of their treatment (along with one other manual therapy provider) for varying ranges of number of visits. The top three bar charts show the distribution of the choice the claimants' have made for their other treatment provider and how many visits they have made to them.

The main feature that stands out from all these figures is that claimants who have visited osteopaths have a much higher propensity to visit acupuncturists for a 'small' number of visits, with a much lower propensity to have a 'high' or 'extreme' number of visits to acupuncturists. Notice that the higher propensity to visit acupuncturists for a small number of visits, also magnifies when the patient has also visited an osteopath for a 'small' or 'medium' number of visits. Overall, there is many more claimants than expected who will have both a 'small' to 'medium' number of visits to osteopaths in combination with a 'small' number of visits to acupuncturists.

There appears to be no substantive change in the distribution of chiropractor visits, compared to the general population, for claimants who have also visited an osteopath, providing further confirmation of lack of pattern in patient choice between these two manual therapist professions mentioned in Section 1.5.

However, you will note the large proportion within the 'high' and 'extreme' number of visits range for physiotherapists and correspondingly lower proportion in the 'small' number of visits, which again appears to magnify as the claimants have an increasing number of visits to an osteopath. This feature suggests that those patients which visits an osteopath also tend to visit a physiotherapist for a 'high' or 'extreme' number of visits, and in particular those which see an osteopath for a 'high' number of visit also seem more likely to visit a 'physiotherapist'

for a ‘high’ number. Overall, claimants which see osteopaths for a ‘high’ number of visits are also more likely to visit physiotherapists for a high number of visits compared to random choice, whereas they don’t appear to be more likely to visit chiropractors.

A somewhat different picture arises in Figures 2.10, 2.11, 2.12 and 2.13 which consist claimants who have visited a chiropractor as part of their treatment, along with one other type of manual therapist. When a claimant has had a ‘small’ number of visits to a chiropractor they have a higher propensity to see an acupuncturist for a ‘small’ number of visits (as for osteopaths above). However, once the claimant has a ‘medium’ number of visits to a chiropractor they have a higher propensity for ‘medium’ number of visits to an acupuncturist as well (not observed for osteopaths). Similarly, once the claimant has a ‘high’ number of visits to a chiropractor they also have propensity for a ‘high’ number of visits to an acupuncturist (not observed for osteopaths). It is difficult to draw any conclusions from Figure 2.13 due to the small sample size.

As observed with claimants who visited osteopaths mentioned above, those who visited chiropractors also tended to have a higher propensity to visit physiotherapists for a ‘high’ number of visits. There appears to be no substantive change in the distribution of osteopath visits, compared to the general population, for claimants who have also visited a chiropractor, again confirming the lack of non-random pattern in patient choice between these two manual therapist professions.

Consider the corresponding bar chart for patients who have visited physiotherapists in Figures 2.20, 2.21, 2.22 and 2.23 along with one other type of manual therapist. There appears to be an increased propensity for claimants who have visited physiotherapists a ‘small’ number of times to also visit chiropractors for a ‘small’ number of visits, however no other substantive patterns of claimant choice in relation to number of visits to chiropractors and physiotherapists. In contrast, those claimants which have a ‘high’ or ‘extreme’ number of visits to a physiotherapist had a higher propensity to visit an osteopath for a ‘high’ or ‘extreme’ number of visits. Further, those claimants who visited a physiotherapist for a ‘small’ to ‘high’ number of visits had a higher propensity to visit acupuncturists for a ‘small’ number of visits compared to the general population.

Acupuncturists In Combination with Other Manual Therapists

It is clear from the discussion in Sections 1.6.3 and 1.5 that the higher propensity for acupuncturists to be used in combination with the other manual therapy providers is the main interesting pattern occurring in the claims, where more than one manual therapy profession is visited. Therefore, in this section we will discuss the distribution of number of visits to each of the manual therapy professions in combination with acupuncturists in detail.

In Section 1.5 we observed that claimants had the highest extra propensity to visit acupuncturists in combination with physiotherapists, closely followed by osteopaths and then chiropractors. In the following discussion we will see whether the claimant choice for “number of visits” to each of the providers has changed as well, using Figures 2.15, 2.16, 2.17 and 2.18.

Firstly, it is interesting to note that those patients which have visited an acupuncturist (no matter how many times), tended to have a higher propensity to visit physiotherapists for a ‘high’ and ‘extreme’ number of times compared to the general population. Further, when we

consider claimants who visit a acupuncturist in combination with either osteopaths or chiropractors they also tended to have a higher propensity to visit these profession for a ‘high’ and ‘extreme’ number of times. However, this difference compared to the general population is weakest when they only visit acupuncturists for a ‘small’ number of visits and increase substantially as we move to visit acupuncturist a ‘high’ or ‘extreme’ number of times. This feature suggesting that the higher propensity to visit physiotherapists/osteopaths/chiropractors in combination with acupuncturists, is predominantly claimants who mainly use the former manual therapist profession which is then supplemented with a smaller number of acupuncture visits.

In fact, some of the largest differences between the proportion within each bin range expected within the general population and observed in the group of claimants who use two types of manual therapists including acupuncturists are observed in Figures 2.17, 2.18 and 2.16. In Figures 2.17 the observed proportion having 9-16 visits (close to or equal to maximum on initial ACC claim form) for all three of manual therapy professions, when the claimant is also close to or equal to maximum number of visits for acupuncturists for an initial claim, are much higher than expected in the general population (with differences ranging from 8% for physiotherapist, 16% for chiropractors and 18% for osteopaths. Although not quite as severe, similar differences are observed for claimants who have seen acupuncturists for a ‘medium’ or ‘extreme’ number of visits, although the latter group of claims must be careful interpreted due to the relatively small sample sizes. There appears to be a higher propensity for claimants to be maximising their claim potential under a single initial claim form (for whatever unknown reason) by combining two (or more) manual therapists including acupuncturists, than would be expected by random choice. (!!! Come back to this - double check is this fair?)

1.7 Number of Visits to GP/Radiologists Per Claim

Table 1.5 show the proportion of claimants which have used a general practitioner as part of their treatment. Overall, 42% of claims see a GP. There is substantial variation across the injury types. Claims with sacroiliac (28%) and neck (29%) injuries are least likely to visit a GP (and claim it on ACC) closely followed by those with thoracic (35%) injuries. Elbow (49%), Lumbar (41%) and ankle injuries have a slightly above average (compared to all claims) proportion who visit the GP. Whereas those with shoulder (63%), wrist (61%) and coccyx (67%) much more commonly visit a GP.

Visit GP?	S50.. Shoulder	S510. Elbow	S520. Wrist	S550. Ankle	S561. Sacroiliac	S570. Neck	S571. Thoracic	S572. Lumbar	S574. Coccyx	Overall
Yes	62.8	49.0	61.3	50.5	27.7	29.0	34.7	41.0	66.7	41.9
No	37.2	51.0	38.7	49.5	72.3	71.0	65.3	59.0	33.3	58.1

Table 1.5: Proportion of claims using a GP or not classified by injury type.

The proportions of claims which use radiologists (79.8%) also varies substantially between injury types as we would expect. The claims with thoracic (10%), sacroiliac (10%), neck (12%) and lumbar (13%) injuries rarely include visits to a radiologist. The claims with coccyx (28%) and elbow (29%) visit radiologist slightly above average compared to the

general population, closely followed by shoulder (32%) and ankle (40%) injuries. Claims with wrist injuries (52%) are the most likely to visit a radiologist as part of their treatment.

Visit Rad?	S50.. Shoulder	S510. Elbow	S520. Wrist	S550. Ankle	S561. Sacroiliac	S570. Neck	S571. Thoracic	S572. Lumbar	S574. Coccyx	Overall
Yes	31.9	29.1	51.5	39.8	10.9	11.6	9.6	12.9	27.5	20.2
No	68.1	70.9	48.5	60.2	89.1	88.4	90.4	87.1	72.5	79.8

Table 1.6: Proportion of claims using a radiologist or not classified by injury type.

Figure 1.8 further decomposes the proportion of claims which visit a radiologist by not only injury type, but also manual therapist. Only claims using a single manual therapy provider type are considered so it is possible to determine which manual therapist a claim is to be attributed. Note that although the proportion of claims which visit a radiologist are roughly the same within each injury type across all manual therapists, some interesting patterns emerge.

Claims which use physiotherapists are almost always the most likely to include at least one visit to a radiologist, the only exception being for elbow and wrist injuries for which chiropractor based claims have a very slightly higher likelihood of seeing a radiologist at least once. For neck, sacroiliac, lumbar and thoracic injuries the pattern of proportions which see radiologists is the same for the other three types of manual therapist (in descending order of proportion of claims involving a radiologist): osteopath, chiropractor and acupuncturist. A similar pattern is observed for injuries involving coccyx injuries, though all four manual therapist are much more spread in terms of the proportion of claims which involve radiologists.

The patterns are a little more mixed for shoulder, elbow, wrist and ankle injuries. For these injury types, osteopath and acupuncturist related claims have the lowest proportion of claims including radiologist visits followed, by either chiropractors or physiotherapists.

1.8 References

Scarrott, C.J. (2009). Statistical Analysis of Manual Therapists Funded by ACC: Market Analysis by Provider and Injury Type with Trend Analysis. Technical report to Osteopathic Council of New Zealand.

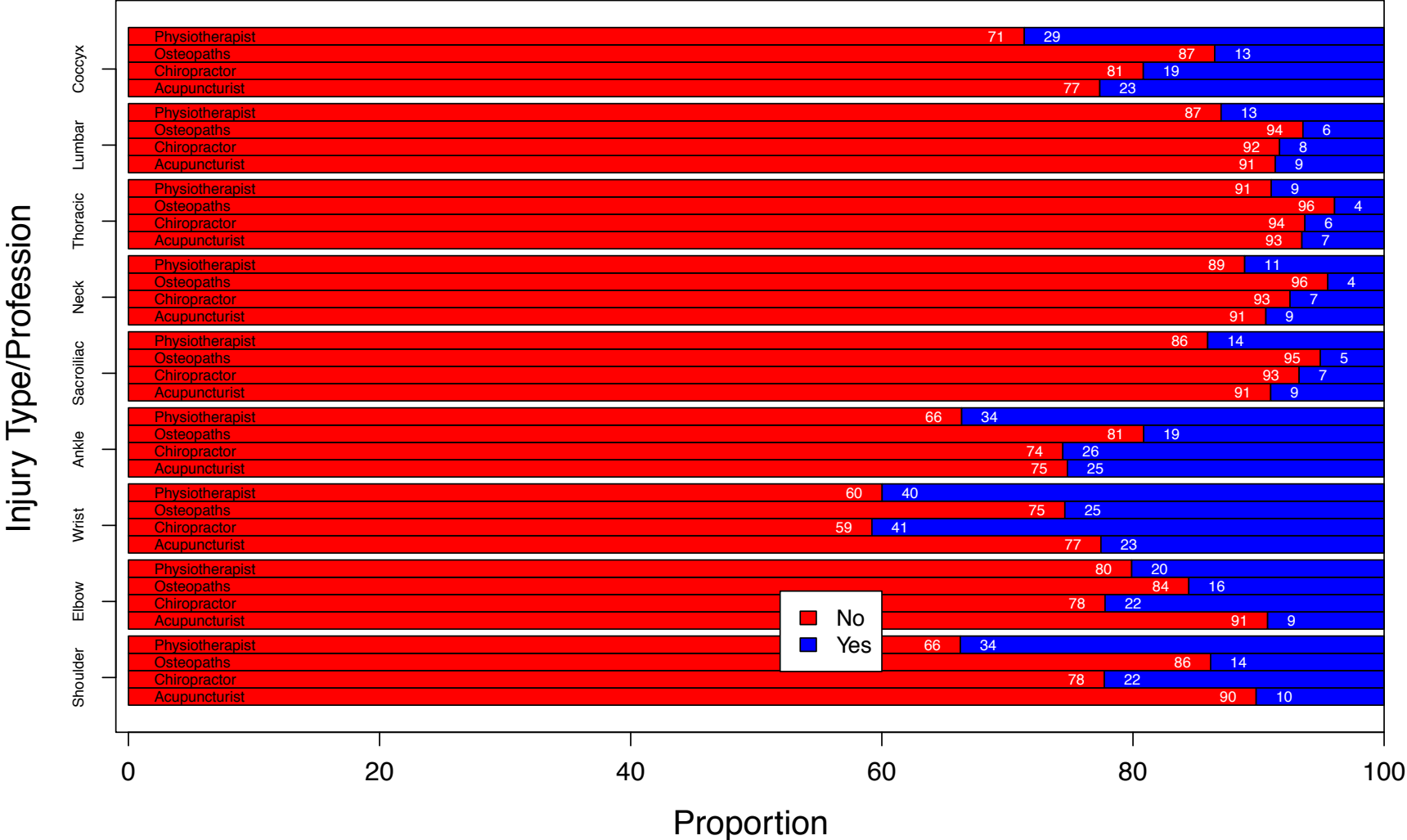


Figure 1.8: Bar plot of proportion of claims who visit a radiologist by profession and injury type. Only claims using a single manual therapist are considered.

Chapter 2

Appendix: Multiple Provider Claim Analysis

	S50.. Shoulder	S510. Elbow	S520. Wrist	S550. Ankle	S561. Sacroiliac	S570. Neck	S571. Thoracic	S572. Lumbar	S574. Coccyx	Overall
No	36.1	46.1	71.3	44.1	11.0	15.3	19.6	20.5	60.7	27.0
Yes	63.9	53.9	28.7	55.9	89.0	84.7	80.4	79.5	39.3	73.0

Table 2.1: Proportion of claims using manual therapy or not classified by injury type.

	S50.. Shoulder	S510. Elbow	S520. Wrist	S550. Ankle	S561. Sacroiliac	S570. Neck	S571. Thoracic	S572. Lumbar	S574. Coccyx	Overall
1	93.6	95.0	96.6	97.7	90.8	92.5	93.3	92.3	93.7	93.3
2	6.0	4.7	3.1	2.2	8.4	6.9	6.3	7.1	5.8	6.2
3	0.4	0.3	0.3	0.1	0.7	0.6	0.4	0.6	0.5	0.5
4	0.02	0	0.2	0.003	0.05	0.03	0.04	0.04	0	0.03

Table 2.2: Proportion of claims who visit one or more (upto 4) manual therapist profession classified by injury type.

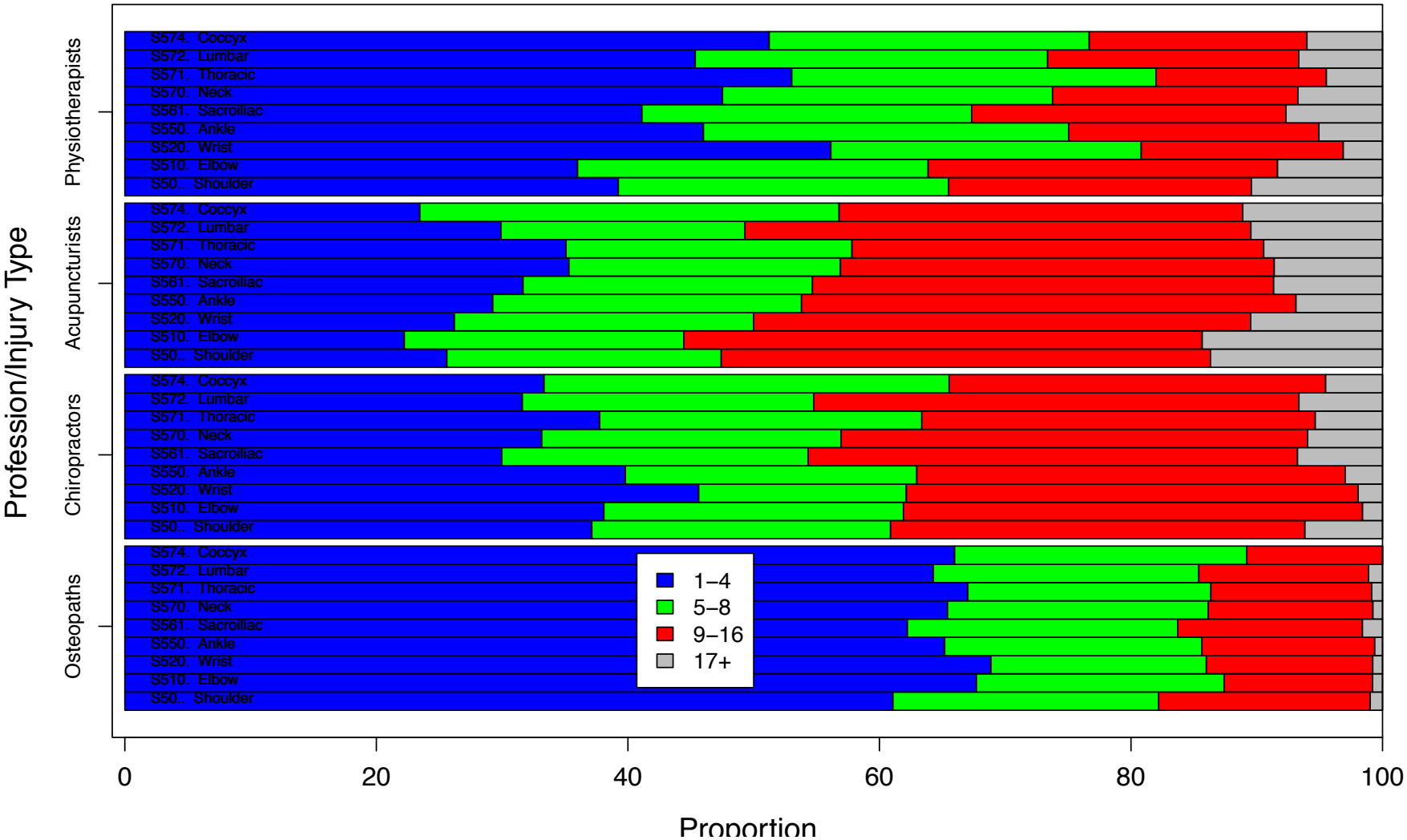


Figure 2.1: Bar plot of proportion of number of visits per claim by profession and injury type, grouped into ranges. All claims considered.
Osteopathic Council NZ Technical Report

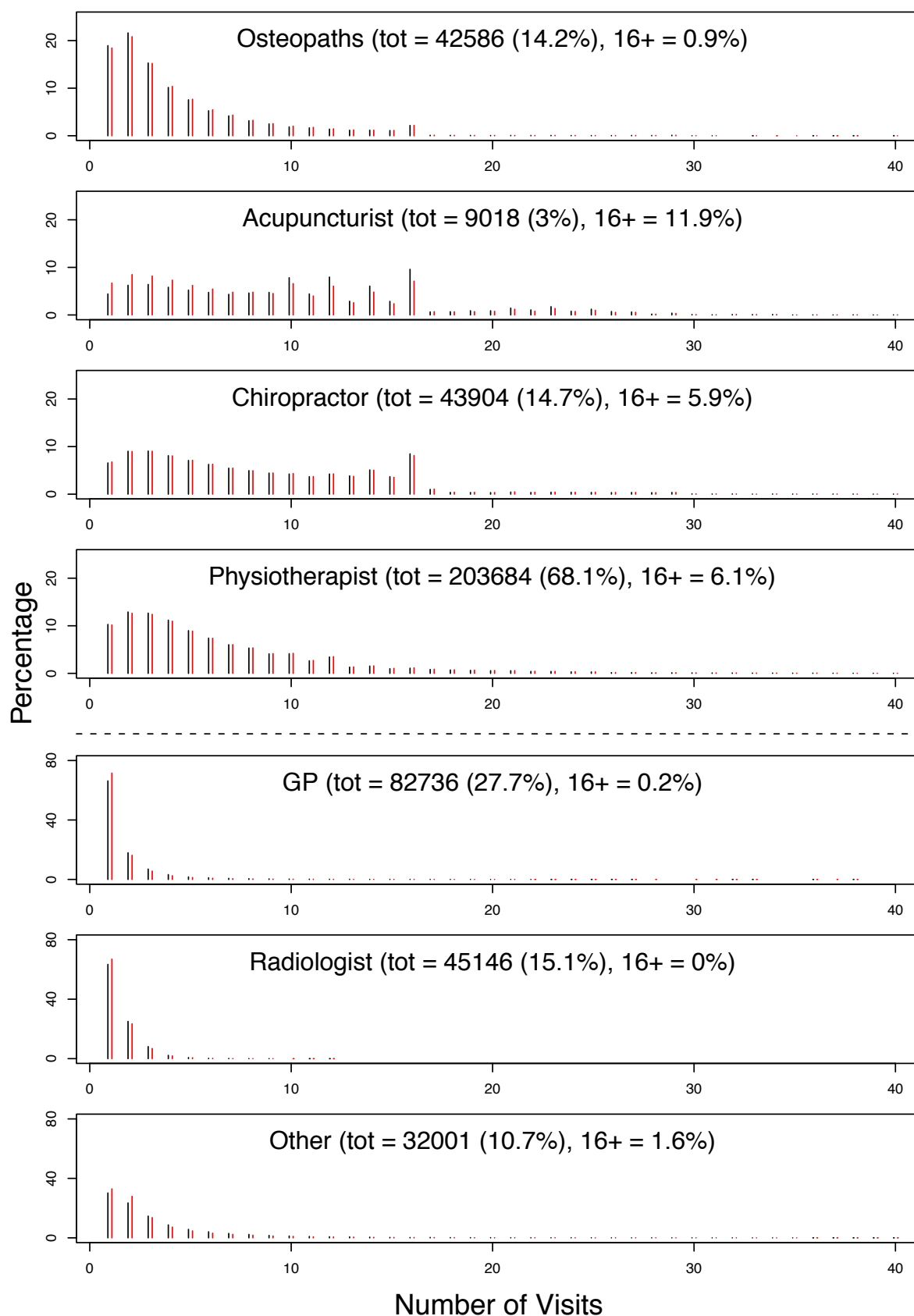


Figure 2.2: Bar chart of proportion of number of visits per claim by profession. Claims using a single manual therapist (lefthand black lines) are compared to all claims (righthand red lines). The top 4 charts have the same y-axis scale, as do the bottom 3 charts.

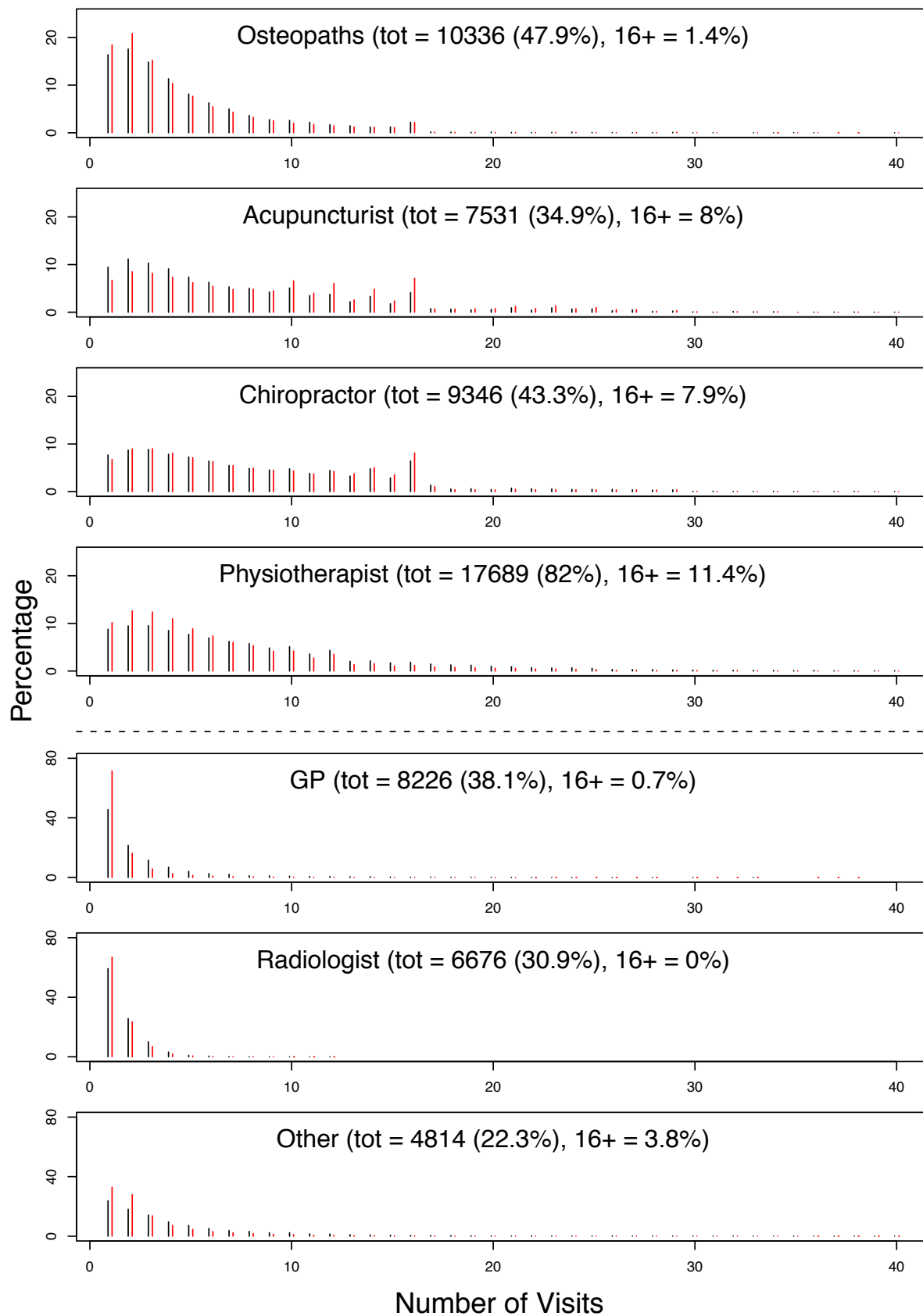


Figure 2.3: Bar of proportion chart of number of visits per claim by profession. Claims using two or more manual therapists (lefthand black lines) are compared to all claims (righthand red lines). The top 4 charts have the same y-axis scale, as do the bottom 3 charts.

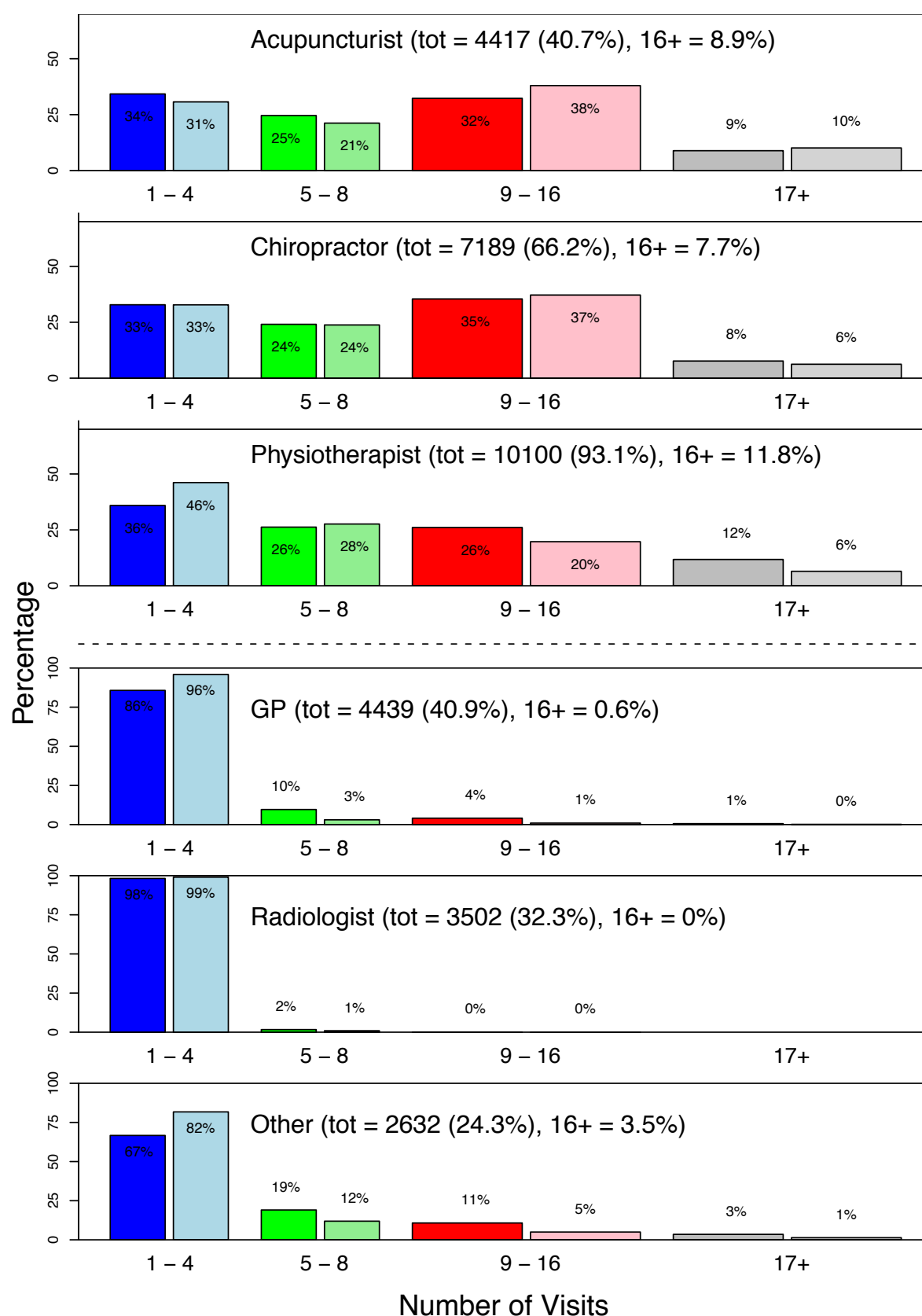


Figure 2.4: Bar chart of proportion of number of visits per claim by profession. Claims using exactly two manual therapists and have not seen an Osteopath (lefthand bright coloured bars) are compared to all claims (righthand light coloured bars). The top 3 charts have the same y-axis scale, as do the bottom 3 charts.

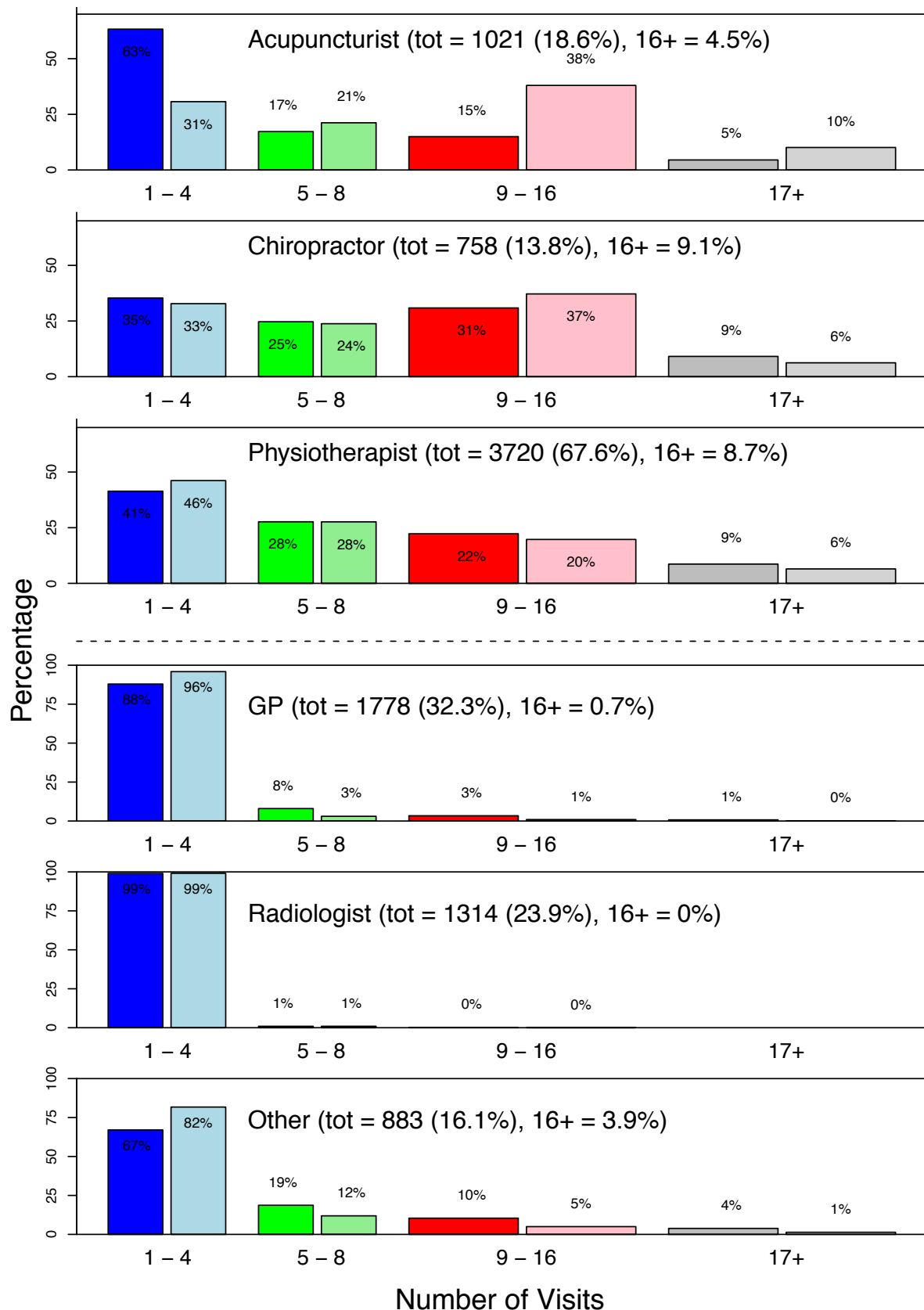


Figure 2.5: Bar chart of proportion of number of visits per claim by profession. Claims using exactly two manual therapists including seeing an Osteopath for 1-4 visits (lefthand bright coloured bars) are compared to all claims (righthand light coloured bars). The top 3 charts have the same y-axis scale, as do the bottom 3 charts.

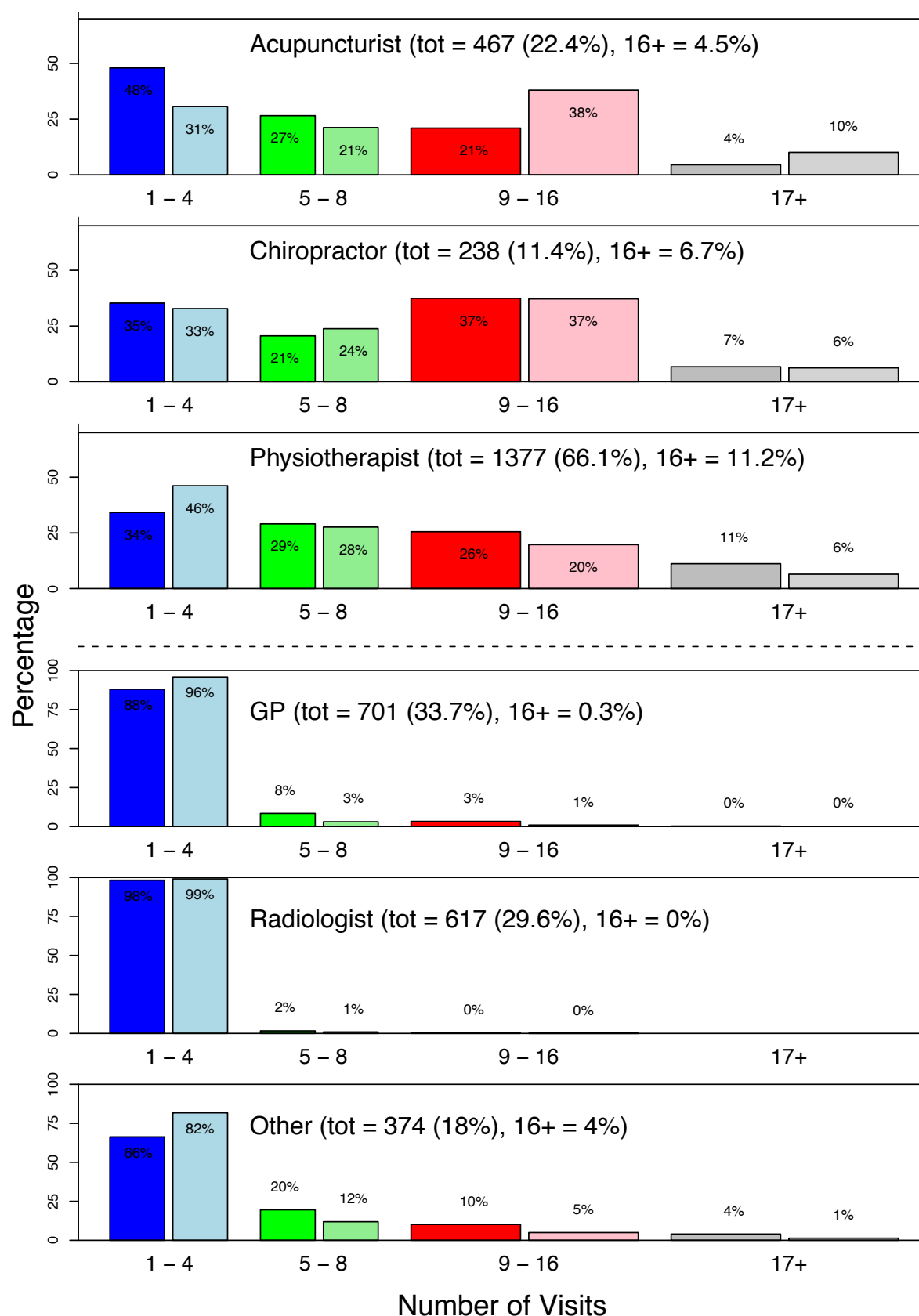


Figure 2.6: Bar chart of proportion of number of visits per claim by profession. Claims using exactly two manual therapists including seeing an Osteopath for 5-8 visits (lefthand bright coloured bars) are compared to all claims (righthand light coloured bars). The top 3 charts have the same y-axis scale, as do the bottom 3 charts.

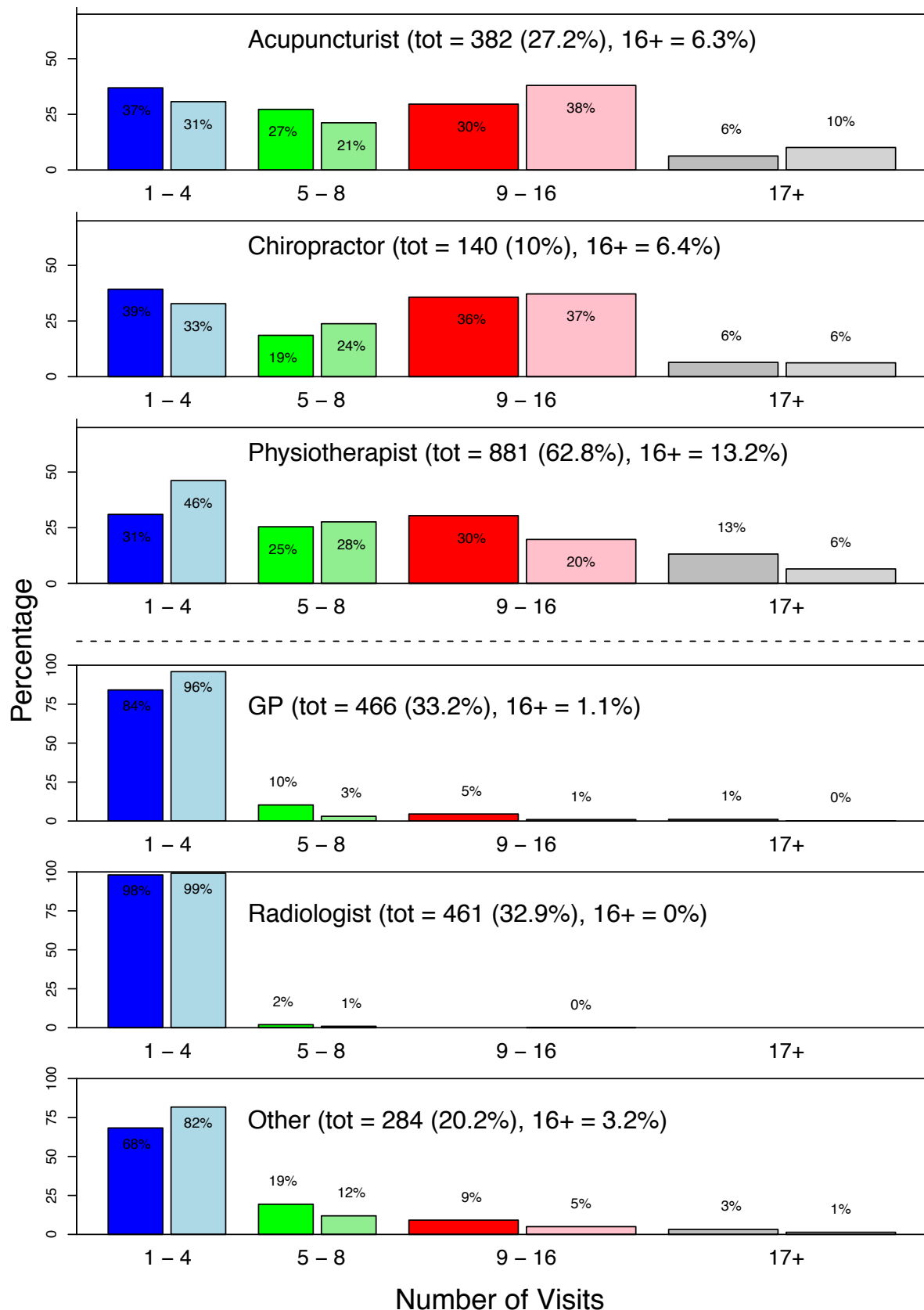


Figure 2.7: Bar chart of proportion of number of visits per claim by profession. Claims using exactly two manual therapists including seeing an Osteopath for 9-16 visits (lefthand bright coloured bars) are compared to all claims (righthand light coloured bars). The top 3 charts have the same y-axis scale, as do the bottom 3 charts.

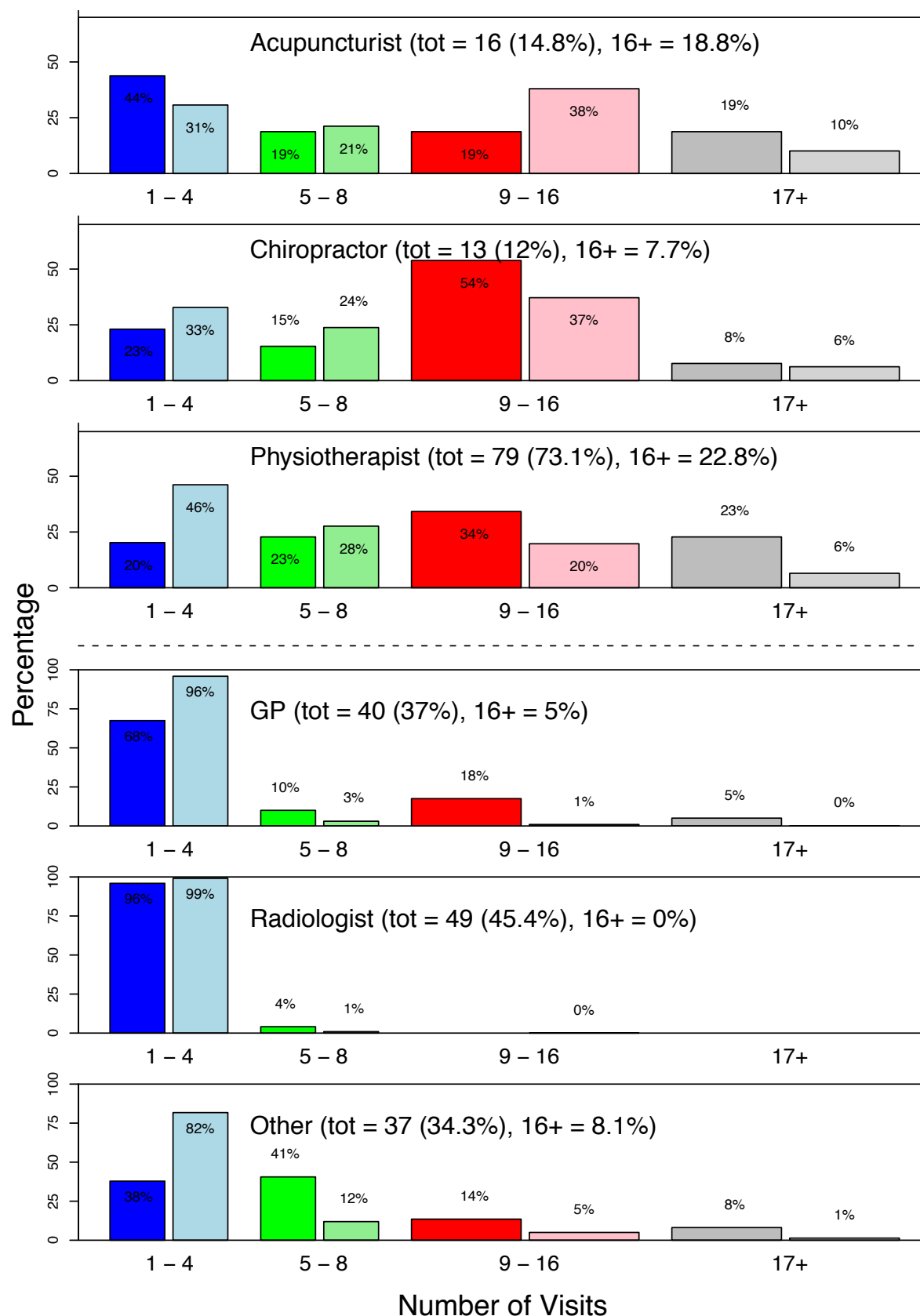


Figure 2.8: Bar chart of proportion of number of visits per claim by profession. Claims using exactly two manual therapists including seeing an Osteopath for 17 or more visits (lefthand bright coloured bars) are compared to all claims (righthand light coloured bars). The top 3 charts have the same y-axis scale, as do the bottom 3 charts.

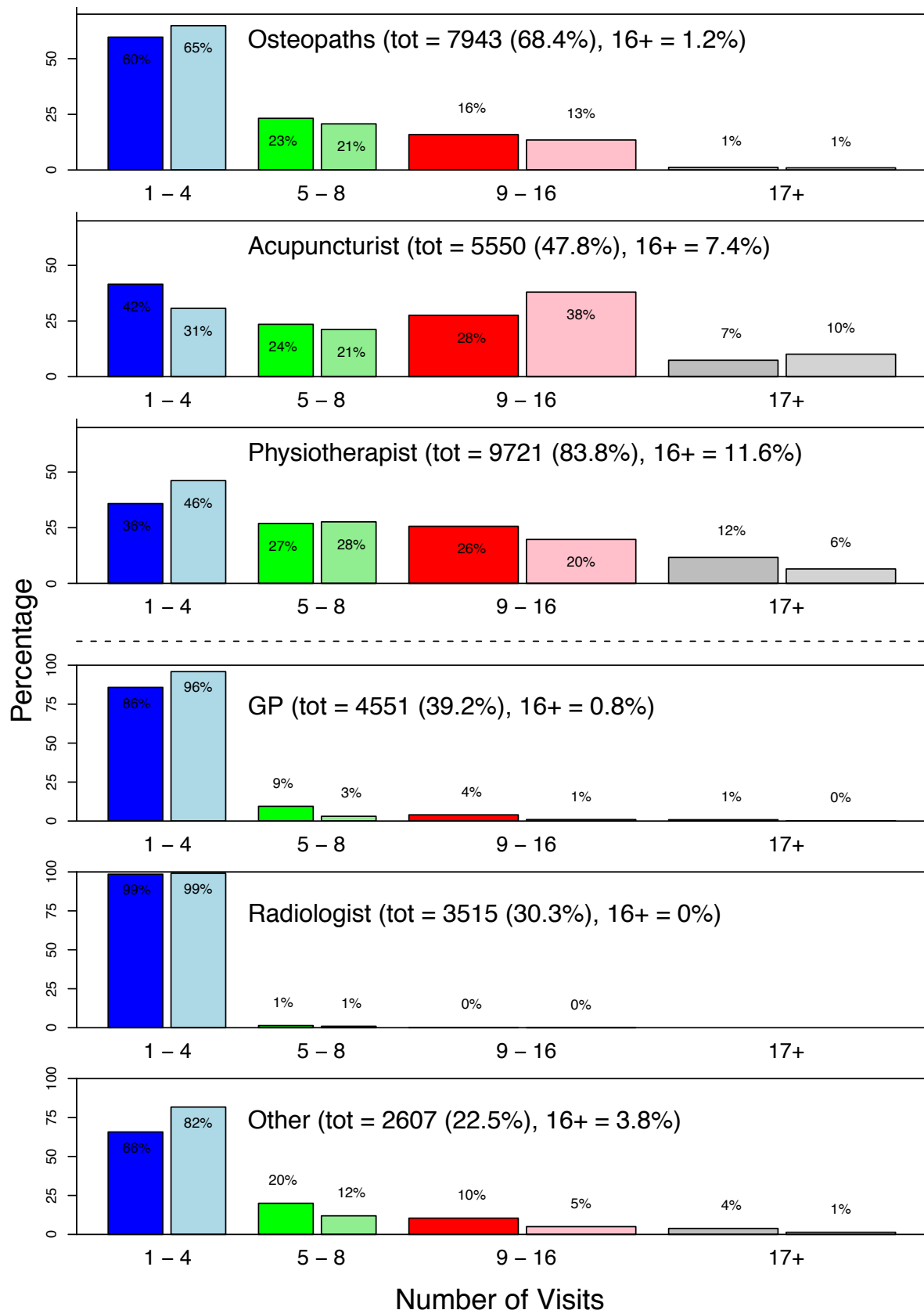


Figure 2.9: Bar chart of proportion of number of visits per claim by profession. Claims using exactly two manual therapists and have not seen an Chiropractor (lefthand bright coloured bars) are compared to all claims (righthand light coloured bars). The top 3 charts have the same y-axis scale, as do the bottom 3 charts.

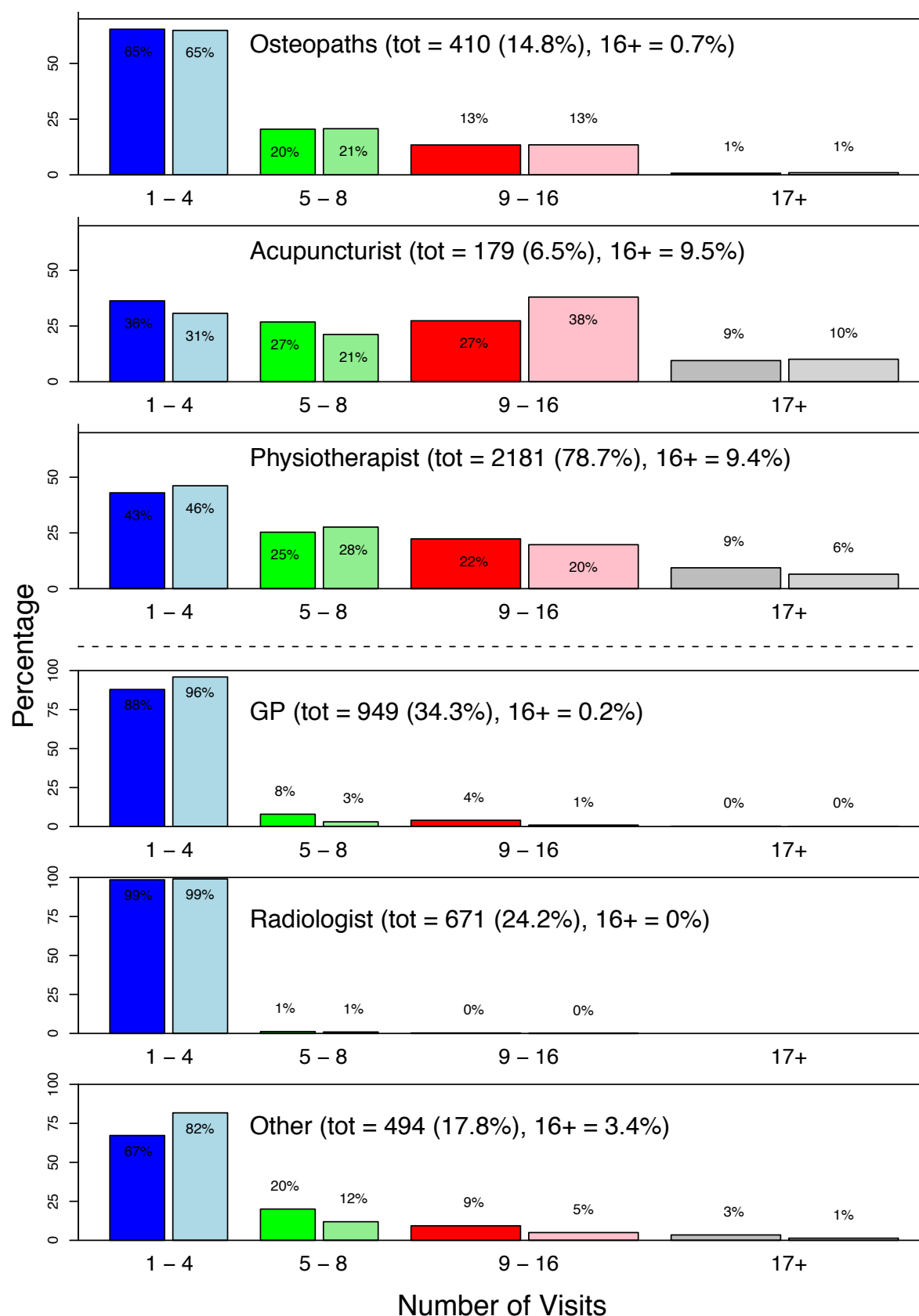


Figure 2.10: Bar chart of proportion of number of visits per claim by profession. Claims using exactly two manual therapists including seeing an Chiropractor for 1-4 visits (lefthand bright coloured bars) are compared to all claims (righthand light coloured bars). The top 3 charts have the same y-axis scale, as do the bottom 3 charts.

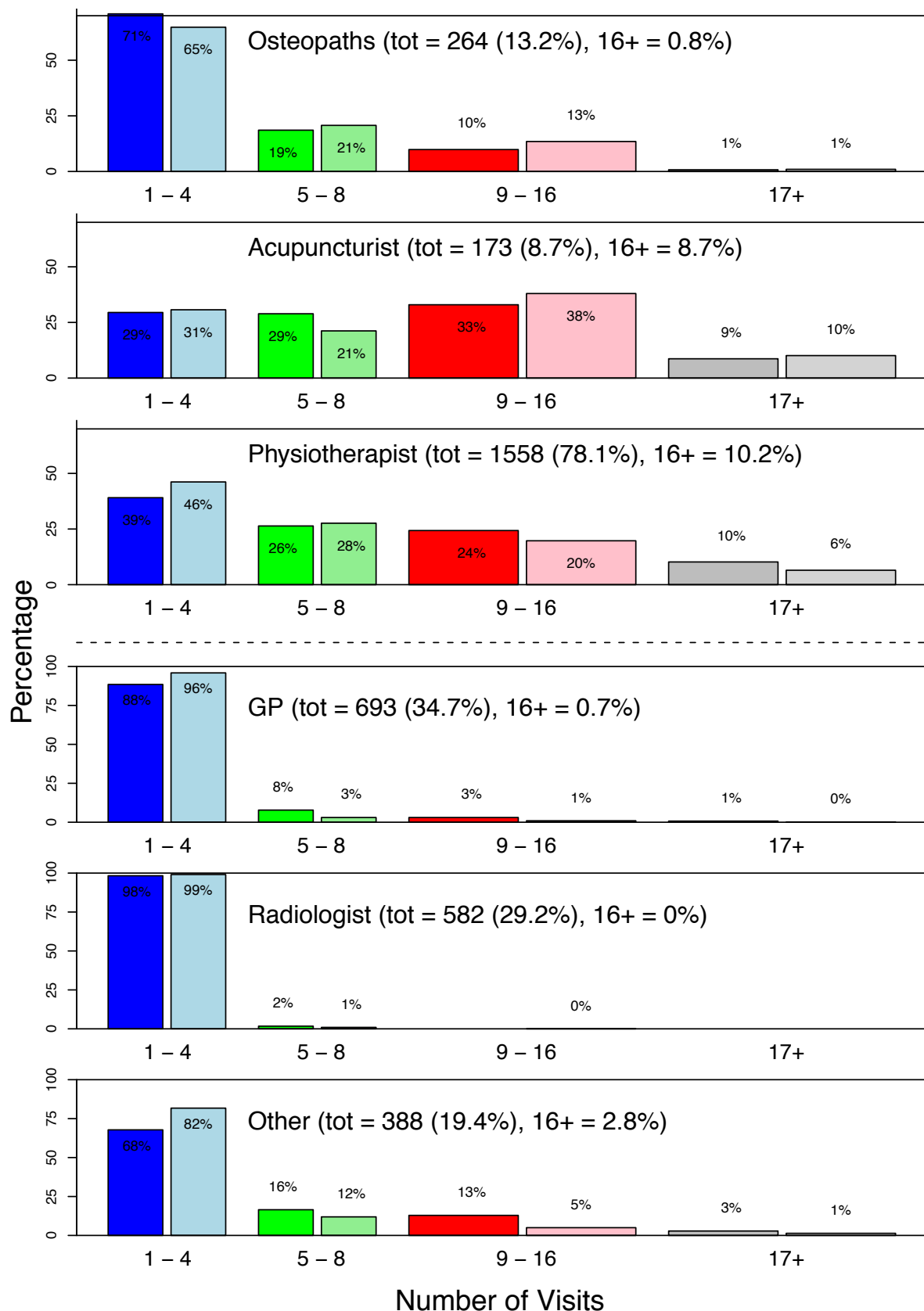


Figure 2.11: Bar chart of proportion of number of visits per claim by profession. Claims using exactly two manual therapists including seeing an Chiropractor for 5-8 visits (lefthand bright coloured bars) are compared to all claims (righthand light coloured bars). The top 3 charts have the same y-axis scale, as do the bottom 3 charts.

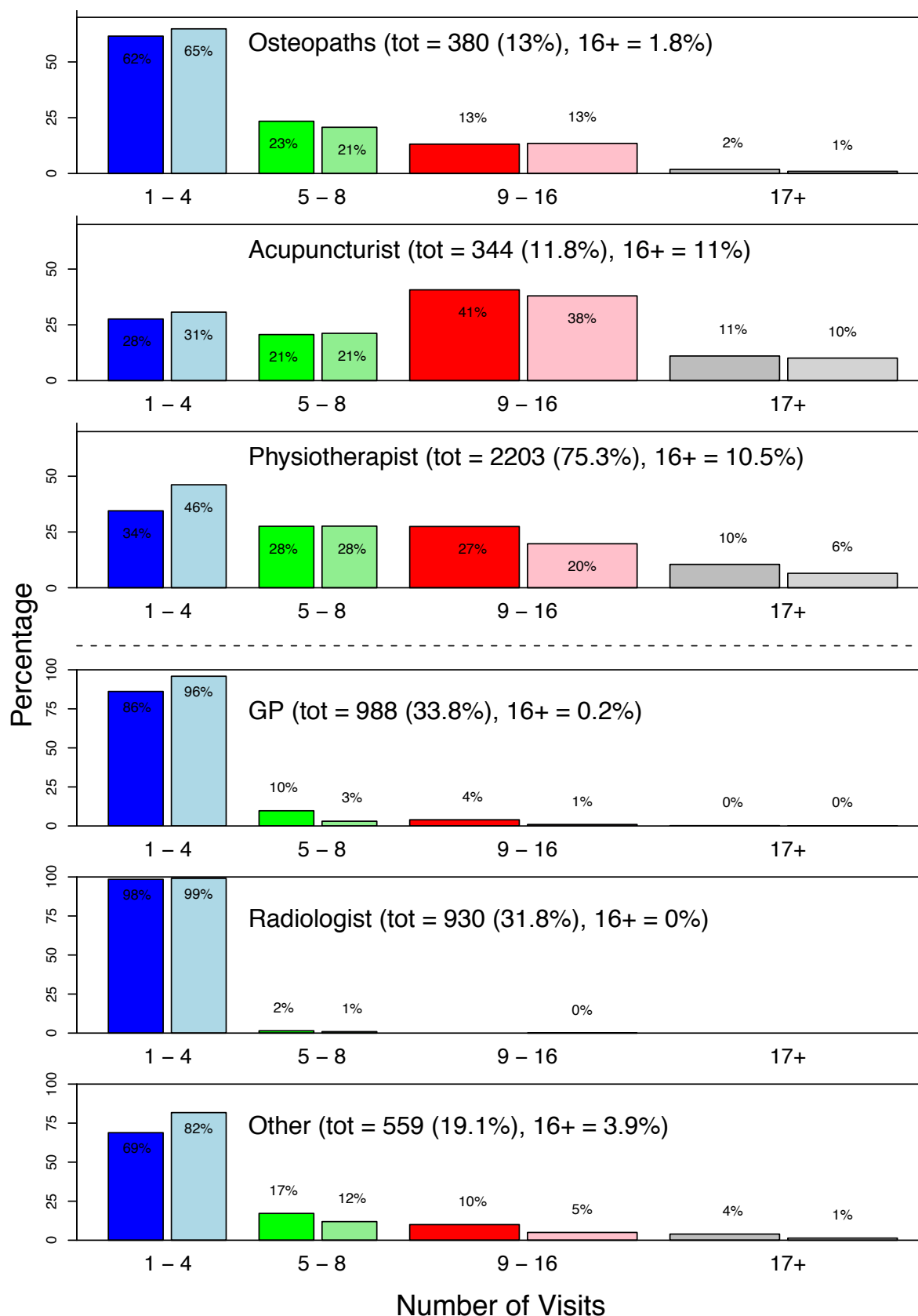


Figure 2.12: Bar chart of proportion of number of visits per claim by profession. Claims using exactly two manual therapists including seeing an Chiropractor for 9-16 visits (lefthand bright coloured bars) are compared to all claims (righthand light coloured bars). The top 3 charts have the same y-axis scale, as do the bottom 3 charts.

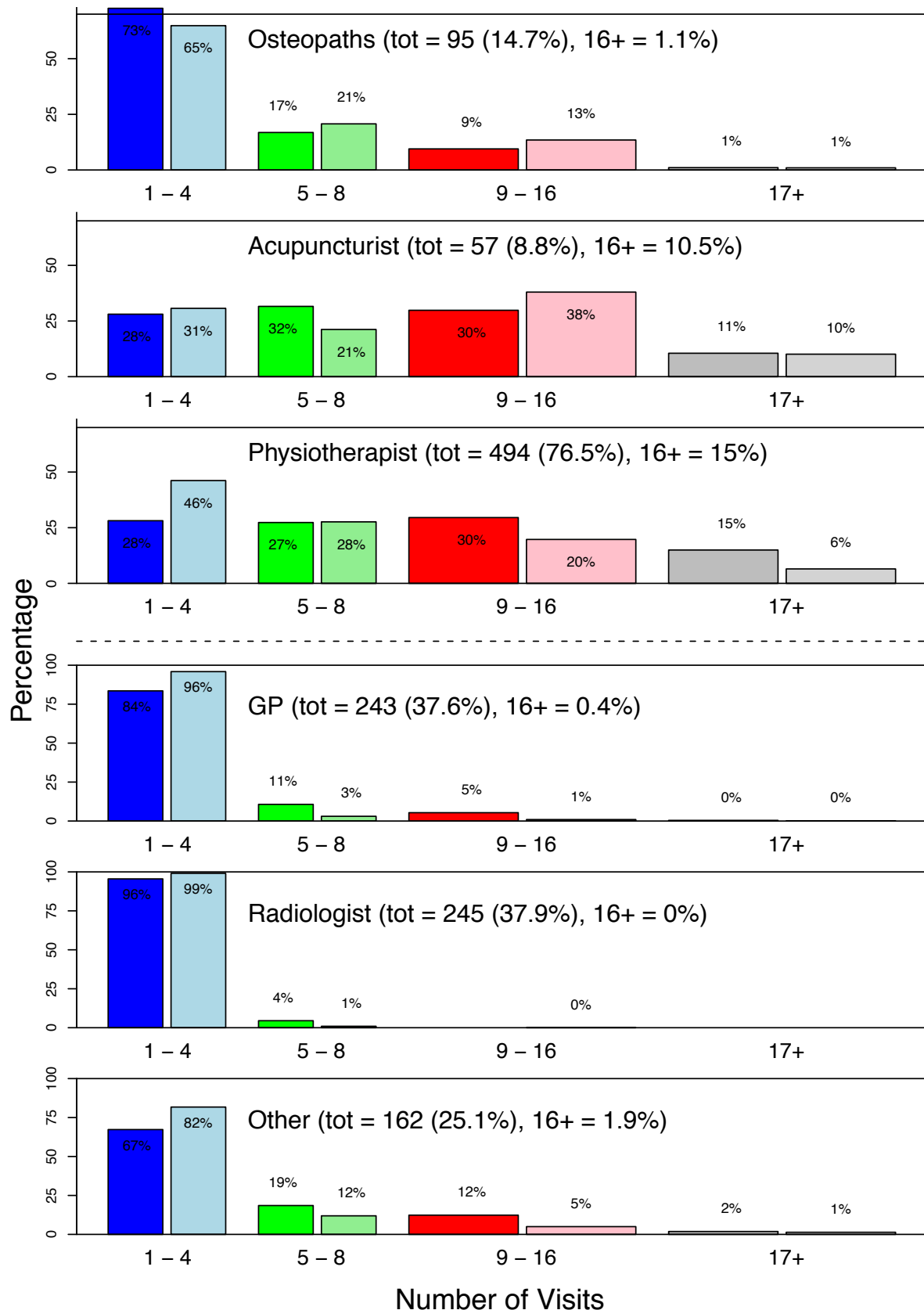


Figure 2.13: Bar chart of proportion of number of visits per claim by profession. Claims using exactly two manual therapists including seeing an Chiropractor for 17 or more visits (lefthand bright coloured bars) are compared to all claims (righthand light coloured bars). The top 3 charts have the same y-axis scale, as do the bottom 3 charts.

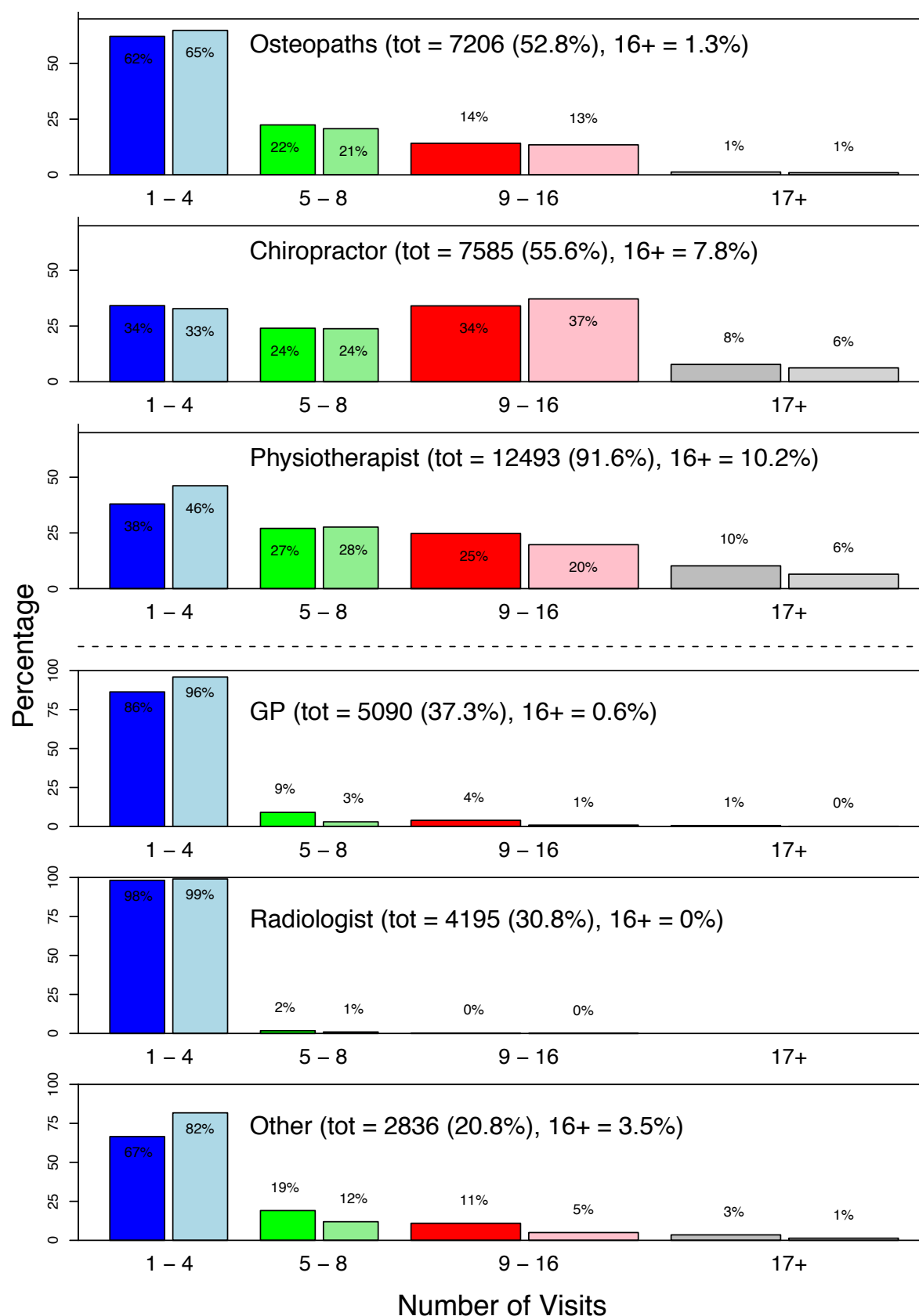


Figure 2.14: Bar chart of proportion of number of visits per claim by profession. Claims using exactly two manual therapists and have not seen an Acupuncturist (lefthand bright coloured bars) are compared to all claims (righthand light coloured bars). The top 3 charts have the same y-axis scale, as do the bottom 3 charts.

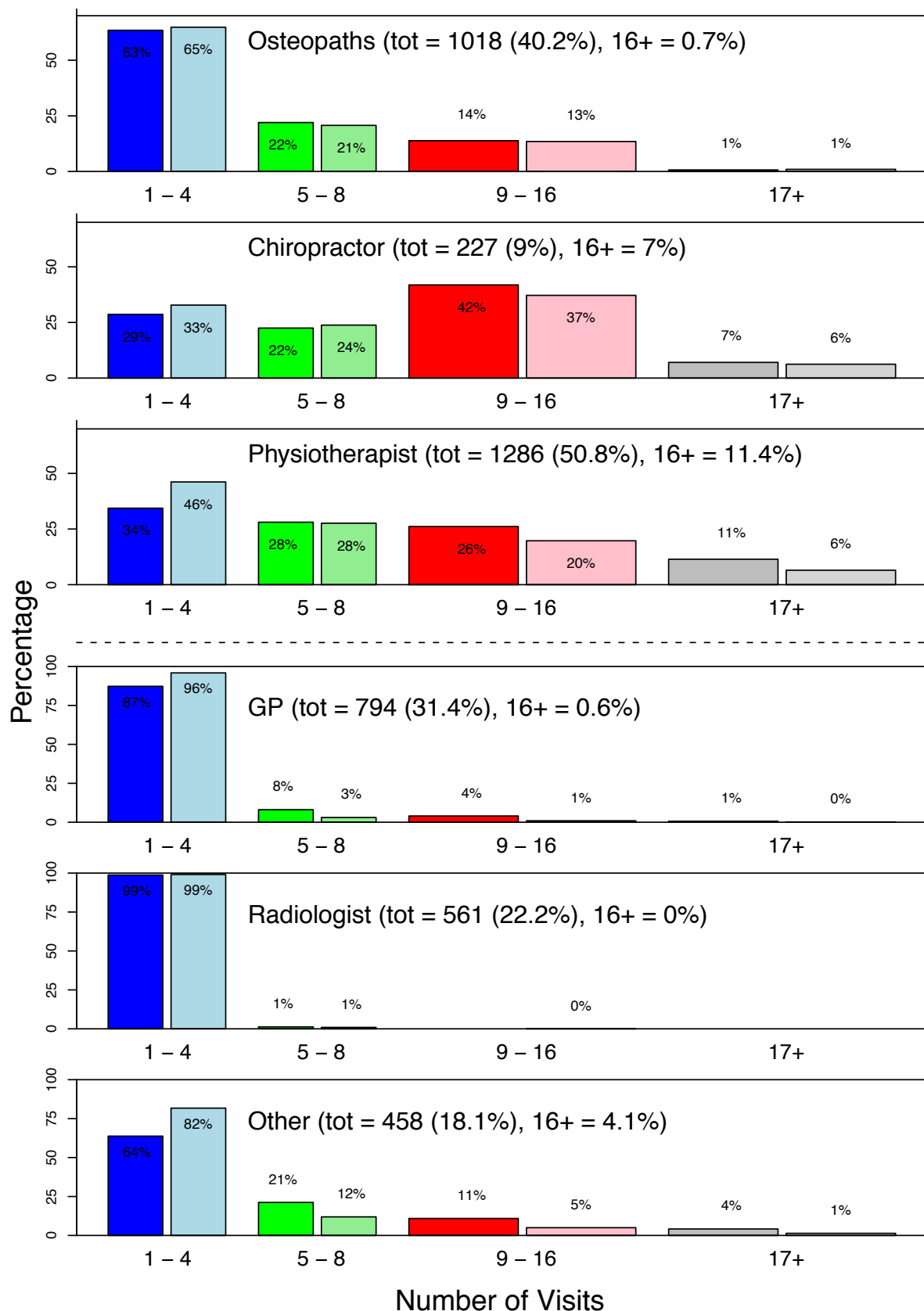


Figure 2.15: Bar chart of proportion of number of visits per claim by profession. Claims using exactly two manual therapists including seeing an Acupuncturist for 1-4 visits (lefthand bright coloured bars) are compared to all claims (righthand light coloured bars). The top 3 charts have the same y-axis scale, as do the bottom 3 charts.

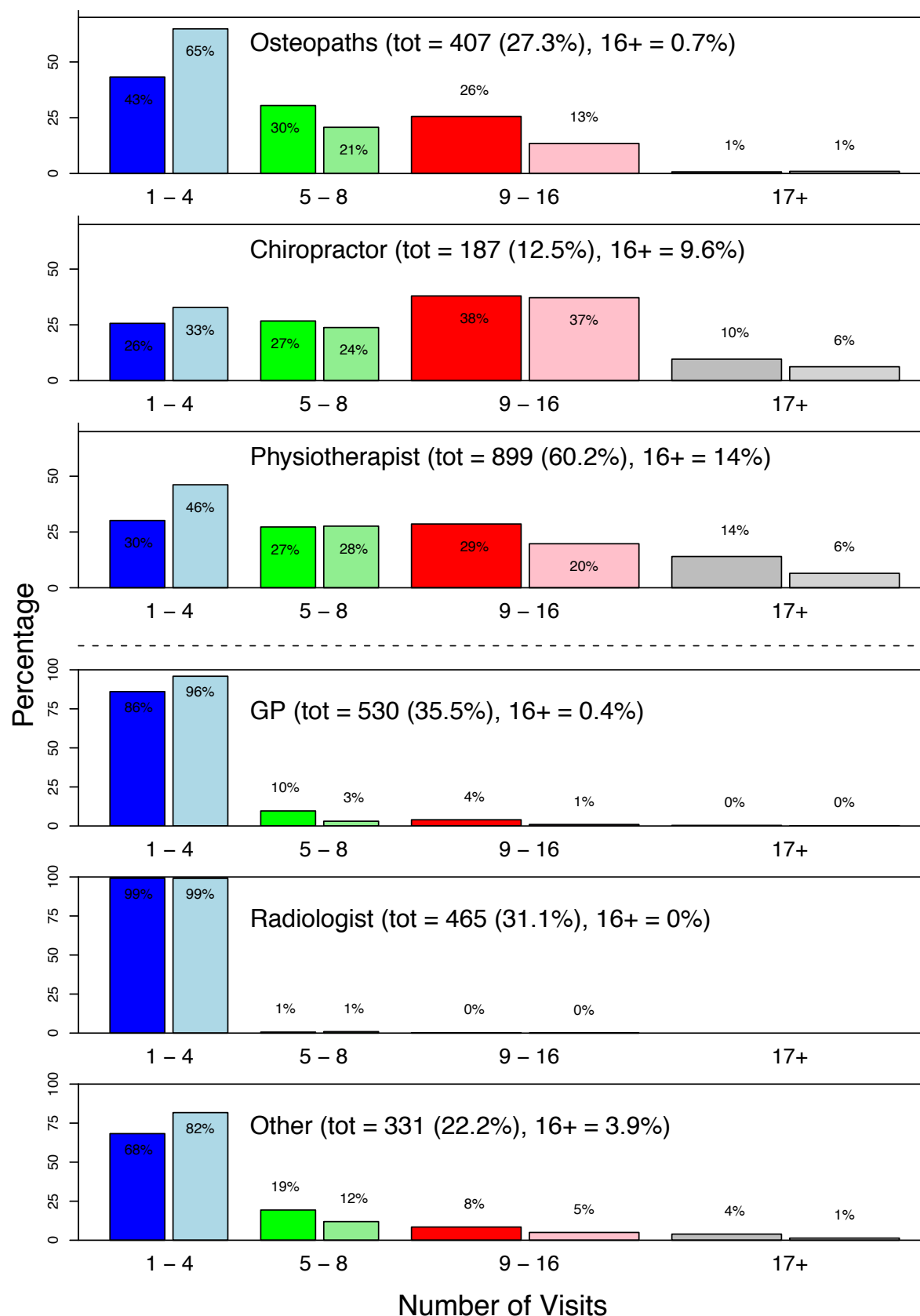


Figure 2.16: Bar chart of proportion of number of visits per claim by profession. Claims using exactly two manual therapists including seeing an Acupuncturist for 5-8 visits (lefthand bright coloured bars) are compared to all claims (righthand light coloured bars). The top 3 charts have the same y-axis scale, as do the bottom 3 charts.

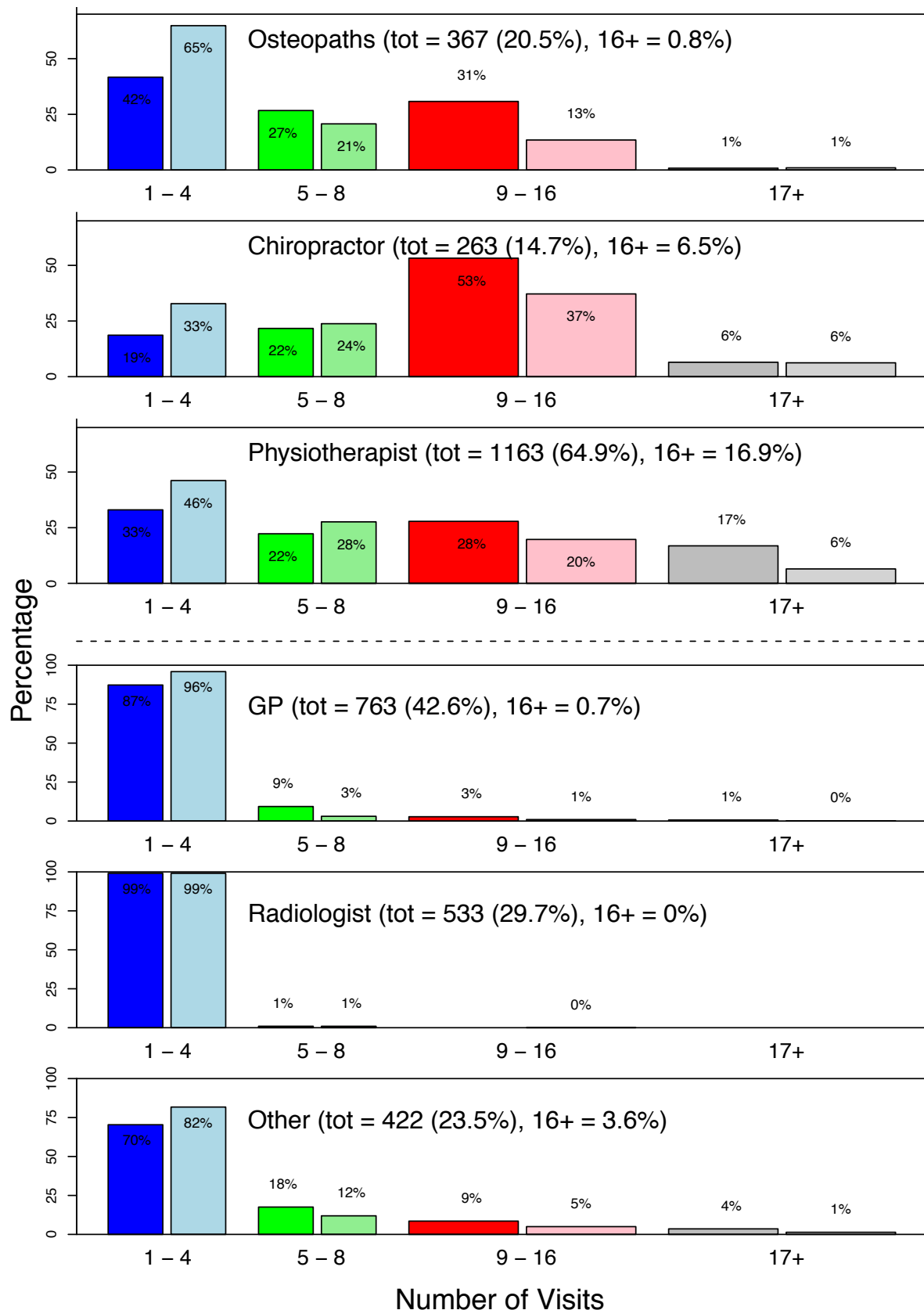


Figure 2.17: Bar chart of proportion of number of visits per claim by profession. Claims using exactly two manual therapists including seeing an Acupuncturist for 9-16 visits (lefthand bright coloured bars) are compared to all claims (righthand light coloured bars). The top 3 charts have the same y-axis scale, as do the bottom 3 charts.

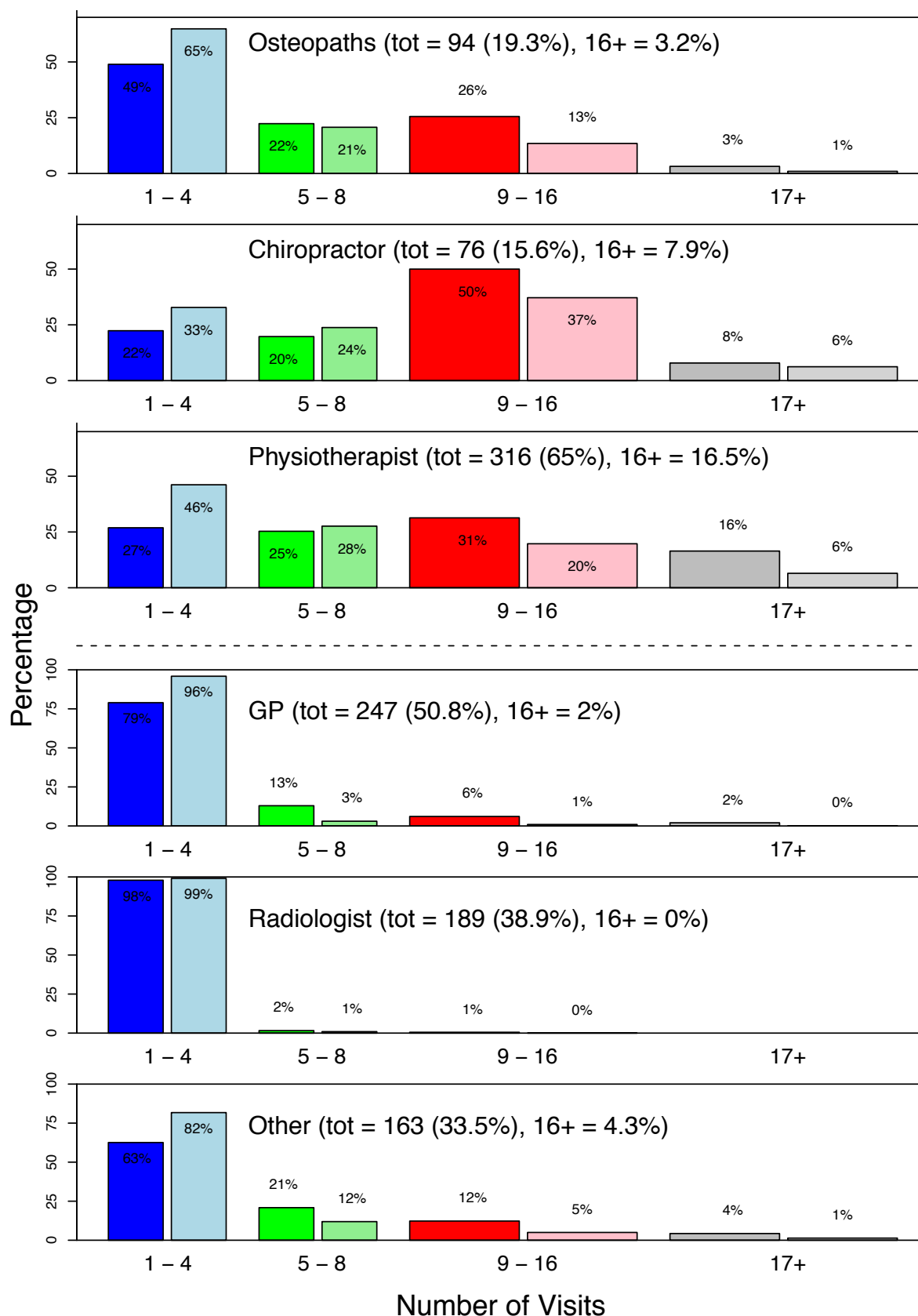


Figure 2.18: Bar chart of proportion of number of visits per claim by profession. Claims using exactly two manual therapists including seeing an Acupuncturist for 17 or more visits (lefthand bright coloured bars) are compared to all claims (righthand light coloured bars). The top 3 charts have the same y-axis scale, as do the bottom 3 charts.

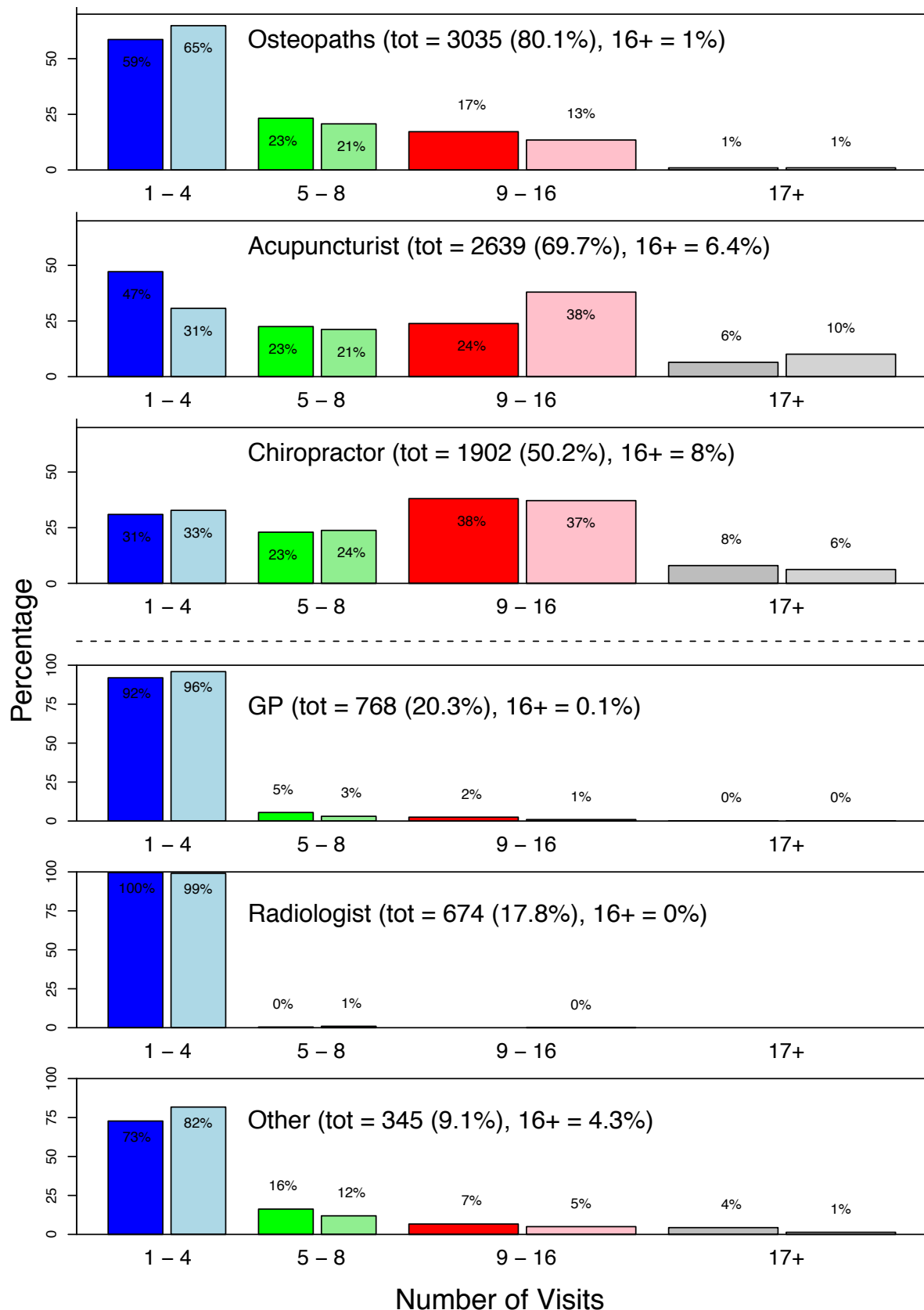


Figure 2.19: Bar chart of proportion of number of visits per claim by profession. Claims using exactly two manual therapists and have not seen an Physiotherapist (lefthand bright coloured bars) are compared to all claims (righthand light coloured bars). The top 3 charts have the same y-axis scale, as do the bottom 3 charts.

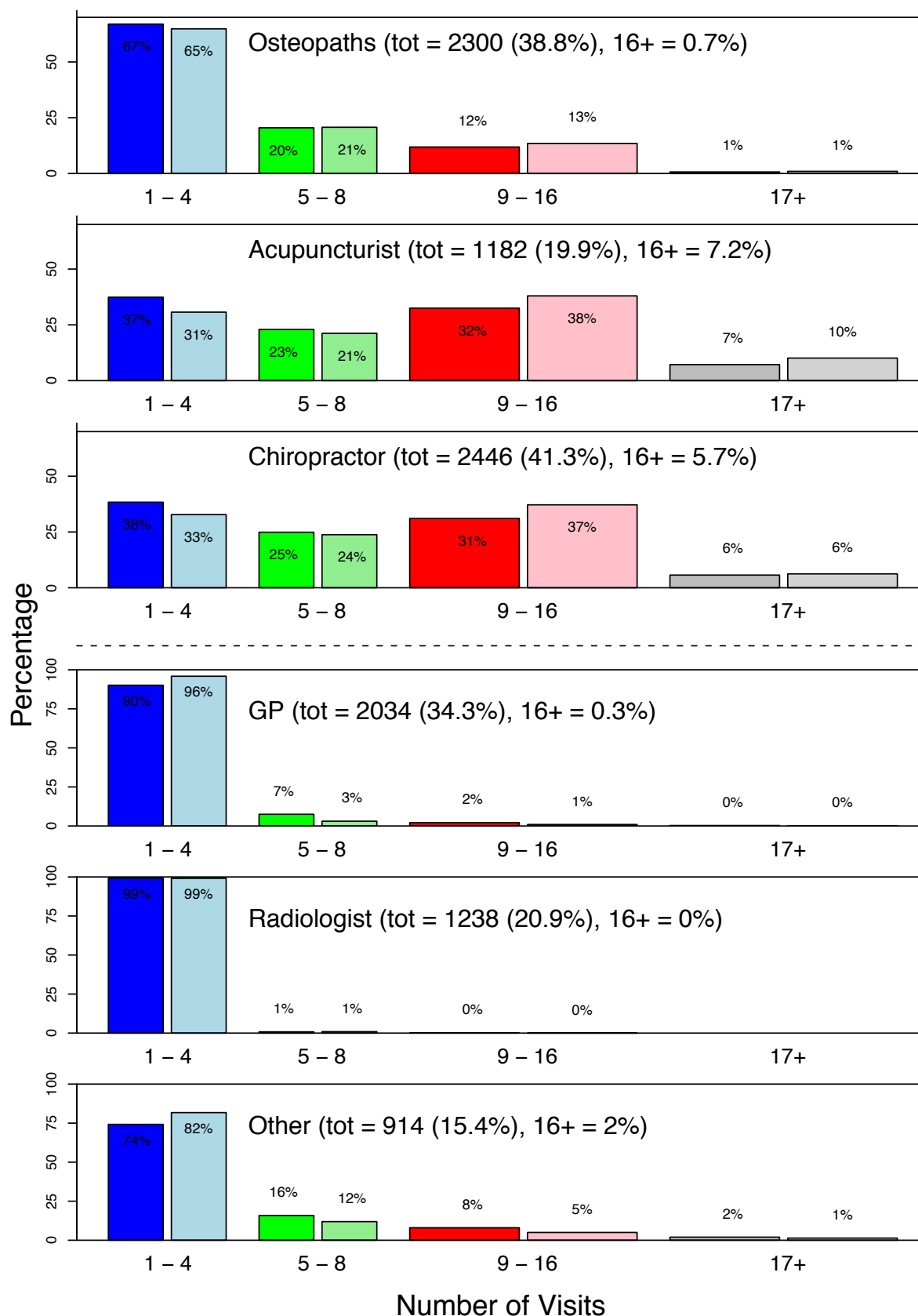


Figure 2.20: Bar chart of proportion of number of visits per claim by profession. Claims using exactly two manual therapists including seeing an Physiotherapist for 1-4 visits (lefthand bright coloured bars) are compared to all claims (righthand light coloured bars). The top 3 charts have the same y-axis scale, as do the bottom 3 charts.

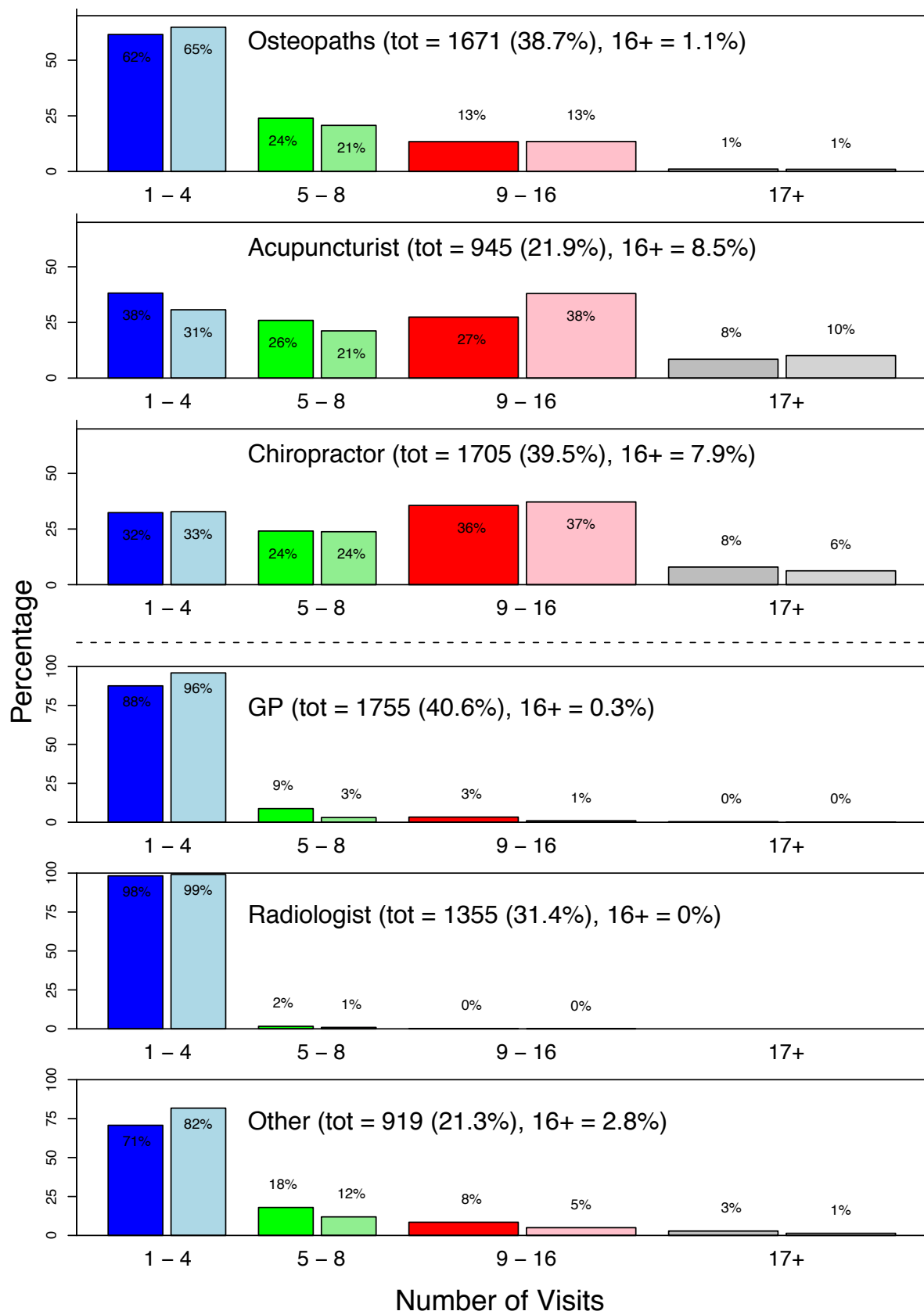


Figure 2.21: Bar chart of proportion of number of visits per claim by profession. Claims using exactly two manual therapists including seeing an Physiotherapist for 5-8 visits (lefthand bright coloured bars) are compared to all claims (righthand light coloured bars). The top 3 charts have the same y-axis scale, as do the bottom 3 charts.

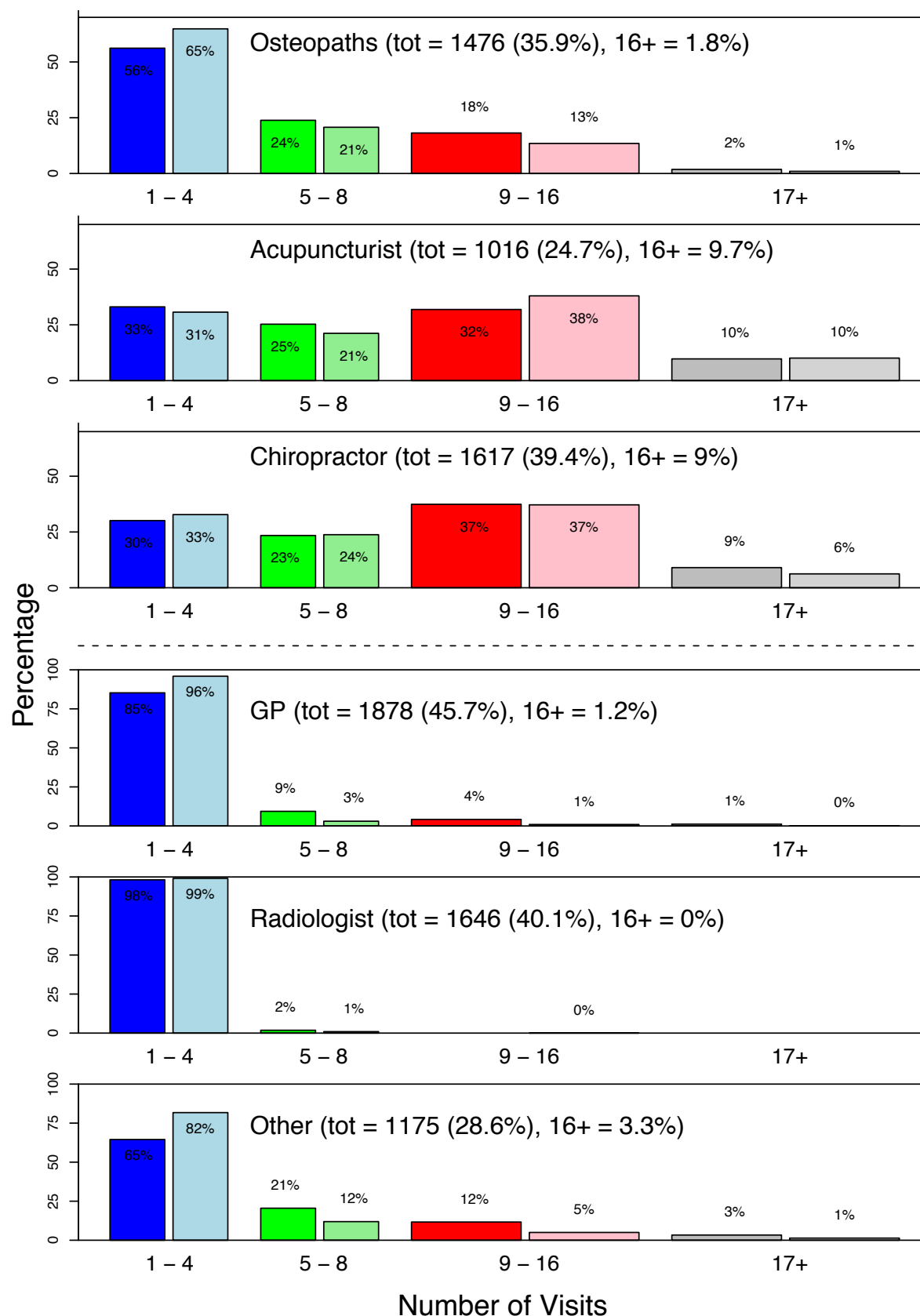


Figure 2.22: Bar chart of proportion of number of visits per claim by profession. Claims using exactly two manual therapists including seeing an Physiotherapist for 9-16 visits (lefthand bright coloured bars) are compared to all claims (righthand light coloured bars). The top 3 charts have the same y-axis scale, as do the bottom 3 charts.

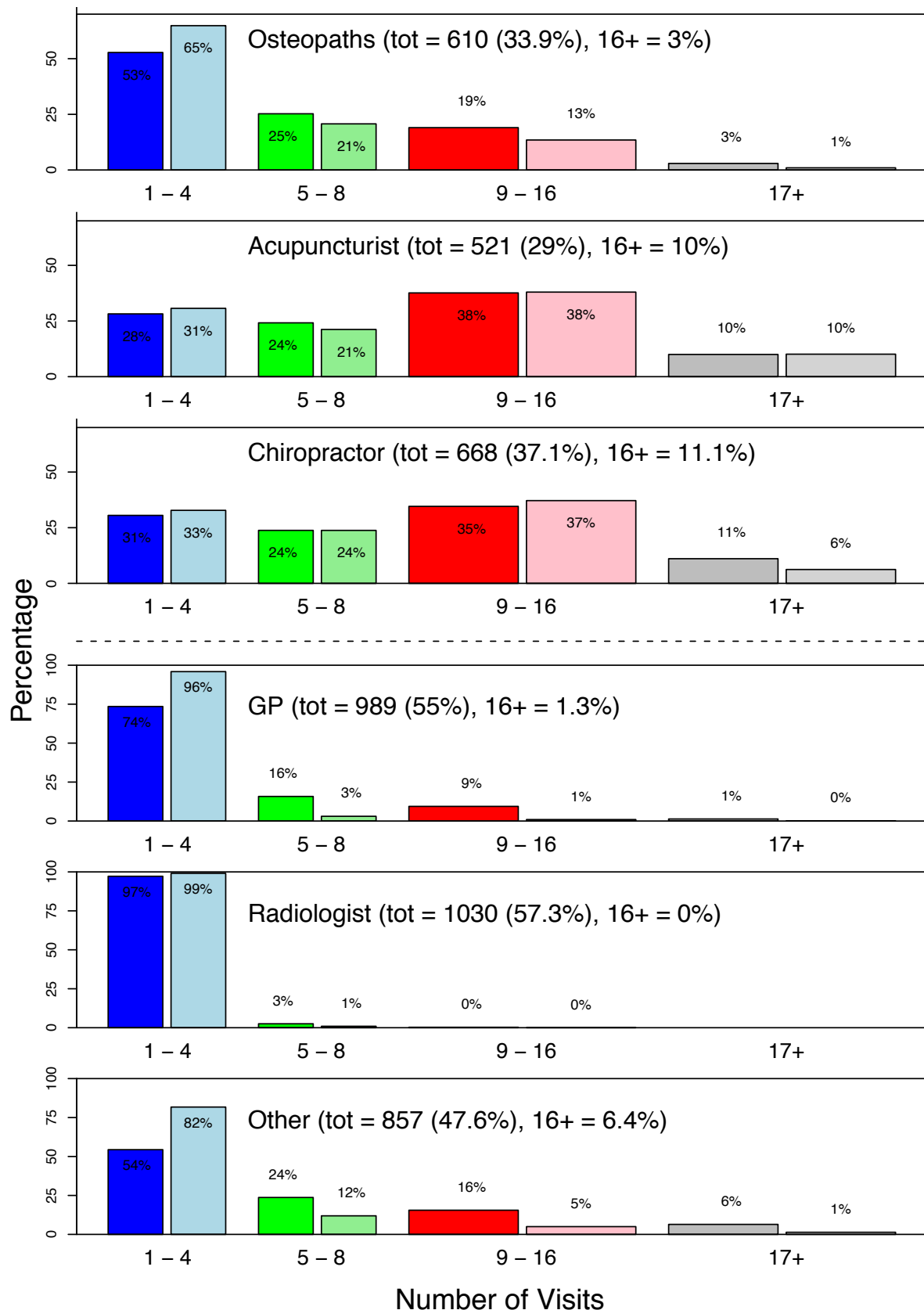


Figure 2.23: Bar chart of proportion of number of visits per claim by profession. Claims using exactly two manual therapists including seeing an Physiotherapist for 17 or more visits (lefthand bright coloured bars) are compared to all claims (righthand light coloured bars). The top 3 charts have the same y-axis scale, as do the bottom 3 charts.